DETAIL PROJECT REPORT

VISHWAKARMA YOJNA: VIII
AN APPROACH TOWARDS RURBANISATION
ZANU -Village

AHMEDABAD - District

PREPARED BY,

STUDENT NAME	BRANCH NAME	ENROLLMENT NO.
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COLLEGE NAME

Ahmedabad Institute of Technology

NODAL OFFICERS NAME

Prof. Tanha Shah

COLLEGE LOGO

YEAR:2020-21

GUJARAT TECHNOLOGICAL UNIVERSITY
Chandkheda, Ahmedabad – 382424 Gujarat

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ON

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CERTIFICATE

This is to certify that the following students of Degree/Diploma Engineering successfully submitted.

Detail Project Report for,

VILLAGE -ZANU

DISTRICT - AHMEDABAD

Under,

Vishwakarma Yojana: Phase-VIII

GUJARAT TECHNOLOGICAL UNIVERSITY, CHANDKHEDA

Impartial fulfillment of the project offered by,
During the academic year 2020-21.

This project work has been carried out by the under our supervision and guidance.

STUDENT NAME	BRANCH NAME	ENROLLMENT NO.
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Date of Report Submission:	
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Internal (Evaluator) Guide Name and Signature:	**Assist. Prof. Sandhya Girish MC.**
College Name:	**Ahmedabad Institute of Technology**
College Stamp:	

ABSTRACT

"Developing village with rural soul but with all urban facilities that a city may have".

Vishwakarma Yojana project and how you do your vision project:

Vishwakarma Yojna is one the initiatives towards rurbanisation by government of Gujarat which was selected as a real time situation type project provide to GTU the student and faculty member meet all the inhabitant of the village, survey the existing accommodations. Then they reimagine and design the whole of the infrastructure of the village. The students use their engineering skills to prepare detailed project report for the infrastructure as the part of their final year project work. By this project, students are experience a real work and able apply own technical knowledge on any real problem. This involves hard work; many students visit to the village and do survey on his specific village.

About your village description:

According to census 2011 information the location code or village code of Zanu village is 511637.Zanu village is located in Daskroi Tehsil of Ahmedabad district in Gujarat, India. It is situated 14km away from Ahmadabad, which is both district & sub-district headquarter of Zanu village. As per 2009 stats, Zanu village is also a gram panchayat. The total geographical area of village is 1070.61 hectares. Zanu has a total population of 4268 peoples. There are about 831 houses in Zanu village. Ahmadabad is nearest town which is located 14km away.

About existing village condition:

There is closed type of drainage system in Zanu. For transportation, there is a bus stand in the main road of village from where buses connecting to the different cities as easily not available. 70-80% of the houses are pucca and rest of the houses are kutcha houses. There is one primary school and four anganwadi. Village is connected with 24-hours electricity supply. The development of city will lead the people to develop their village otherwise there will be more migration towards cities, which will setup RURBAN planning.

About your proposed designs your view for village development:

We decided to plan various six designs for the future development of the village. The six designs are primary health center, village main gate, solid waste management. All this design might help for the village development.

About future scope of the village development:

For future prospect, the village Zanu can use more advanced technologies for agricultural prospect and for another requirement also. They can make the village WI-FI zone and can improve the computer lab in the schools. They can also provide biogas plant in the village. In the future, due to the development of Ahmedabad city the development of the Zanu will increase and the area of the city become spreads so that the allocated village will include in the city area and it will make a portion of the Ahmedabad city.

Key Words: Rurbanisation, Rural soul, Development, Migration

ACKNOWLEDGEMENT

We are highly indented to **Gujarat Technological University**, Ahmedabad for providing us such opportunity to work under Vishwakarma Yojana to get real work experience and applying our technical knowledge in the development of Villages.

We wish to express our deep sense of gratitude to **Prof. (Dr.) Navin Sheth**, **Hon'ble Vice Chancellor, Gujarat Technological University-Ahmedabad**, for his encouragement and giving us the wonderful project.

We also express our gratitude to **Dr. K.N. Kher**, **Registrar, Gujarat Technological University-Ahmedabad** for giving us complete support.

We express our sincere thanks to **Commissionerate of Technical Education, Gujarat State** for appreciating and acknowledging our work.

We express our sincere thanks to **DDO, TDO, Sarpanch, Talatiand staff members of Ahmadabad** District for providing us with requisite data whenever we approached them. Especially our thanks are to all villagers and stake holders for their support during Survey.

We are also thankful to our **Prof**. (**Dr.) Sarda Devi Principal**, faculties of our colleges for their encouragement and support to complete this project work.

An act of gratitude is expressed to our internal guide / Evaluator / Nodal Officer,
Dr./Mr./Mrs. *Sandhya Girish Mc./Mrs. Tanha Shah* from college Ahmedabad Institute of Technology for their invaluable guidance, constant inspiration and active involvement in our project work.

We are also thankful to all the experts who provided us their valuable guidance during the work. We express our sincere thanks to, **Dr. Jayesh Deshkar, Hon'ble Director of Vishwakarma Yojana project and Principal, V.V.P Engineering College and Core Committee member of Vishwakarma Yojana project Prof(Dr.) Jigar Sevalia**, Professor, SCET, Surat, **Prof. K.L. Timani,** Associate Professor, VGEC, **Prof. Rena Shukla**, Associate Professor, LD Engineering College, **Prof. Y.B. Bhavsar,** Associate Professor, VGEC, **Prof. Jagruti Shah**, Assistant Professor, BVM Engineering College for providing us technical knowledge of this project work.

We are also thankful to **Ms. Darshana Chauhan, Vishwakarma Yojana**, for all support during our work. We therefore, take this opportunity for this Project work expressing our deep gratitude and sincere thanks for her cooperation to produce this project work in the present form.

Above all we would like to thank our Parents, family members and Friends for their encouragement and support rendered in completion of the present this work.

CONTENT

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

SHORT NAME /SYMBOL	FULL NAME
APL	Above poverty line
AMTS	Ahmedabad Municipal Transportation service
AUDA	Ahmedabad Urban Development Authority
A.M.C.	Ahmedabad Municipal Corporation
A.D.B.	Asian Development Bank
ATM	Automated Teller Machine
ATMS	Advance Traffic Management System
A.T.V.T.	Appno Taluka Vibrant Taluka
BPL	Below poverty lone
BRTS	Bus Rapid Transit System
BPO	Business process outsourcing

B.O.D.	Biological Oxygen Demand
BOOT	Built Own Operate and Transfer
C.C.	Cement concrete
CAD	Computer Aided Design
CBD	Central Business District
CDP	City Development Plan
CEZS	Coastal Employment Zones
CSR	Corporate social responsibility
CCTV	Closed Circuit Television
CFC	Chloroform Carbon
COD	Chemical Oxygen Demand
CPCB	Central Pollution Control Board
DTH	Door to Door
DHC	District Heating and Cooling
DPP	Desert Development Programmer
DPAP	Drought Prone Area Programmer
DRDA	District Rural Development Agency
ERKC	Energy Research Knowledge Center
FFC	Fourteenth Finance Commission
FR	Feeder Routes
FRP	Fiber Reinforce Plastic
GIFTCL	Gujarat International Finance Tec City Company Limited
GSRTC	Gujarat State Road Transport Corporation
GDP	Gross Domestic Product
GOI	Government of India
GOG	Government of Gujarat
GHB	Gujarat Housing Board
GUDA	Gandhinagar Urban Development Agency
GSM	Global System of Mobile
GEB	Gujarat Electric Board
G.L. / L.L. / S.L.	Ground Level/ Lintel Level / Slab Level
HARIDAY	National Heritage City Development and Augmentation Yojana
HDPE	High density Polyethylene.
IL&FS	Infrastructure Leasing and Financial Services Limited
ITI	Industrial Training Center
IAY	Indira Awaas Yojana
ICDC	Integrated child development center
ICAP	Integrated Cluster action Plan
IRDP	Integrated Rural Development Programmer
ICT	Information and Communication Technology
ITDP	Integrated Tribal development Programmer

IMIS	Integrated Management Information System
IEC	Information, Education and Communication
IPC	Interpersonal Communication.
JN NURM	Jawaharlal Nehru National Urban Renewal Mission
KPO	Knowledge process outsourcing
KLD	Kilo Liter per Day
KV	Kilovolt
LED	Liquid Emitting Display
MLD	Million Liter per day
MFAL	Marginal farmers and Agricultural Labours Agencies
NRUM	National Rurban mission
MDWS	Ministry of Drinking Water and Sanitation
MSW	Municipal Solid waste
NGO	Non-Government Organization
NWDA	National Water Development Agency
NIIF	National Investment and Infrastructure Fund
NRI	Nonresident Indian
NREP	National Rural Employment Programmer
OHWT	Over Head Water Tank
PDS	Public distribution system
PPP	Public Private Partnership
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
PMSAGY	Pradhan Mantri Sansad Adarsh Gram Yojana
PTC	Primary Teacher Certificate
R.O.	River's osmosis
R.C.C.	Reinforce Cement Concrete
SC	Scheduled Caste
ST	Scheduled Tribe
SFDA	Small Farmers Development Agencies
SAGY	Sansad Adarsh Gram Yojana
TOD	Transit oriented development
TRYSEM	Training of a Rural Youth for Self-Employment
UGWT	Under Ground Water Tank
ULB	Urban Local Body
UF	Ultrafiltration
URDPFI	Urban & Regional Development Plan Formulation and Implementation
WI-FI	Wireless Fidelity
URDPFI	Urban and regional development plans formulation and implementation
FE500	Ferrous steel (strength 500 N/mm2)

Chapter 1: Ideal village (VAHELAL)Visit from district of Gujarat state

Introduction: -

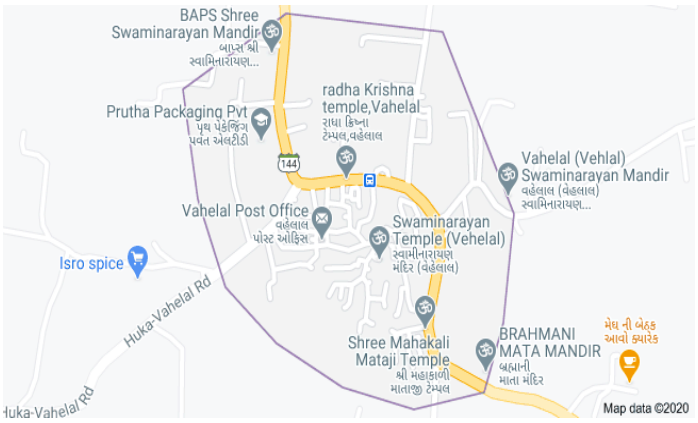
- Vahelal village is located in Daskroi Tehsil of Ahmadabad district in Gujarat, India. It is situated 25km away from Ahmadabad, which is both district & sub-district headquarter of Vahelal village.
- As per 2009 stats, Vahelal village is also a gram panchayat. The total geographical area of village is 794.93 hectares.

1.1 Background: -

- Vishwakarma Yojana provide the benefits of real work experience to engineering students and simultaneously apply their technical knowledge in the development of infrastructure in rural development.
- this scheme, the villages are surveyed and this project was identified and selected for implementation. Rurbanisation is to bring peace of mind to the villagers by providing them the basic amenities required and still keeping the village soul.
- This project gives one new idea for Development of rural villages. Also gives procedure how they fulfill needs of the villages.
- As a measure to strengthen the Panchayat Raj Institutions in terms of functions, powers and finance. Gram Sabha, NGOs, Self-Help Groups have been accorded adequate role to make participatory democracy meaningful and effective.
- By this Vishwakarma Yojana project government want technical solution of the problem of villages at the engineering point of view.

Study Area Location: -

- According to Census 2011 information the location code or village code of Vahelal village is 511634.
- Vahelal village is located in Daskroi Tehsil of Ahmadabad district in Gujarat, India.
- It is situated 25km away from Ahmadabad, which is both district & sub-district headquarter of Vahelal village.
- per 2009 stats, Vahelal village is also a gram panchayat.
- Village: Vahelal,
- Taluka: Daskroi
- State: Gujarat
- Pin code: 382330
- Language: Gujarati, Hindi, English



1.2 Concept: Ideal village: -

- This ideal village has good system of sanitation and drainage. Because filth and rubbish of the village should be regularly removed away into the compost pits.
- An ideal village has very good drain system so that the dirty water of the village is properly drained away.

House:

- The residence/house in an ideal village are very neat and clean. The owners of these houses look to the house sanitation and house-drainage.
- The houses have sufficient windows to let in air and light**.**

Agriculture:

- People of an ideal village are good farmers and good in nature. They grow food crops and seasonal crops etc.
- Now they improved method of farming for more production of crops.

Educational facilities:

- There are Primary schools and High schools in an ideal village. Primary education is free and compulsory.

Medical facilities:

- In an ideal village, there are clinical facilities for villagers and animals. Hence, there are lots of dispensaries.

Other facilities:

- We can find post-office, public library, playground, garden, Skill Development Centre etc. there.
- People: People of an ideal village are very neat and clean. They have a sense of discipline and collaboration.
- They have a spirit of service and let go.

Conclusion: -

- An ideal village makes all possible provision for development of her people.
- It is our main duty that we should develop every village of India to much higher level.
- The idea of an ideal village will certainly help us in discharge our duty.

1.2.1 Objectives: -

1.) The development of model villages, called ideal /smart villages, through the implementation of existing schemes, and certain new initiatives to be designed for the local context, which may vary from village to village.

2.) Creating models of local development which can be example of other villages.

3.) Provide easier, faster and cheaper access to urban market for agricultural produce or other marketable commodities produce in such villages.

4.) Create and sustain a culture of cooperative living for inclusive and rapid development.

1.2.2 Live case studies of ideal village of Gujarat: -

- According to Census 2011 information the location code or village code of Vahelal village is 511634.
- Vahelal village is located in Daskroi Tehsil of Ahmadabad district in Gujarat, India. It is situated 25km away from Ahmadabad, which is both district & sub-district headquarter of Vahelal village.

- As per 2009 stats, Vahelal village is also a gram panchayat.

Table 1. Vahelal

Gram panchayat- Vahelal, Tehsil- Daskroi, District- Ahmedabad, State- Gujarat, Pin code-382330, Area-794.93 hectares, Population-3,074, Household-684, Nearest town- Ahmedabad (25km)

1. **Dharnai (Bihar) First fully solar powered village:**

- Dharnai, a village in Bihar, beat 30 years of darkness by developing its own solar-powered system for electricity.
- Dharnai declared itself an energy-independent village in July. Students no long need to limit their studies to the day time, women no longer limit themselves to stepping out in the day in this village of 2400 residents.

2. **Pothanikkad (Kerala) The village with 100% literacy rate:**

- Unsurprisingly in Kerala, Pothanikkad village was the first in the country to achieve a 100% literacy rate.
- Not only does the village boast of city-standard high- schools, but it also has primary schools and private schools.
- Guess the number of people the village has educated? Well, per the 2001 census there are 17563 residents living in the village.

3. **Mawlynnong (Meghalaya) Asia's cleanest village:**

- Mawlynnong, a small village in Meghalaya, was awarded the prestigious tag of 'Cleanest village in Asia' in 2003 by Discover India Magazine.
- Located at about 90 Km from Shillong, the village offers a sky walk for you to take in the beauty as you explore it.
- According to visitors, you cannot find a single cigarette butt/plastic bag lying around there.

1.2.3 The idea of an Ideal village/Smart village: -

- India is a country of villages, where more the 68 % of the total population residue in villages.
- As said, 'India lives in its villages' Mahatma or 'India's soul is in villages', which is the backbone of an Indian culture.
- Agriculture is practiced in the country from antiquity (from Harappa Civilization) where, communities settled and civilized structure of villages evolved.
- However, even after the collapse of such progressed civilizations, villages continued to exist and flourish through rich heritage and traditional practices.
- Now a day's urbanization has taken place on a big scale. Only due to lack of facilities and sources in villages.
- It was the dream of Mahatma Gandhi to make the Indian villages smarter and ideal/model by improving them in all aspects like physical, economic and social etc.…

- The concept of smartness is popular in respect and honor of human development regardless of rural or urban area, literate or illiterate in all country and India is not omission to it.
  - The ideas of ―smart village will also attention to multiple challenges such as unplanned urbanization, under development of village and smart villages
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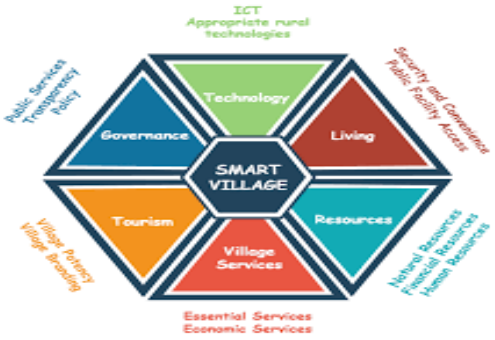


What is smart village?

In smart village access sustainable energy services acts as a catalyst for development –enabling the provision of good education and health care, access to clean water, sanitation and nutrition, the growth of productive enterprise to boost income and enhanced security.

Objectives of Ideal village: -

- To study the existing growth, characteristics and development of villages.
- To study how to improve drainage and sanitation systems.
- To study the future developing and growth scenario of village.
- To analyze all feasibility parameters and relevant factors for sustainable development of villages.
- To study the existing infrastructure facilities and its management issues phasing by villages.
- Creating models of local development which can be example of other villages.

- Provide easier, faster and cheaper access to urban markets for agricultural produce or other marketable commodities produced in such villages.

1.2.4 Ancient History civil: -

- It is difficult to determine the history of emergence and beginning of civil engineering.
- Man used the old shelter caves to protect themselves of weather and harsh environment, and used a tree trunk to cross the river, which being the demonstration of ancient age civil engineering.
- Ancient historic civil engineering constructions include the water management system.
- The Romans developed civil structures throughout their empire, including especially aqueducts, insulae, harbors, bridges, dams and roads.

1.3 Detail Study: -

Social Details: -

- We have found that all villagers of this village are much connect with today technology environment and working area.

Physical Details: -

- According to Census 2011 information the location code or village code of Vahelal village is 511634. Vahelal village is located in Daskroi Tehsil of Ahmadabad district in Gujarat, India. It is situated 25km away from Ahmadabad, which is both district & sub-district headquarter of Vahelal village. As per 2009 stats, Vahelal village is also a gram panchayat.
- The total geographical area of village is 794.93 hectares. Vahelal has a total population of 3,074 peoples. There are about 684 houses in Vahelal village. Ahmadabad is nearest town to Vahelal which is approximately 25km away.

Demographic Details: -

Table 2. Population of VAHELAL

Sr. No.	Census	Population	Male	Female
1.)	2011	3074	1560	1514

Infrastructure Details: -

The village is developed during recent years very efficiently. The village has basic physical amenities like, Sanitation facilities, Education, Post office, Drainage system, CC Roads, Street lights, Anganwadi, Community hall.

Economic Details: -

Table 3. Economic Details

Name of three major occupation groups in village: -
Farming - 70%, Production of food items - 30%, Jobs in Ahmedabad - 10%

1.4 SWOT Analysis of Ideal village: -

Strength	Weakness	Opportunities	Threats
Proper Drainage facilities.	Unproper disposal of waste	Improving in waste management	Lack of awareness of villagers about cleaning.
Transportation facilities	Unproper layout of village	Women empowerment	Lack of wastage of garbage's.
Sanitation facilities	No facilities for higher education	Educational awareness	Lack of funds and technical knowledge in agriculture.

1.5 Future prospects of development of the ideal village: -

- For future prospect, the village VAHELAL can use more advanced technologies for agricultural prospect and for other requirements also.
- They can make the village WIFI zone and can improve the computer lab in the schools. They can also provide biogas plant in the village. In the future, due to the development of Ahmedabad city the development of the VAHELAL will increase and the area of the city become spreads so that the allocated village will include in the city area and it will make a portion of the Ahmedabad city.

1.6 Benefits of the visit of Ideal village: -

- We visited VAHELAL village, Ahmedabad. By the visit of the village VAHELAL, we got an idea about an ideal village.
- We had seen much kind of new technologies which can be used in village that are being used in the urban area. By this visit of this village, it has improved our communication skills and we knew how to interact with the different peoples.
- To improvement allocated village.
- To understand allocated village condition.
- Pollution-free environment in villages.
- Cost of living is extremely low in villages.
- There are more avenues for social life
- To get comparison of ideal and allocated village.
- We got some new idea and references to develop our allocated village.

Social Security: -

- Total no. of eligible beneficiaries under Aayushman Bharat-Pradhan Mantri Jan Arogya Yojana or any State Govt Health scheme.
- Total no of eligible beneficiaries under Pradhan Mantri Matru Vandana Yojana.
- Total number of eligible households under National Food Security Act (NFSA).
- Total number of farmers registered under Pradhan Mantri Kisan Pension Yojana (PMKPY).
- Total number of farmers in the age of 18-40 years subscribed to Pradhan Mantri Kisan Pension Yojana (PMKPY).

Health and Nutrition: -

- Total number of children (0-6 years) immunized under ICDS.
- No of pregnant women receiving services under ICDS.
- Total no of women delivered babies at the hospitals who are registered with ASHA Anganwadi workers.
- No of young anemic children in ICDS Common Application Software (6-59 months).

Good Governance: -

- No of elected representatives undergone refresher training under Rashtriya Gram Swaraj Abhiyan.
- Total area covered under irrigation (drip, sprinkler), If in acres divide by 2.47
- Total expenditure approved under NRM in the Labour Budget for the year 2018-19)

Chapter 2: About Village: -

2.1. Introduction: -

- Based on the density of population, development, amenities, employment opportunities, education etc. human settlement is majorly divided into two categories i.e., "Urban and Rural"

URBAN: -

- Urban refers to a human settlement where the rate of urbanization and industrialization is high, urban area are highly populated.

RURAL: -

- Rural settlement is one where the rate of urbanization is quite slow, rural areas have comparatively less population than the urban areas.

Table 2.1: Area wise Population

Name & Population – City-50000 to 100000, Great city- 100000 and over, Super City-More than 300000, Metro polis-1000000 and above, Mega polis-5000000 and above.

2.2. Importance of rural development: -

Importance: -

- The National Rurban Mission (NRuM) follows the vision of "Development of a cluster of villages that preserve and nurture the essence of rural community life with focus on equity and inclusiveness without compromising with the facilities perceived to be essentially urban in nature, thus creating a cluster of "Rurban Villages".
- The objective of the National Rurban Mission (NRuM) is to stimulate local economic development, enhance basic services, and create well planned Rurban clusters.
- Bridging the rural-urban divide viz: economic, technological and those related to facilities and services.
- Attracting investment in rural areas.
- Stimulating local economic development with emphasis on reduction of poverty and unemployment in rural areas.
- Spreading development in the region.

Rural development is the national necessity and it has following measures:

- To develop rural area as whole in terms of culture, society, economy, technology and health.
- To develop living slandered of rural mass.
- To develop rural youths, children and women.
- To develop and empower human resource of rural area in terms of their psychology, skill, knowledge, attitude and other abilities.
- To develop infrastructure facility of rural area.

- To provide minimum facility to rural mass in terms of drinking water, education, transport, electricity and communication.
- To develop rural institutions like Panchayat, cooperatives, post, banking and credit.
- To provide financial assist to develop the artisans in the rural areas, farmers and agrarian unskilled labor, small and big rural entrepreneurs to improve their economy.
- To develop rural industries through the development of handicrafts, small scaled industries, village industries, rural crafts, cottage industries and other related economic operations in the rural sector.
- To develop agriculture, animal husbandry and other agricultural related areas.
- To restore uncultivated land, provide irrigation facilities and motivate farmers to adopt improved seed, fertilizers, package of practices of crop cultivation and soil conservation methods.

2.3. Ancient Villages: -

- A village is a clustered human settlement or community, larger, than a hamlet but smaller than a town, with a population ranging from a few hundred to a few thousand.
- Though villages are often located in rural areas, the term urban village is also applied to certain urban neighborhoods.

RURAL VILLAGES:

- The basic unit for rural areas is the revenue village. In a rural area, there are fewer people, and their homes and businesses are located far away from one another. Agriculture is the primary industry in most rural areas. Most people live or work on farms or ranches.

URBAN VILLAGES:

- In urban planning and design, an urban village is an urban development typically characterized by medium density housing, mixed use zoning, good public transit and an emphasis on pedestrianization and public space.

2.4. Scenario: Rural / Urban Village of Indian Population Growth: -

- Agenda of census of India is to release of provisional population totals-Rural urban distribution. Population of Rural and Urban area (in crore).

Table 4. Population of Rural and Urban areas as per census

	2001	2011	Difference
India	102.9	121.0	18.1
Rural	74.3	83.3	9.0
Urban	28.6	37.7	9.1

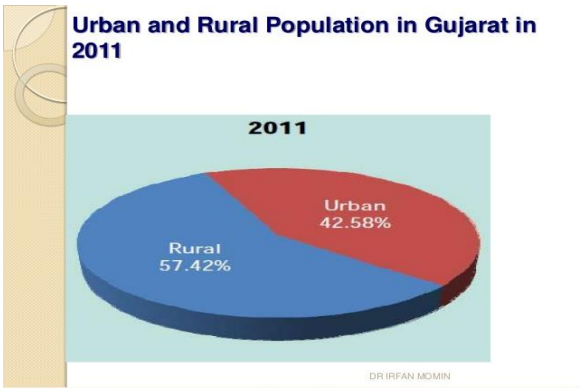
For the first in since independence, the absolute increase in population is more in urban areas that in rural areas.

Rural-Urban Distribution: 68.84% & 31.16 Level of urbanization increased from 27.81% in 2001 census to 31.16% in 2011.

Literacy rates (in %)

Table 5. Literacy Rates in Rural and Urban areas as per the male and female

	2001	2011	Difference
Male			
India	75.3	82.1	+6.8
Rural	70.7	78.6	+7.9
Urban	86.3	89.7	+3.4
Female			
India	53.7	65.5	+11.8
Rural	46.1	58.8	+12.7
Urban	72.9	79.9	+7.0



Gujarat Census: -

Description	Rural	Urban
Population Growth	9.31 %	36.00 %
Sex Ratio	949	880
Child Sex Ratio (0-6)	914	852
Child Population (0-6)	4,824,903	2,952,359

2.5. Scenario: Rural / Urban Village of Gijarat as per Census of 2011 and latest: -

For the first time since Independence, the absolute increase in population is more in urban areas that in rural areas,

Rural – Urban distribution: 68.84% & 31.16% Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census. The proportion of rural population declined from 72.19% to 68.84%The slowing down of the overall growth rate of population is due to the sharp decline in the growth rate in rural areas, while the growth rate in urban areas remains almost the same. The improvement in overall sex ratio is largely in urban areas Though the Urban Child sex ratio is far worse than in the rural areas, the fall in Child sex ratio in rural areas is around 4 times that in urban areas. In fact, the decline is more gradual in urban areas. There is a decline of 8.9 million children in Rural areas, while in Urban areas has shown increase of 3.9 million.

2.6 Rural Development issues and concerns: -

Following issues are concern with rural areas:

- People are directly or indirectly dependent on agriculture and a large number of landowners have small and medium-sized landholding.
- Economy of the people living in rural areas is low.
- The price the farmers get for their produces less than in relation to the work they put in.
- People have to migrate to the urban areas due to unavailability of education.
- The other rural problems are due to the fact that since the rural people do not live-in concentrated masses, the availability of specialized service to them is minimum.

- Very less people are employed in the rural areas.
- Lack of physical facilities in rural areas.
- Lack of recreational facilities.
- Farmers are not having market area for selling their goods directly to the market.
- Lower living standards.
- No transportation facility.
- Less awareness.
- Less income opportunity.

2.7 Various Infrastructure guidelines/ norms for village for the provisions of different infrastructure facilities: -

Here is a look at how different sections of rural infrastructure play their role in improving the rural economy as well as life of the people...

1. Rural road infrastructure: It provides mobility and connectivity to people living in rural areas. It also provides the much-needed boost to agricultural activities by making available water, seeds and other raw materials to the farmers. By improving connectivity, rural roads also enhance employment opportunities for the rural people in non-agriculture sector, thereby, increasing livelihood opportunities. Rural roads also ensure that the rural areas are served with better public services and all the benefits offered by the state reach the far-flung areas easily. They can even provide access to education and health services.

2. Rural electrification infrastructure: It basically caters well to the requirements of agriculture and other activities including irrigation pump sets, small and medium industries, khadi and village industries, cold storage chains, healthcare and education

3. Rural water supply system: It can lead to sustainability of systems and sources and tackle the problem of water quality, thereby, increasing good health of people.

4. Rural housing infrastructure: It has the potential to improve living standard of the people.

Overall and as per various studies, development of rural power, irrigation, water, sanitation and road infrastructure can increase productivity, savings, income and tourism and result in better jobs and health of rural people.

2.8. Ancient study as Literature Review for village development: -

- Sustainable development is the organizing principle for sustaining finite resources necessary to provide for the needs of future generations of life on the planet.
- It is a process that envisions a desirable future state for human societies in which living conditions and resource-use continue to meet human needs without undermining the "integrity stability and beauty" of natural biotic systems.
- Sustainable development is a process for meeting human development goals while sustaining the ability of natural systems to continue to provide the natural resources and ecosystem services upon which the economy and society depend.

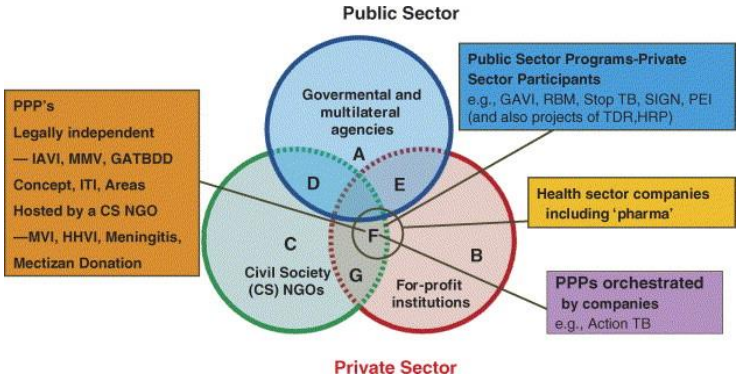
- While the modern concept of sustainable development is derived most strongly from the 1987 Brundtland Report, it is rooted in earlier ideas about sustainable forest management and twentieth century environmental concerns. As the concept developed, it has shifted to focus more on economic development, social development and environmental protection.

2.9 Other Projects / Schemes: -

- In other projects for the development of the rural area is the Public Private Partnership (PPP).

❖ Public-Private-Partnership - The Concept:

- Public-private partnerships involve collaboration between a government agency and a private-sector company that can be used to finance, build, and operate projects, such as public transportation networks, parks, and convention centers.
- Financing a project through a public-private partnership can allow a project to be completed sooner or make it a possibility in the first place.
- Public-private partnerships often involve concessions of tax or other operating revenue, protection from liability, or partial ownership rights over nominally public services and property to private sector, for-profit entities.

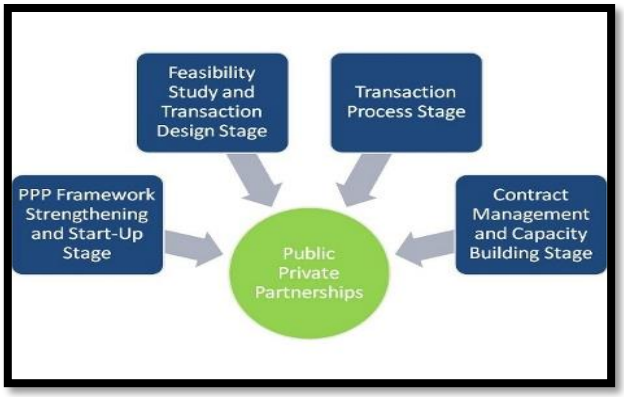


The potential benefits expected from PPP could be mentioned as below:

- Cost-effectiveness- since selection of the developer/ service provider depends on competition or some bench marking, the project is generally more cost effective than before.
- Higher Productivity-by linking payments to performance, productivity gains may be expected within the programmer/project.

Accelerated Delivery– since the contracts generally have incentive and penalty clauses is implementation of capital projects/programmers this leads to accelerated delivery of projects. Clear Customer Focus- the shift in focus from service inputs to outputs create the scope for innovation in service delivery and enhance customer satisfaction.

- Enhanced Social Service- social services to the mentally ill, disabled children and delinquents etc. require a great deal of commitment than sheer professionalism. In such cases, it is Community/Voluntary Organizations (VOs) with dedicated volunteers who alone can provide the requisite relief.



Chapter 3. Smart Village Concept: -

3.1 Introduction smart cities: -

Concept

- In Smart villages access to sustainable energy services acts as a catalyst for Development – enabling the provision of good education and healthcare, access to clean water, sanitation and nutrition, the growth of productive enterprises to boost Incomes, and enhanced security, gender equality and democratic engagement.

Definition

- Smart village means all the necessaries facilities is developed in the village and no need to moves in city for any kind of requirement.

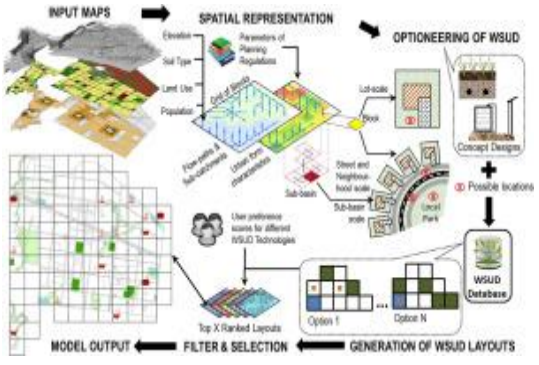
3.2 Vision-Goals, Standard and Performance Measurement Indicators: -

A. Transport

- Maximum travel time of 30 minutes in small & medium size cities and 45 minutes in metropolitan areas.
- Continuous unobstructed footpath for 2 m wide on either side of all street with Row 12 m more.
- Dedicated and physically segregated bicycle tracks with width of 2 m or more, one in each direction, should be provided on all streets with carriage way larger than 10 m.
- High quality and high frequency mass transport within 800 m (10-15-minute walking distance) of all residences in areas over 175persons / ha of built area.

B. Spatial Planning

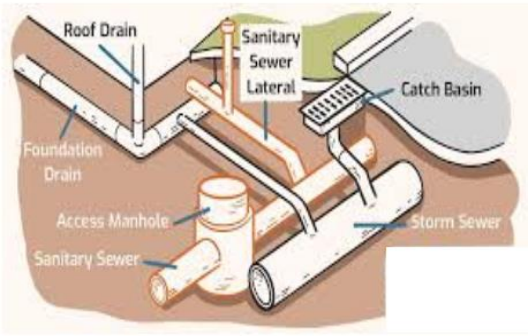
- 175 persons per Ha along transit corridors.
- 95% of residences should have daily needs retail, parks, primary schools and recreational areas accessible within 400m walking distance.
- 95% residences should have access to employment and public and institutional transport or bicycle or walk.
- At least 20% of all residential units to be occupied by economically weaker sections in each Transit Oriented Development Zone 800m from transits.
- At least 30% residential and 30 commercial / institutional in every TOD Zone within 800m of Transit Stations.



C. Water Supply

- 24 x 7 supply of water.
- 100% household with direct water supply connections.
- 135 liters of per capita supply of water.
- 100% metering of water connections
- 100% efficiency in collection of water related charges.

D. Sewerage & Sanitation

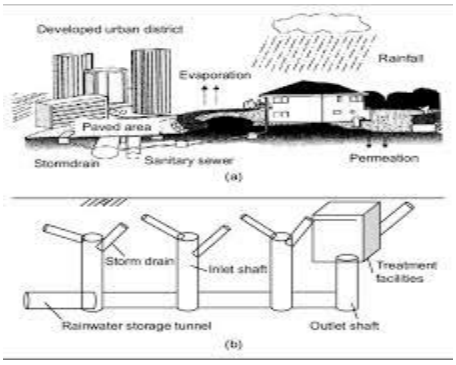


- 100% households should have access to toilets
- 100% schools should have separate toilets for girls
- 100% households should be connected to the waste water network
- 100% efficiency in the collection and treatment of waste water.
- 100% efficiency in the collection of sewerage network.

E. Solid management

- 100% households are covered by daily door-step Collection system.
- 100% collection of municipal solid waste.
- 100% segregation of waste at source, i.e., bio- degradable and non-degradable waste 100% recycling of solid waste.

F. Storm storage



- 100% coverage of road network with storm water drainage network.
- Aggregate number of incidents of water logging reported in a Year = 0
- 100 % rainwater harvesting.

G. Electricity

- 100% households have electricity connection 24 x 7 supply of electricity.
- 100% metering of electricity supply.
- 100% recovery of cost
- Tariff slabs that work towards minimizing waste.

H. Health care facilities

- Availability of telemedicine facilities to 100% residents.
- 30 minutes emergency response time.

- 1 dispensary for every 15,000 residents.
- Nursing home, child, welfare and maternity, center - 25 to 30 beds per lakh population.

3.3. Technological Options: -

- Smart mobility: Intelligent mobility; Advanced traffic management system (ATMS), Parking management, ITS-enabled transportation pricing system.
- Smart infrastructure: Automated Intelligent Buildings, Advanced Heating Ventilation and Air conditioning systems (HVAC), Lighting Equipment.
- Smart healthcare: - Intelligent Healthcare, Technology, use of e-Health and m-Health systems, Intelligent and connected medical devices.
- Smart governance and smart education: - Government on the Go, e-Government, education, Disaster management solutions.

3.4. Road Maps and Safeguards: -

- The first step in establishing a road map for a smart city is to know why there is a need for a smart city initiative.
- GIS is an essential economic development tool that many cities use for planning, analyses, and building lively communities that attract businesses and residents
- The second step in establishing a smart city roadmap is by developing a policy that drives the whole initiatives.
- The policy needs to define the roles, responsibilities, strategies, and objectives of the smart cities.
- The third element in developing a smart city roadmap is engaging the citizens through the use of e-government and effective governance, which leads to the increase of efficiency and enhancing delivery of services.
- One goal of engaging the citizens is to build trust and make them part of the solution.
- Open data through the use of mobile applications is one way to establish such engagement- mobility is a gateway to building a civic engagement, as it allows the public to connect to the city's infrastructure to perform services whenever they want from wherever they are.
- Another method to engage the citizens is by granting access to high-speed Internet and building Wi-Fi wireless infrastructure city wide.

3.5. Issues and Challenges: -

These are some of the issues which are faced for developing smart cities in India

1. Financing: Main problem which is faced in developing smart cities in India is financing problems. Government have started so many schemes to help peoples living in village and for development of village but the funding which government is giving to villages is very low.
2. Availability of Master Plan This problem is experienced mostly in India as many cities in India does not have their master plan due to which they are not aware of the development to be done in upcoming time.

3. No Time Figure attached to the plan Each and every work should be completed on time but in our country the government procedure to be done for development of country take so much time due to which it is unable to complete the work on time.
4. Availability of facilities as compared to other countries the facilities available in India is very less. So, the materials which are required are not easily available and the technology required for transformation of normal village into smart village is also not Found.
5. Corruption: The major cause of less development in India is Corruption. Every other country in the world is less corrupted than India. this is the major cause for time lag and delay work. This is the main reason for ineffective execution of big projects due to which our country is still in developing phase.

3.6 Smart Infrastructure: -

- Smart infrastructure provides the foundation for all the key themes related to a smart city, including smart people, smart mobility, smart economy, smart living, smart governance and smart environment. The central characteristic that underlies most of these components is that they are connected and that they generate data, which may be used intelligently to ensure the optimal use of resources and improve performance.
- This section introduces some key Components of smart city infrastructure and concludes by highlighting the need for a combined method in dealing with such infrastructure. Smart infrastructure includes following:

- Smart building, Smart mobility, Smart energy, Smart waste management, Smart health.

3.7. Cyber security: -

- SMART cities are the future of urban living, harnessing the power of three D's digital technologies, data, and design thinking to boost the efficiency and effectiveness of city services.
- Smart cities are comprised of a highly complex, interdependent network of devices, systems, platforms, and users. Smart energy, utilities, water and wastage, parking and automotive, industrial and manufacturing, building automation, e-government and telemedicine, surveillance and public safety are just some of the verticals that vendors and governments must secure.
- According to ABI Research there will be approximately 1.3 billion wide-area network smart city connections by 2024.

3.8. District cooling and heating: -

- Air condition from Hammond services In the Southeast, air conditioners are almost crucial pieces of equipment for home comfort. However, it can be difficult to find the

right air conditioner for your home, one that will provide enough cool air in the summer to cool your home without driving your energy costs through the roof. We can help! At Hammond Services, we can help you choose the perfect air conditioner for your home, install it professionally, and even maintain/repair it in the years ahead.

- Energy Efficient and Affordable Air Conditioners:
- When it comes down to selecting a new air conditioner for your home, there are a few things you should consider.
- First of all is efficiency. By choosing an energy efficient model, you can be sure your money is being well spent and isn't being thrown away with inefficiencies.
- Get the most bang for your buck with an air conditioner that won't cost a fortune to run. Reliability You Can Count on As a Carrier Factory Authorized Dealer, our commitment to quality products you can count on is clear.
- We're confident when we say that with the proper maintenance, you can count on our air conditioners to operate efficiently for years to come.
- If you're having trouble choosing an air conditioner for your home, contact us today – we can help you weigh your options.

3.9. Strategic options for fast development: -

- There are some solutions which may be considered strategically and economically for faster development of smart cities.
  - E-governance and citizen services.
  - Energy Management.
  - Urban mobility.
  - Waste management.
  - Water Management.
  - Resource Management.
  - Direct funding.
  - People Awareness programs.

3.10. India's Urban water and sanitation challenges and role of indigenous technologies: -

- Swachh Bharat Abhiyaan was launched by Hon'ble Prime Minister of India on 2nd October 2015, which caught attention of everybody not only in India, but also in the world. the government has taken various steps to create awareness among the masses for keeping the area surrounding them neat and clean.
- Urban cities or areas are facing water scarcity challenge as more peoples are migrating every year to urban areas which leads to the scarcity of water in urban areas.
- Due to migration of people sanitation problems are also occurring and main reason for it is water scarcity and availability of water per person per day.

- From Studies it is found that around 50%of people will face scarcity of water in Year 2050.
- Main sanitation problems in India are the lack of public toilet facilities and still by this year also there are many villages in India in which no toilets are there in houses.
- It is estimated that by Year 2030 everyone in India will have access to basic toilets and due to which diseases will not spread.
- By this step the water treatment plants will also be helpful and will be used widely to control the effluent Discharge.
- Also paying special attention for cleaning of rivers, railway stations, tourist destinations and other public places.
- The BARC is playing a pivotal role in the development of these technologies. Some of these technologies are as follows:

❖ **Indigenous water purification technologies**:

- These technologies can improve the drinking water quality of smaller villages as well as larger cities.
- It uses the Pressure Driven Membrane Processes. These are suitable for all capacity units e.g.; they are adaptable from household level unit or community level unit to large scale unit.
- Water purification technologies make use of the nuclear energy and solar energy also.

❖ **Environment friendly Plasma technologies**:

- Solid waste dumping sites or landfill sites need more amount of land which is not available in urban areas.
- Incineration of solid waste pollutes the environment if the incinerators are not designed or operated properly.
- Thermal Plasma Technology is ideally suited for waste treatment. By plasma technology Hazardous & toxic compounds are broken down to elemental constituents at high temperatures; Inorganic materials are converted to Vitrified Mass; and Organic materials are Pyrolyzed or Gasified, converted to flue gases (H2 & CO) & Lower hydrocarbon gases when operated at low temperature (500 – 600OC).
- Disposal of carcass is also being thought of using plasma pyrolysis.

❖ **Unique Multi Stage Biological Treatment Solution**:

- Multi Stage Biological Treatment Solution (MSBT) can be implemented on existing STP which is not able to process Sewage to optimum efficiency.
- MSBT can be implemented as a modular or container on the banks of rivers on Drains/Nalas which discharge waste water to the river. It can also be implanted in small urban societies and housing complex for better water management.
- Benefits of MSBT are: No Surplus of Organic Sludge, no odor problem, Drastic reduction of electrical Power usage which minimizes operating costs, no need for return sludge pumping (minimizing electromechanical component which ultimately reduces operating cost.

3.11. Initiatives in village development by local self-government: -

- In the past "government as provider" approach, the priorities were to secure budget allocations and develop projects.
- The Housing Policy and the NCU statement implicitly give higher priority to two other requirements: first, the reform of policies and regulations that now inhibit development initiatives by the people; and second, more efficient resource management and the building of institutional capacity.
- Resource Management and Institutional Development. As discussed in Section 5, India's urban institutions do not have the capacity to provide adequate services at present, let alone address the requirements of accelerated urban growth in the future. Proposals relate to three types of institutions.
- He primes public sector actors in the urban development process; call for clearer allocations of responsibility and authority to them; and recognize the need for new organizational relationships between local governments and development authorities and State governments that would avoid overlaps and facilitate coordinated programming.
- Improved personnel incentives will be needed to permit the recruitment and retention of qualified staff as will skills training programs. Resource constraints, however, preclude simply expanding local government under current practices in proportion to urban growth. In many areas, the very nature of the way work is conducted will have to be redesigned to permit much higher levels of productivity.
- The NCU recognizes reforms of internal management as vital. This is likely to entail implementing more systematic and efficient approaches in many areas: for example, budgeting and financial management; project management and control; billing and collections; infrastructure systems maintenance; and personnel management.
- Financial Systems. Constraints on government budgets and the rigidities of the present system of intergovernmental transfers prevent an adequate response of traditional arrangements to the challenge of urbanization.
- A new and more decentralized system of public and private financial intermediaries will be required. The establishment of the NHB represents an important step: an apex institution that will stimulate the creation of a network of mortgage financing.
- The NCU also calls for the creation of Urban Infrastructure Development banks to permit local governments to borrow for infrastructure.

3.12 Smart Initiatives by District Municipal Corporation: -

- Urban India faces an enormous challenge: managing its gigantic load of solid waste.
- It is not just a public health issue, but also turning out to be a serious law and order problem as people resort to violent methods to protest waste being dumped in their backyard.
- But cities simply do not have the space or the wherewithal to dispose of waste.
- The challenge is going to be tougher. With India's urban population growing at 3-3.5 per cent annually, the waste generated by cities is expected to increase by 5 per cent every year.

Chapter 4: About ZANU village

4.1 Introduction: -

4.1.1 Introduction about ZANU village details: -

- "ZANU" is a village in Daskroi Taluka in Ahmedabad District of Gujarat State, India. It is located 19km west from District Headquarters Ahmedabad 43km from state capital Gandhinagar.
- Demographics of ZANU: Gujarati is the local language here.

4.1.2 Need of the study: -

- Rural development which is concerned with economic growth and social justice, improvement in the living standards of the rural people by providing adequate and quality social services and minimum basic needs becomes essential.
- The present study deals with the same. In Vishwakarma Yojana, the students and faculty members meet all the stake holders in a village, survey the existing facilities.

4.1.3 Study Area: -

- ZANU village is located in Daskroi Taluka of Ahmedabad District in Gujarat, India. It is situated 25km away from Ahmedabad.

4.1.4 Objectives of the study: -

1. To provide basic amenities in the village like transportation, sanitation, educational, health care facilities.
2. To reduce migration from rural to urban.
3. To promote integrated development.
4. To provide sustainable development.
5. To propose the comprehensive planning suited for ideal village.

4.1.5 Scope of the Study: -

- By the analysing present conditions, we can improve the basic amenities and facilities like agricultural facilities, milk cooperative facility, education facilities.
- To improve life style of the villagers by helping them to develop their skills by assisting them in implementing income generating activities in close coordination and cooperation with national and international organizations.
- The scope of a study explains the extent to which the research area will be explored in the study and specifies the parameters within which the study will be operating. Thus, the scope of a study will define the purpose of the study, the population size and characteristics, geographical location, the time period within which the study will be conducted, the theories that the study will focus on
- As a researcher, you have to be careful when you define your scope or area of focus. Remember that if you broaden the scope too much, you might not be able to do justice to the work or it might take a very long time to complete. Consider the feasibility of your work before you write down the scope. Again, if the scope is too narrow, the findings might not be generalizable.

4.1.6 Methodology Framework for development of ZANU village:

Planning is the process of systematically finding the best ways to solve a problem, achieve some desired goal or create some required object. Village Development Planning is identifying problems and finding ways to solve them,

• Identifying future desired goals

• Finding ways to achieve development through a systematic process.

All groups of people included and the needs of poor households, SC and ST groups, women, children and the elderly taken into account.

4.2 Study Area Profile:

4.2.1 Study Area Location:

- We allocated one village for surveying which is ZANU near Ahmedabad District.
- This is our study area to find problems related to structure and general amenities. ZANU is 14km away from Ahmedabad.

Village Name- Zanu, Taluka Name- Daskroi, District- Ahmedabad, State- Gujarat, Language- Gujarati, Hindi, Pin code-382430

4.2.2 Base location map, land map, gram tal map:

Fig: Gram Tal Map

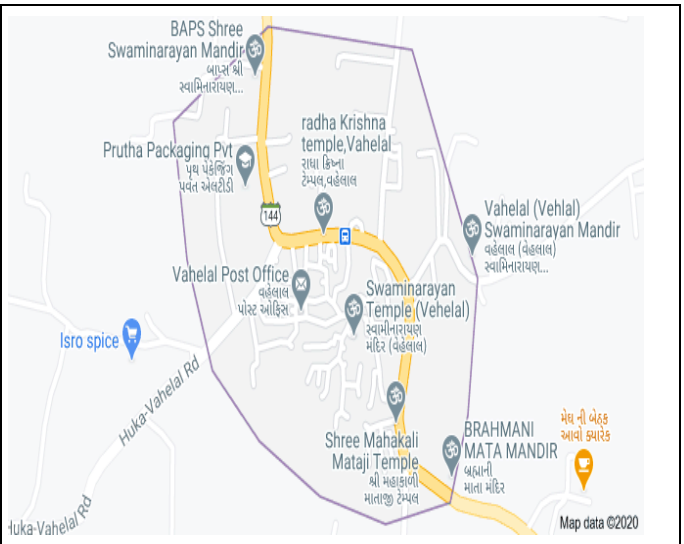
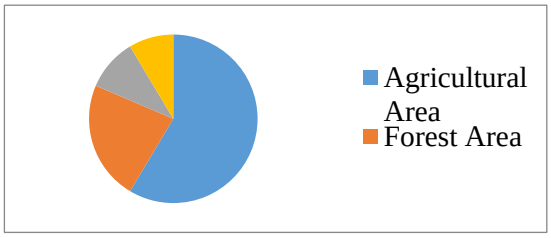
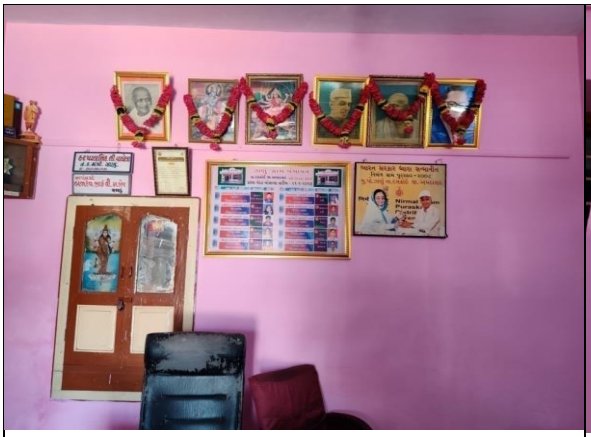


Fig: Location Map



(DASKROI) (ZANU)



Panchayat Inside View

AWARDS

4.2.3 Physical and Demographic growth:

- In Zanu village population of children with age 0-6 is 687 which makes up 16.10 % of total population of village.
- Average Sex Ratio of Zanu village is 939 which is higher than Gujarat state average of 919. Child Sex Ratio for the Zanu as per census is 898, higher than Gujarat average of 890.
- Zanu village has higher literacy rate compared to Gujarat.
- In 2011, literacy rate of Zanu village was 82.74 % compared to 78.03 % of Gujarat. In Zanu Male literacy stands at 87.55 % while female literacy rate was 77.67 %.

(1) ANGANWADI

(2) ANGANWADI

4.2.4 Economic generation profile:

- About the economic profile of this village, many citizens work interest is Farming, labour work and business.
- The village does not have any better facilities regarding infrastructure but has good electrification system which distributed 24*7 hours for domestic use and 8 hours for agricultural use. Dairy and Milk production is also prime source of income.

4.2.5 Actual problem faced by villagers:

Problems:

1. No Hospital or doctor clinic
2. No Transportation
3. Less electricity
4. Low quality network at all
5. Worst condition of street road
6. Low quality education

Health care center

4.2.6 Social scenario:

Particulars	Total	Male	Female
Total No. of Houses	831	-	-
Population	4,268	2,201	2,067
Child (0-6)	687	362	325
Schedule Caste	373	192	181
Schedule Tribe	3	2	1
Literacy	82.74 %	87.55 %	77.67 %
Total Workers	1,327	1,201	126
Main Worker	611	-	-
Marginal Worker	716	639	77

4.2.7 To know the reasons of migration/Trends:

- Employment opportunities are the most common reason due to which people migrate. Expect this, lack of opportunities, better education, construction of dam, globalization, natural disaster (flood and drought) and sometimes crop failure forced villagers to migrate to cities.

4.2.8 Study area land use details:

Table 11. Land use data

1.	Area of village	1070.61 hectares
2.	Agricultural land area	300 hectares
3.	Residential area	770.61 hectares

4.3 Data collection:

4.3.1 Methods for data collection:

- Base line survey is a standard for any intervention during and post application of any development programme.
- A complete baseline survey was undertaken which involved household census survey, bio-physical survey, and village level data collection from sarpanch.

- This gave in the details of the demographic profile of the village, the literacy percentage, Sc/St population, cattle population, and net consumption rate of the village, average milk production of the cattle and various schemes running and their benefits.
- Bio-physical survey was undertaken to identifying various natural resources available in the village. It included the soil typology, well in the area, crop taken in the field, cropping pattern, fertilizer used and various sources of irrigation in the field.

❖ Primary Survey Data:

- The Primary survey was conducted to identify the various general problems of the villagers by interacting with them and enquiring about the problems faced by them in daily life.
- They were asked to suggest the possible and desirable solutions for these problems as well as other infrastructural facilities they would like to have in their village. The data is collected by the following methods:

- Questionnaire method.
- Focus group discussion.
- Survey method.
- Diaries method.

❖ Secondary Survey Data:

- The Secondary survey was conducted to identify the working condition of existing structures of village like school building, panchayat building, drainage facility etc. and to identify the various requirements of development in village.
- For this purpose, we have taken photos of all existing infrastructure facilities in village and also asked question related to the various structures of to the deputy sarpanch and sarpanch of village. The data is collected by the following methods:

- Published printed sources.
- Books.
- Journals.
- Gov. records.

4.3.2 Primary survey details:

- According to Census 2011 information the location code or village code of Zanu village is 511637.
- Zanu village is located in Daskroi Tehsil of Ahmadabad district in Gujarat, India.
- It is situated 14km away from Ahmadabad, which is both district & sub-district headquarter of Zanu village. As per 2009 stats, Zanu village is also a gram panchayat.
- The total geographical area of village is 1070.61 hectares. Zanu has a total population of 4,268 peoples.
- There are about 831 houses in Zanu village. Ahmadabad is nearest town to Zanu which is approximately 14km away.

4.3.3 Average size of the house:

- The average size of the house 700 square feet.

4.3.4 Number of human beings in one house:

- As per the sarpanch and our survey there are 4 to 5 persons in one house.

4.3.5 Material used locally Out Sourced Material:

- The construction of the houses was made of stone, cement, sand, bricks and concrete. In this village kutcha houses are more than the pucca houses.
- Major economic option of the village is farming so there are no more locally material available like standard bricks, aggregates, concrete and reinforcements. So, this material is brought from nearest city for construction of the houses.

4.3.6 Geographical details:

Village Name- Zanu, Taluka Name- Daskroi, District- Ahmedabad, State- Gujarat, Language- Gujarati, Hindi, Pin code-382430

4.3.7 Demographical Details:

Table 13. Demographical details

Description	Census 2011 Data	Description	Census 2011 Data
Village Name	Zanu	Village Name	Zanu
Tehsil Name	Daskroi	Teshil Name	Daskroi
District Name	Ahmadabad	District Name	Ahmadabad
State Name	GUJARAT	State Name	GUJARAT
Total Population	4268	Total Population	4268
Total Area	1071 (Hectares)	Total Area	1071 (Hectares)
Total No of House Holds	831	Total No of House Holds	831

4.3.8 Occupational details:

- In this village 70 to 75 % people connected with agriculture activities it's the villages main source of income. But village has the milk production business so that's an income of source too there are approx. 20 to 25 % people are connected with milk production and other are doing labour work for money.

4.3.9 Agriculture Detail:

Description Type	Commodities
Agricultural Commodities (First)	PADDY
Manufacturers Commodities (First)	N/A
Agricultural Commodities (Second)	WHEAT
Agricultural Commodities (Third)	PEARLMILLET/BAJRA

4.3.10 Physical Infrastructure details:

Bus stand, Primary school, Water tank, Open drainage, WBM and CC road, Panchayat building, Street lighting.

4.3.11 Tourism Cluster: -

- Village is not as good for tourism, so no tourist spots are there in Village.

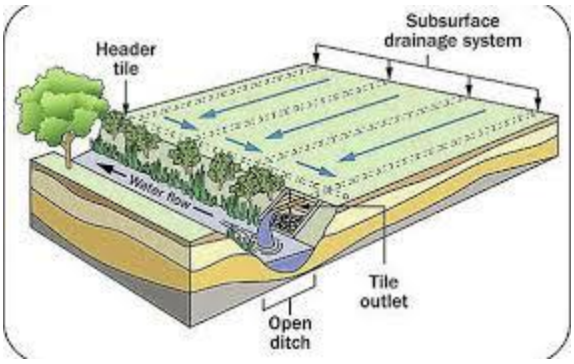
4.4 Infrastructure Details:

4.4.1 Drinking water:

- For drinking Purpose ground water tank, tube well and tap water available. Some people also use hand pump for water purpose.
- While piped water is used as a drinking water source by most people in villages, the water supply is not continuous and varies between half to two hours daily or every second day. The villagers have to withdraw water when available and store it until the next supply phase, increasing chances of contamination.
- Households access water from borewells, open wells and tankers and even surface water sources during situations where the water supply is not continuous, when the pressure in the pipes is low or when there are technical difficulties and during summer months when water is scarce.
- Water quality tests reveal that water from surface water sources such as ponds, tanks, rivers have the lowest water quality while that from the open wells and borewells is also contaminated due to poor sanitation, insufficient treatment of urban and industrial wastewater, and lack of watershed protection measures.
- Even improved sources such as piped water supply show faecal contamination. Poor monitoring mechanisms for water quality, irregular chlorine treatment by the waterman and overdependence on the waterman for the maintenance of water quality increase chances of contamination. The risk of contamination gets worse during the monsoons.

4.4.2 Drainage Network:

- Underground drainage facilities are available in all areas of the village.
- No treatment is given to the waste water, it is directly disposed to the Nayarit and Drainage Strom water facility is not available in village; due to that clogging of rain water on road is problem in monsoon.



- In geomorphology, drainage systems, also known as river systems, are the patterns formed by the streams, rivers, and lakes in a particular drainage basin. They are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land. Geomorphologists and hydrologists often view streams as part of drainage basins. This is the topographic region from which a stream receives runoff, throughflow, and its saturated equivalent, groundwater flow. The number, size, and shape of the drainage basins varies and the larger and more detailed the topographic map, the more information is available.

4.4.3 Transportation & Road network:

- Main road of village is in good condition and all main roads are of black topped.
- Road maintenance is required in some areas of village. The internal street roads are also 90% of R.C.C. Buses are not easily available at the entrance of village Other transport facilities like Auto, chakra and private vehicles are also available.
- Nearest railway station is at Naroda junction which is 14 km far from the village.
- The ultimate objective of solving this system is to provide road connectivity at appropriate level of serviceability to serve as much of population as possible, with involved road length kept to a minimum. The rural roads for the inter settlement interaction are required to fulfil their missing socio-economic functions. The road network, therefore, should match the movement pattern in the region.

4.4.4 Housing condition:

- There are households in the village. 60% households are kutcha and 40% are pucca.
- The people who are most likely to become homeless are those who have least resources as providing housing is a profit-oriented industry. They cannot purchase houses nor can they afford high rent, so they live in unfit accommodation, as the rents demanded for such an accommodation is much low. Some very poor people prefer to squat rather than even rent an accommodation, thus leading to the growth of slums.

- Many households in urban areas have to cope with increasingly crowded conditions, although this is certainly not true for everyone. The housing conditions improve when people build high buildings, sometimes more than five storeys, to increase the number of houses. Many urban centres have very high population densities. The house owners therefore rent out numerous rooms to migrants. Poor migrants five under the most crowded condi-tions. They do not have access to ancestral residential land.
- Therefore, they depend on the rented accommodation, which they often share with many others to save money. Some poor households of the original population also live in very crowded dwellings for two other reasons. First, many families expand and split up into multiple households, while the land available for construction becomes unaffordable. They are thus forced to fit more people into the same space or house or else to split up the existing plots and dwellings to accom-modate a new household. Second, in the absence of sufficient income from other sources, some households are inclined to rent out a portion of their living space or sheds to tenants.

4.4.5 Social Infrastructure Facilities: -

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Water tank</td><td>Panchayat Bhavan</td></tr>
<tr><td> 
</td><td>  </td></tr>
<tr><td>Clinic</td><td>Anganwadi</td></tr>
</table>

4.4.6 Existing Condition of Public Buildings:

- In ZANU public building like gram panchayat, school etc are good in condition. But Anganwadi's condition is well so maintenance.

4.4.7 Technology Mobile/WIFI/Internet Usage Details:

- ZANU village is not a Wi-Fi village. Approximately only 30-40 % people use technology or mobile or internet.

- Mobile internet usage has worked its way into the daily life of smartphone and tablet users, enabling consumers to access and share information on the go. There portends a promising future for mobile internet usage, as global mobile data traffic is projected to increase nearly sevenfold between 2017 and 2022. According to April 2019 data, the global mobile population amounted to 4 billion unique users. As of February 2019, mobile devices accounted for 48 percent of web page views worldwide, with mobile-first markets such as Asia and Africa leading the pack. The Americas and Europe have the highest mobile broadband subscription penetration rate, around 97.1 percent and 93.6 percent respectively. In 2018, the global average stood at nearly 69.3 percent.

4.4.8 Sport Activity:

- There is NO Any Sport Activity

4.4.9 Socio cultural facilities:

- There are NO socio-cultural facilities like public garden, park, playground etc.

4.4.10 Other facilities:

- Other facility like panchayat building and temples exists.

4.5 Electrical Concept:

- There are not so many facilities in village.
- The electrical control system generally provides not only the 'control', but also 'protection' and 'instrumentation'

❖ System Control

- Electrical control signals enable and trigger essential electrical functions like voltage build-up, load control and management, normal and emergency de-excitation of the generator or shut down of the plant.
- In basic electrical control systems is done manually through push buttons and switches.
- In schemes that are designed for a higher degree of automation, electronic, programmable logic controllers (PLCs) can provide fully automatic start-up and shutdown procedures.

❖ Protection

- While electricity is probably the most convenient form of energy presently available, its use involves certain risks.
- Reduce danger to a minimum, national rules and international standards form a base for electrical safety.
- Protection systems have to be designed accordingly to fulfil the specified requirements which can basically be categorized into two groups: the protection of human beings and the protection of property.

❖ Protection of Human Beings

❖ Touching life parts is extremely dangerous and often even causes loss of life.

❖ Basic Protection

❖ Is ensured by the insulation of all life parts to prevent from a direct contact.

❖ Direct Protection

❖ Is ensured by simply placing electrical circuits and installations out of reach and by prevention of direct contact through enclosures, barriers or covers and housing.

❖ The degree of protection is best indicated with reference to the international IP classification.

❖ The IP-code consists of two figures: the first one indicates the degree of protection of persons from contact the second specifies protection against penetration of water.

❖ Widely adopted IP classes are summarized. In spite of providing basic protection, enclosures and barriers, accidents still may occur for instance in case of an insulation failure.

❖ In view of these cases direct protection can be enhanced by the use of residual current operated circuit breakers (RCCB) or earth leakage breakers/relays (ELB/R).

❖ Indirect Protection

- Is provided by a number of measures briefly mentioned hereunder.
- Earthing: electrical connection of all accessible, conducting parts like covers, frames or housings together and to earth (neutral potential see also chapter earthing).

- Also provide effective, automatic disconnection of the supply before a shock is likely to prove fatal.

4.5.1 Renewable energy:

- Renewable energy, often referred to as clean energy, comes from natural sources or processes that are constantly replenished.
- For example, sunlight or wind keep shining and blowing, even if their availability depends on time and weather.
- While renewable energy is often thought of as a new technology, harnessing nature's power has long been used for heating, transportation, lighting, and more.
- Wind has powered boats to sail the seas and windmills to grind grain.
- The sun has provided warmth during the day and helped kindle fires to last into the evening. But over the past 500 years or so, humans increasingly turned to cheaper, dirtier energy sources such as coal and fracked gas.
- Renewable energies (or renewables) are ways to generate energy from (theoretically) unlimited natural resources. These resources are either available with no time limit or replenish more quickly than the rate at which they are consumed.
- Renewable energies are generally spoken of as opposed to fossil fuel energies. The fossil fuels' stocks are limited and non-renewable in the human timescale. The most known examples of these resources are coal, oil or natural gas. On the contrary, renewable energies are produced from renewable sources. Here, we're talking about energy coming from solar rays, wind or water cycles – all theoretically unlimited on a human scale time.
- Renewable energies are also often referred to as "green energies" or "clean energies". Still, this doesn't mean that these energies aren't harmful to the environment and have zero impact. Nonetheless, they have a low environmental impact compared to fossil fuels.
- Solar energy is inexhaustible in the sense that it will cease once the solar system's star – the sun – dies. However, many people wonder if, from a perspective of human's being able to capture and use solar energy in the long-term, whether solar energy is renewable or nonrenewable.
- This type of renewable energy comes directly from the capture of solar radiation. Here, the solar radiation is absorbed by specific sensors and rebroadcasted following 2 possible operation modes: -

- Capturing sun rays and directly converting them into energy through photovoltaic solar panels;
- Capturing, collecting and turning the sunlight into heat that warms up water or air.

4.5.2 Irrigation facilities:

Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during periods of less than average rainfall.

- Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation.
- Irrigation is the process of applying water to the crops artificially to fulfil their water requirements.
- Nutrients may also be provided to the crops through irrigation. The various sources of water for irrigation are wells, ponds, lakes, canals, tube-wells, and even dams. Irrigation offers moisture required for growth and development, germination, and other related functions.
- The frequency, rate, amount and time of irrigation are different for different crops and also vary according to the types of soil and seasons. For example, summer crops require a higher amount of water as compared to winter crops.
- Let us have a look at different types of irrigation and the methods used for irrigation.

- Also Read: Modern Methods of irrigation
- The Irrigation Canal

Types of Irrigation

- There are different types of irrigation practiced for improving crop yield.
- These types of irrigation systems are practiced based on the different types of soils, climates, crops and resources.
- The main types of irrigation followed by farmers include:

Surface Irrigation

- In this system, no irrigation pump is involved. Here, water is distributed across the land by gravity.

- **Localized Irrigation**
- In this system, water is applied to each plant through a network of pipes under low pressure.
- **Sprinkler Irrigation**
- Water is distributed from a central location by overhead high-pressure sprinklers or from sprinklers from the moving platform.
- **Drip Irrigation**
- In this type, drops of water are delivered near the roots of the plants. This type of irrigation is rarely used as it requires more maintenance.
- **Centre Pivot Irrigation**
- In this, the water is distributed by a sprinkler system moving in a circular pattern.
- **Sub Irrigation**
- Water is distributed through a system of pumping stations gates, ditches and canals by raising the water table.
- **Manual Irrigation**
- This a labour intensive and time-consuming system of irrigation. Here, the water is distributed through watering cans by manual labour.
- **Methods of Irrigation**
- Irrigation can be carried out by two different methods:
- Traditional Methods
- Modern Methods
- Traditional Methods of Irrigation
- In this method, irrigation is done manually.
- Here, a farmer pulls out water from wells or canals by himself or using cattle and carries to farming fields.
- This method can vary in different regions.
- The main advantage of this method is that it is cheap.
- But its efficiency is poor because of the uneven distribution of water.
- Also, the chances of water loss are very high.
- Some examples of the traditional system are pulley system, lever system, chain pump.
- Among these, the pump system is the most common and used widely.
- **Modern Methods of Irrigation**
- The modern method compensates the disadvantages of traditional methods and thus helps in the proper way of water usage.
- The modern method involves two systems:
- Sprinkler system
- Drip system
- Sprinkler System

- A sprinkler system, as its name suggests, sprinkles water over the crop and helps in an even distribution of water.
- This method is much advisable in areas facing water scarcity.
- Here a pump is connected to pipes which generate pressure and water is sprinkled through nozzles of pipes.

➢ **Drip System**

- In Drip system, water supply is done drop by drop exactly at roots using a hose or pipe.
- This method can also be used in regions where water availability is less.
- Drip irrigation is the most efficient water and nutrient delivery system for growing crops. It delivers water and nutrients directly to the plant's roots zone, in the right amounts, at the right time, so each plant gets exactly what it needs, when it needs it, to grow optimally. Thanks to drip irrigation, farmers can produce higher yields while saving on water as well as fertilizers, energy and even crop protection products.
- Drip Irrigation method, also called drop by drop irrigation, and underground irrigation, functions as its name imply.
- Drop by drop, water is distributed to the active root zone of plants. This method, if managed properly, might be the most water-supply-efficient way of irrigation, because runoff and evaporation reduced significantly.
- Drip irrigation in today's agriculture, is frequently integrated with plastic sheet, further diminishing evaporation, and is also a method of fertilizers delivery to the plants. This process called fertigation (fertilizer + irrigation). DIY Drip Kits, complete professional drip systems.

4.5.3 Electricity facilities with area:

- There are a street LED lights which works on battery. Also, there server type made in panchayat recently it is good.
- For a start, electric lighting makes the use of candles, kerosene and other polluting fuels for lighting redundant, not only saving money (and providing lighter) but also seriously improving health.
- Electricity can increase productive hours in a household leading to positive outcomes on education and economic well-being. It can also spur innovation and lead to entrepreneurial micro businesses ventures, and in time lead to greater agricultural yields. Benefits also flow to the likes of schools, banking and medical services.

4.6 Existing Institution like - Village Administration- Detail profile:

There is no existing institution like:

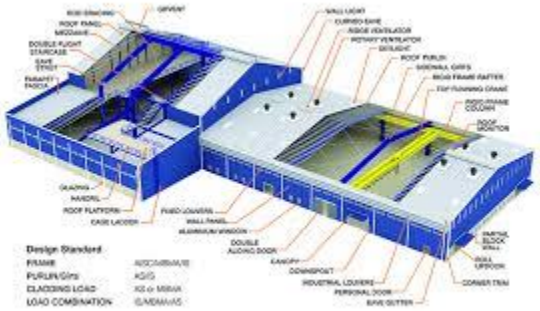
- Bachat Mandali
- Dudh Mandali
- Mahila Forum
- Plantation for air pollution
- Rain water harvesting
- Agricultural Development etc.

Chapter 5: Sustainable Technical Options with case study of existing village:

5.1.1 Advance Sustainable Construction Techniques/Practices and Quantity Surveying:

1. Prefabricating Materials in Controlled Environments

- Constructing as much of a structure in a controlled environment as possible has improved the quality of buildings and resulted in less trash, says Spencer Finseth, principal of Minneapolis-based Greiner Construction.
- Being able to cut materials precisely decreases waste and creates buildings that are strong enough to allow contractors to use wood framing as high as five stories, he says.



- Mechanical contractors use Building Information Management (BIM) systems to cut sheet metal for duct work in a controlled environment instead of outside to avoid the shape-changing problems caused by cold or hot weather, according to Mike Smoczyk, director of professional development for Minneapolis-based Kraus-Anderson.
- That same duct work is delivered to a project "wrapped and sealed tightly and kept out of the elements" to avoid damage, he says. He estimates that prefabrication probably accounts for 15% of any project and likely more for hotels.
- Roseville-based McGough Construction is prefabricating forms for use in creating the concrete superstructure of the 57,000-sq.-ft. addition for the Ordway Center for Performing Arts addition in downtown St. Paul, according to Dan Brenteson, McGough's lean enterprise system director.
- McGough first creates 3D models then pre-builds forms at its White Bear Lake warehouse, a much better environment than being outside at a work site exposed to the elements and "in a constrained environment," he says.

2. Construction Waste Management

- Reducing waste is becoming more achievable for contractors as haulers have grown more sophisticated in recent years. Where jobsites once had trash bins for different types of waste, they now need just one, in many cases, because haulers use pickers to separate materials.

- "Through haulers, we can achieve

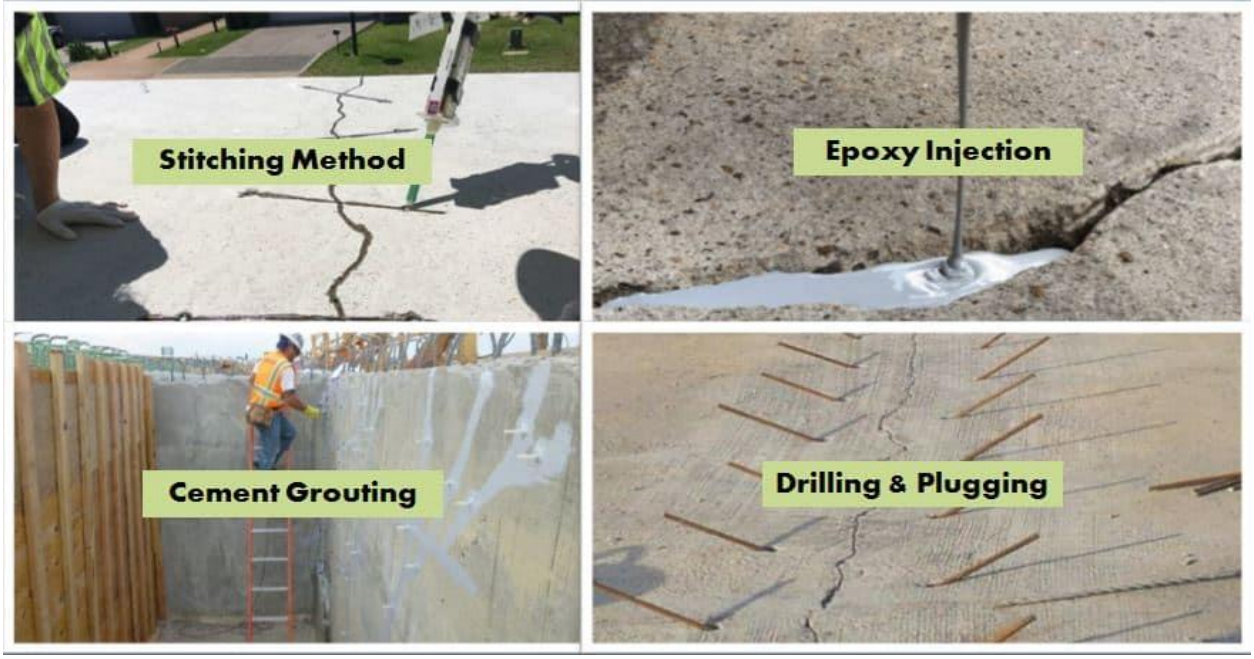
75% landfill avoidance through their process and we don't need to separate materials to do it," says Dale Forsberg, president of St. Louis Park-based Watson-Forsberg. "On a couple of sites, we've hit 95%."

- For inner city projects with small footprints, having haulers handle materials in a single container makes all the difference because space is at a premium, Forsberg says. Some materials are recyclable on site — in particular, concrete that can be crushed and used for foundations or as aggregate beneath parking lots.
- The three largest construction projects underway in the Twin Cities all have a recycling rate of more than 90%.

5.1.2 Soil Liquefaction:

Repair of cracks:

The repair of cracks can be achieved with the following techniques:
1) By epoxy-injection grouting 2) By routing and sealing 3) By flexible sealing 4) By stitching 5) By providing additional reinforcement 6) By drilling and plugging 7) By prestressing steel 8) By grouting 9) Dry packing 10) Overlays 11) Auto generous healing 12) Surface coatings
Here we will discuss about most popular repair technique of cracks such as epoxy-injection method and grouting.1) Crack Repair by Epoxy-injection Method



- Epoxy compounds are having very well compressive, tensile and bond strength.
- They can be used for preparing repair mortars but if used as bonding/binding materials for concrete i.e., epoxy concrete, the cost is prohibited.
- Cracks as narrow as 0.05 mm can be bonded by the injections of epoxy.

- It is excellent material for repairing cracks because they have very good properties such as resistant against water penetration, resistant to crack formation and their very good adhesive properties.
- This method has been successfully used in the repair of cracks in building, bridges, and other types of concrete structures. The repair process by this method is as follow:

a) Clean the cracks: -

- The very first step is to clean the cracks that have Contaminants such as oil, grease, dirt or fine particles.
- Because such contaminants prevent epoxy penetration in the cracks to be repaired. For this reason, cleaning is required.

b) Sealing of the surfaces

- Surface cracks should be sealed. It is used to keep the epoxy from leaking out before it has gelled.
- This can be done by applying an epoxy, polyester or other appropriate sealing material to the surface of the crack and allowing it to harden.

c) Install the entry and venting ports

- When the cracks are v-grooved, drill holes are made in the groove of about 20mm diameter below the apex of the v-grooved section.
- Fittings such as pipe nipples are inserted in to the holes. But when the cracks are not v-grooved, an entry port is to be bond a fitting flush with the concrete face over the crack.

d) Mixing of epoxy

- It is done either by batch or continuous methods. In batch mixing, the adhesive components are premixed according to the manufacturer's instructions, usually with the use of mechanical stirrer, like a paint mixing paddle.
- In the continuous method, the two liquid adhesive components pass through metering and driving pumps prior to passing through an automatic mixing head.

5.1.3 Sustainable sanitation:

- Disaster management in India refers to conservation of lives and property during a natural and man-made disaster.
- Disaster management plans are multi-layered and are planned to address issues such as floods, hurricanes, fires, mass failure of utilities and the rapid spread of disease.
- India is especially vulnerable to natural disasters because of its unique geo-climatic conditions, having recurrent floods, droughts, cyclones, earthquakes, and landslides.

- As India is a very large country, different regions are vulnerable to different natural disasters. For example, during rainy season the peninsular regions of South India is mostly affected by cyclones and states of West India experience severe drought during summer.

❖ Disaster management Act, 2005:

- The Disaster Management Act was passed by the Lok Sabha on 28 November 2005, and by the Rajya Sabha on 12 December 2005.
- It received the assent of the President of India on 9 January 2006. The Act calls for the establishment of a National Disaster Management Authority (NDMA), with the Prime Minister of India as chairperson.
- The NDMA has no more than nine members at a time, including a Vice-Chairperson.
- The tenure of the members of the NDMA is 5 years. The NDMA which was initially established on 30 May 2005 by an executive order, was constituted under Section-3(1) of the Disaster Management Act, on 27 September 2005.
- The NDMA is responsible for "laying down the policies, plans and guidelines for disaster management" and to ensure very timely and effective response to disaster".
- Under section 6 of the Act, it is responsible for laying "down guidelines to be followed by the State Authorities in drawing up the country Plans".

❖ Disaster Management Plan:

- On 1 June 2016, Narendra Modi, the Prime Minister of India, launched the Disaster Management Plan of India, which seeks to provide a frame work and direction to government agencies for prevention, mitigation and management disasters.
- This is the first plan nationally since the enactment of the Disaster Management Act of 2005.

❖ About the Authority:

- National Disaster Management Authority (NDMA) is an agency of the Ministry of Home Affairs whose primary purpose is to coordinate response to natural or man-made disasters and for capacity-building in disaster resiliency and crisis response.
- NDMA was established through the Disaster Management Act enacted by the Government of India in December 2005. The Prime Minister is the ex-officio chairperson of NDMA.
- The agency is responsible for framing policies, laying down guidelines and best-practices and coordinating with the State Disaster Management Authorities (SDMAs) management.

5.1.4 Transport system:

Roads have been existing in India for the last 5000 years.
In early stages of Indian history, Ashokan Chandragupta made efforts to construct roads. But the real progress was made during the Mughal period.

WBM Road

- Water Bound Macadam (WBM) roads contain crushed stone aggregate in its base course.
- The aggregates are spread on the surface and these are rolled after sprinkling water.
- WBM roads provides better performance compared to earthen, gravel, marram and canker roads.

The construction of WBM road is carried out in following stages.

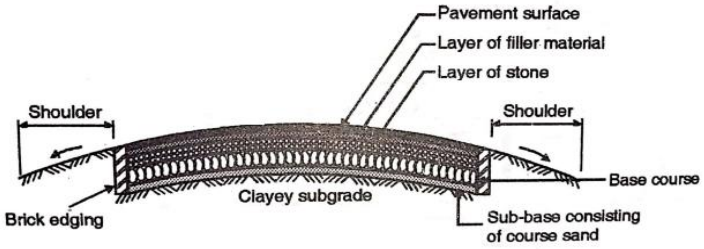


Fig. 6.4.1 : A water bound macadam road

- WBM roads are laid as layers about 10cm thickness of each layer. They are very rough and may disintegrate immediately under the surface.

Bituminous Road

- Bituminous roads are very popular roads around the world. They are most used roads in the world.
- They are low in cost and good for driving conditions.
- They are flexible and thickness of bituminous roads depends upon the subgrade soil conditions.

Concrete Road:

- Cement concrete is used to construct the pavements in case of concrete roads.
- These are very popular and costlier than all other types of roads. They are not flexible so; they require less maintenance.
- Concrete roads are suitable for high traffic areas.
- Concrete roads are laid with joints and time of construction is more.

Composite Road:

- Composite materials are often used in types of construction that are more related to maintenance, recycling, and rehabilitation.

- Composite materials are combinations of both asphalt and concrete, and are typically employed in one of two methods.
- Asphalt overlays literally are placed over a damaged surface, or alternatively pavement may be cracked and seated instead, forming a true new surface.

Asphalt Road

- One of the most popular types of construction ever since its inception in the early 1920s is asphalt paving.
- In this construction technique, a layer of asphalt is laid on top of an equally thick gravel base.
- Advantages of this form of road construction are that the pavement produces relatively little noise, its relative low cost compared to other materials, and that it is relatively easy to repair and maintain as well.
- However, asphalt is known to be significantly less durable and strong than most other choices, and isn't the best for the environment either.

5.1.5 Vertical farming:

- Environmental factor or ecological factor or eco factor is any factor, abiotic or biotic, that influences living organisms.
- Abiotic factors include ambient temperature, amount of sunlight, and pH of the water soil in which an organism lives.
- Biotic factors would include the availability of food organisms and the presence of conspecifics, competitors, predators, and parasites.

Physical Environmental Factors

- The factors in the physical environment that are important to health include harmful substances, such as air pollution or proximity to toxic sites (the focus of classic environmental epidemiology); access to various health-related resources (e.g., healthy or unhealthy foods, recreational resources, medical care); and community design and the "built environment" (e.g., land use mix, street connectivity, transportation systems.

Social Environmental Factors

- Factors in the social environment that are important to health include those related to safety, violence, and social disorder in general, and more specific factors related to the type, quality, and stability of social connections, including social participation, social cohesion, social capital, and the collective efficacy of the neighborhood (or work) environment.
- Social participation and integration in the immediate social environment (e.g., school, work, neighborhood) appear to be important to both mental and physical health.

5.1.6 Corrosion Mechanism, Prevention & Repair Measures of RCC Structure:

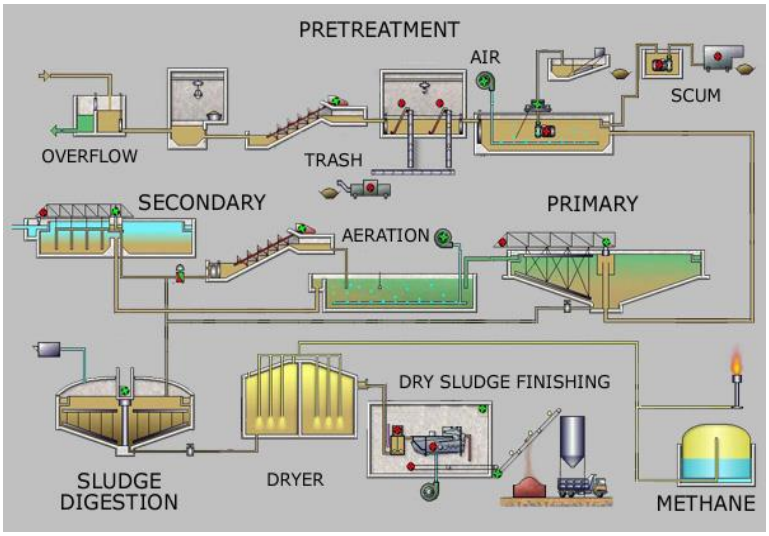
- The durability of concrete structures is affected by a number of factors such as environmental exposure, electrochemical reactions, mechanical loading, impact damage and others.
- Corrosion management is becoming increasingly necessary as a result of the growing number of ageing infrastructure assets (e.g., bridges, tunnels etc.) and the increased requirement for unplanned maintenance in order to keep these structures operational throughout their design life (and commonly, beyond). The main RC repair, refurbishment and rehabilitation approaches generally employed can be broadly categorized under a) conventional, b) surface treatments, c) electrochemical treatments and d) design solutions.
- The overarching aim of this research was to identify the key corrosion management techniques and undertake empirical investigations focused on full-scale RC structures to investigate their long-term performance.
- To achieve this, individual research packages were identified from the above broad five approaches for repair, replacement and rehabilitation.
- These were 1) Patch repairs and incipient anodes, 2) Impressed Current Cathodic Protection, 3) Galvanic Cathodic Protection and 4) Hydrophobic treatments.

- The selection of the above research packages was based on past and present use by the construction industry to repair, refurbish and rehabilitate RC structures.
- Their contributions may be broadly categorized as i) Investigations on how specific treatments and materials perform, ii) Investigations on the effectiveness of existing methods of measurements and developing alternatives, iii) Changes to the existing theory of corrosion initiation and arrest and iv) Changes to management framework strategies.
- The key findings from each research package can be summarized as follows: Microcell activity appears to be a consequence rather than a cause of incipient anode formation in repaired concrete structures, as has previously been presented; ICCP has persistent protective effects even after interruption of the protective current; Discrete galvanic anodes installed in the parent concrete surrounding the patch repair are a feasible alternative to galvanic anodes embedded within the patch repairs of RC structures; Silanes may have a residual hydrophobic effect even after 20 years of service.

5.1.7 Sewage treatment plant:

1. Preventing or reducing waste generation:

- Extensive use of new or unnecessary products is the root cause of unchecked waste formation.
- The rapid population growth makes it imperative to use secondhand products or judiciously use the existing ones because if not, there is a potential risk of people succumbing to the ill effects of toxic wastes.
- Disposing of the wastes will also assume formidable shape. A conscious decision should be made at the personal and professional level to judiciously curb the menacing growth of wastes.



2. Recycling:

- Recycling serves to transform the wastes into products of their own genre through industrial processing.
- Paper, glass, aluminum, and plastics are commonly recycled.
- It is environmentally friendly to reuse the wastes instead of adding them to nature. However, processing technologies are pretty expensive.

3. Incineration:

- Incineration features combustion of wastes to transform them into base components, with the generated heat being trapped for deriving energy.
- Assorted gases inert ash are common by-products. Pollution is caused by varied degrees dependent on nature of waste combusted and incinerator design.
- Use of filters can check pollution.
- It is rather inexpensive to burn wastes and the waste volume is reduced by about 90%.
- The nutrient rich ash derived out of burning organic wastes can facilitate hydroponic solutions.
- Hazardous and toxic wastes can be easily be rid of by using this method.
- The energy extracted can be used for cooking, heating, and supplying power to turbines.
- However, strict vigilance and due diligence should be exercised to check the accidental leakage of micro level contaminants, such as dioxins from incinerator.

4. Composting:

- It involves decomposition of organic wastes by microbes by allowing the waste to stay accumulated in a pit for a long period of time.
- The nutrient rich compost can be used as plant manure.
- However, the process is slow and consumes a significant amount of land.
- Biological reprocessing tremendously improves the fertility of the soil.

5. Sanitary Landfill:

- This involves the dumping of wastes into a landfill.
- The base is prepared of a protective lining, which serves as a barrier between wastes and ground water, and prevents the separation of toxic chemicals into the water zone.
- Waste layers are subjected to compaction and subsequently coated with an earth layer.
- Soil that is non-porous is preferred to mitigate the vulnerability of accidental leakage of toxic chemicals.
- Landfills should be created in places with low groundwater level and far from sources of flooding.

- However, a sufficient number of skilled manpower is required to maintain sanitary landfills.

6. Disposal in ocean/sea:

- Wastes generally of radioactive nature are dumped in the oceans far from active human habitats.
- However, environmentalists are challenging this method, as such an action is believed to spell doom for aquatic life by depriving the ocean waters of its inherent nutrients.
- Effective waste disposal calls for concerted efforts from all, no matter how anxious or worried they may be about our environment.

5.1.8 CIVIL Design and Prototype Model of Pervious Concrete: -

Abstract: Pervious concrete is a special high porosity concrete used for roads carrying light traffic, allows the water from precipitation and thereby reducing the runoff from a road surface and hence recharging ground water levels. Objective of this research is to find mechanical properties i.e., compressive strength, split tensile strength and flexural strength of the pervious concrete. The main problem of pervious concrete pavement is the strength itself. The conventional and pervious concrete is tested for 28 days of curing period with fresh water & salt water. For conventional concrete the mix proportion is considered as 1:1.5:3 and that of for pervious concrete 1:4. Water cement ratio of 0.3 for both conventional and pervious concrete is adopted. Fresh water (FW) is a tap water and salt water (SW) are prepared by adding of common salt (2.5%), detergent (2.5%) by volume. From experimental results, it is observed that use of salt water for curing of concrete, improved the mechanical properties of both the conventional and pervious concrete for the period of 28 days.

Keywords: - Pervious concrete, Salt water, Compressive strength, Split tensile strength, Flexural strength

Introduction: - Pervious concrete which is also known as the no-fines, porous, gap-graded, and permeable concrete. It has been found to be a reliable storm water management tool. By definition, pervious concrete is a mixture of gravel or granite stone, cement, water, little to no sand (fine aggregate) with or without admixtures. When pervious concrete is used for paving, the open cell structures allow storm water to filter through the pavement and into the underlying soils. Pervious concrete can be used in a wide range of applications, although its primary use is in pavements which are in: residential roads, alleys and driveways, low volume pavements, low water crossings, sidewalks and pathways, parking areas, tennis courts, slope stabilization, sub-base for conventional concrete pavements etc... The performance of slag concrete exposed to artificially made sea water. They concluded that the development of compressive strength for slag concrete is not significant at the early age of curing. The gain in strength occurs at relatively rapid ate at later ages of curing. Mix proportion of slag with cement has a significant effect on strength development of slag concrete. Among the mix proportions studied, the 70:30 mix slag concrete shows higher compressive strength. studied the effect of different concentrations of ammonia in the popular image on the physical, chemical and mechanical properties of different types of cement. The electrochemical measurement (linear polarization systems) as well as infrared spectroscopy (IR) were used in this study. The results showed that ammonia gets a harmful effect on OPC and SRC mortars but HSC shows high resistivity. Also, the reinforced steel is greatly affected in the aggressive medium containing ammonium solution. The effects of

S. No.	Mix Proportion	28 days Compressive Strength (FW) (MPa)	28 days Compressive Strength (SW) (MPa)
1	1:1.5:3	22.52	24.64
2	1:1.5:3	22.52	22.49
3	1:1.5:3	22.63	23.40
Average Compressive Strength (MPa)		22.55	23.51

Table 1. Compressive Strength of Conventional Concrete cured with FW and SW

percentage of fine aggregates and cement to coarse aggregate ratio on the important engineering properties of pervious concrete were investigated. As per the test results, maximum compressive strength of pervious concrete was achieved by using the 20mm graded aggregate and 1:4 cement: total aggregate ratio, studied the properties of pervious concrete used for bridge superstructure. They concluded that use of this concrete is suitable bridge superstructure. Employed testing processes for pervious concrete that are more representative of field conditions to determine the effects of the inclusion of sand as a fine aggregate; fly ash, slag and silica fume as cementitious alternatives, and construction practices on freeze-thaw durability and deicing salts exposure of pervious concrete. The pervious concrete helps in attenuate storm water problems, reduce the absorption of solar radiation but requires regular maintenance to prevent any clogging of the pores by sediments and vegetation

Experimental Program and Results: -

a) Compressive strength: - The blocks made of conventional concrete with 1:1.5:3 cement sand and aggregate ratio with 0.30 of water cement ratio were cured with fresh water (FW) for 28 days, the average compressive strength was 22.55 MPa and when the same sample mix was cured with salt water (SW) for 28 days the average compressive strength was 23.51 MPa which is a 4.2% higher. As shown in Table.

b). Split Tensile Test: -

Concrete is strong in compression and weak in tension. Tensile forces are taken mainly by reinforcement. Due to tension, cracks are formed. This test is based on the fact that circular disc is subjected to compression load diametrically. As per IS 5816-1970 [8] the split tensile strength of the concrete is given by:

S. No.	Mix Proportion	Tensile Strength (FW) (MPa)	Tensile Strength (SW) (MPa)
1	1:1.5:3	2.90	3.34
2	1:1.5:3	3.49	3.49
3	1:1.5:3	3.34	3.49
Average Tensile strength (MPa)		3.24	3.44

Table 2. Split Tensile Strength of Concrete cured with FW and SW $F = \frac{2P}{\pi DL}$ Conventional

c). Flexural Strength: -

As per IS 456:2000 [9], the flexural strength of concrete is calculated as:

$$f_{cr} = 0.7 \sqrt{f_{ck}}$$

Where, f_{ck} is the characteristic cube compressive strength of concrete in N/mm^2. The flexural strength of conventional concrete when cured with FW and SW is shown in Table 5. For conventional concrete, the average flexural strength was 3.68 MPa at 28 days of curing with fresh water and when the same sample mix, cured with salt water for 28 days the average flexural strength was 3.82 MPa, which is 3.80% higher.

S. No.	Mix Proportion	Flexural Strength (FW) (MPa)	Flexural Strength (SW) (MPa)
1	1:1.5:3	3.23	3.33
2		3.97	4.12
3		3.85	4.02
Average Flexural Strength (MPa)		3.68	3.82

Table 5. Flexural Strength of Conventional Concrete cured with FW and SW

Conclusion: -

From the experimental work and the results obtained it can be concluded that:

- The fine aggregate plays a vital role in imparting the strength to the concrete. Also, salt water enhancing the strength in the early stage.
- The compressive strength of conventional concrete and pervious concrete increased in all cases when curing is done with salt water, to that of the compressive strength of both the concrete cured with fresh water.
- The split tensile strength as well as flexural strength improves considerably when cured with salt-detergent solution.

References: -

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[2]. Magdy A. Abd El-Aziz, Waleed H. Sufe, Effect of sewage wastes on the physio-mechanical properties of cement and reinforced steel, Ain Shams Engineering Journal, 4, 2013, 387–391.

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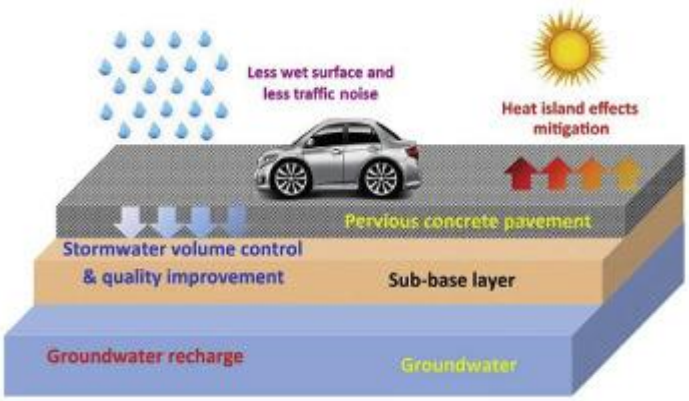
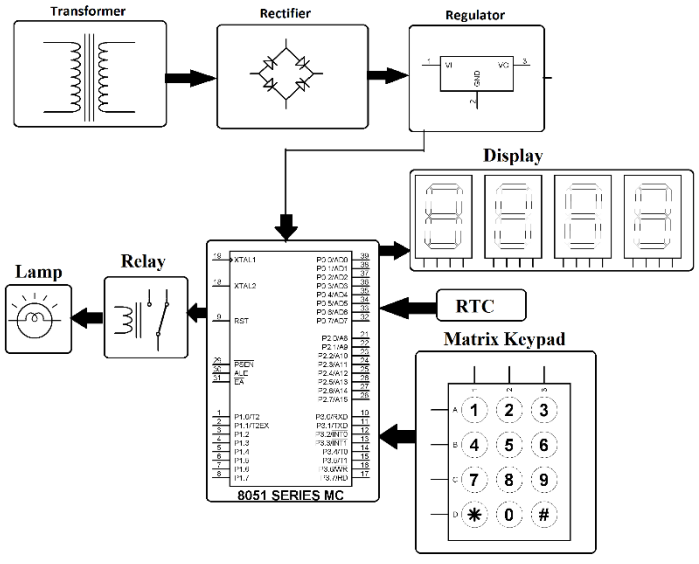


5.2 Concept (Electrical):

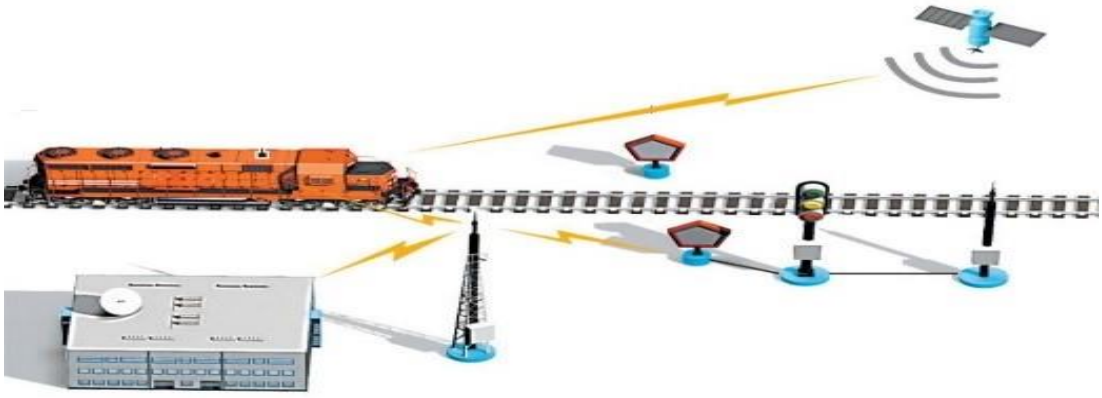
5.2.1 Programmable Load Shedding:

- Programmable load shedding time management system is a reliable circuit that takes over the manual task of switch ON/OFF the electrical devices with respect to time.
- It uses real time clock (RTC) interfaced to a microcontroller of 8051 family. ... Multiple ON/OFF time entry is the biggest advantage with this project.
- The project is an automatic load operation system that controls load operation, multiple numbers of times according to programmed instruction. The project eliminates the manual ON/OFF switching of load. A real time clock (RTC) is used to track the time and automatically switch ON/OFF the load.
- This project is required for load shedding time management which is used when the electricity demand exceeds the supply and there comes a need for manually switching ON/OFF the electrical devices in time. Hence this system eliminates the manual operation by automatically switching the load ON/OFF. A matrix keypad is interfaced with the microcontroller from where the specified time is input to the microcontroller. When this input time equals to the real time, based on the commands the microcontroller initiates that particular relay to switch ON/OFF the load. The time is displayed on a seven-segment display.



5.2.2 Railway Security System using IoT:

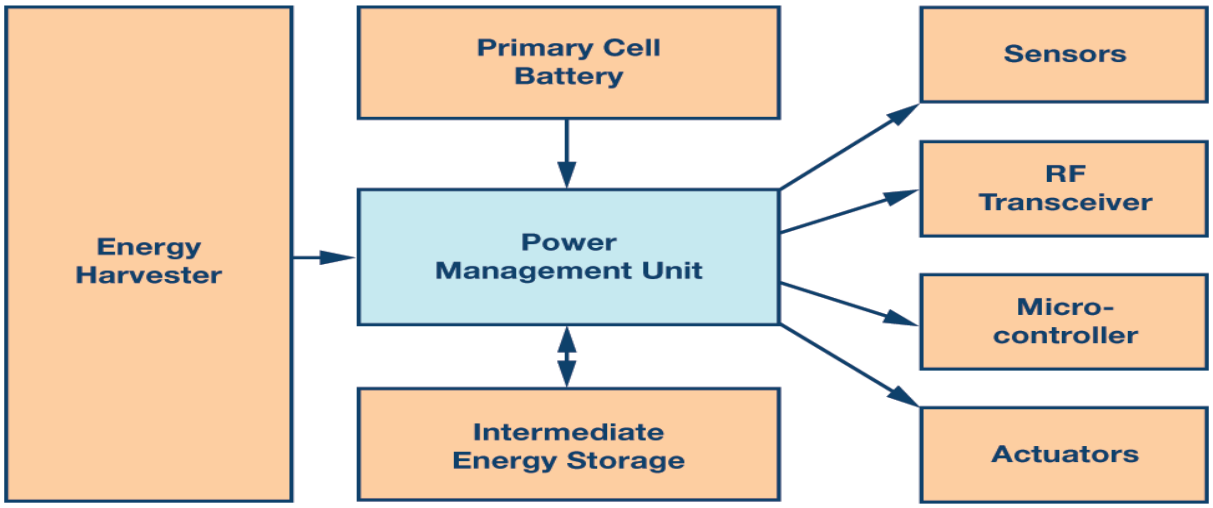
- The objective of this project is to create a Security System for the goods that are carried in open top freight trains.
- The most efficient way to secure anything from thieves is to have a continuous observation. So, for continuous observation of the open top freight train, Camera module2 has been used.
- Passive Infrared Sensor (PIR) 1 has been used to detect the motion or to sense movement of people, animals, or any object.
- So, whenever a motion is detected by the PIR sensor, the Camera takes a picture of that particular instance.
- That picture will be sent to the Raspberry PI which does Skin Detection Algorithm and specifies whether that motion was created by a human or not.
- If a human makes it, then that picture will send to the drop box. Any Official can have a look at the same.
- The existing system has a CCTV installed at various critical locations like bridges, railway stations etc. but they do not provide a continuous observation.
- This paper describes about the Security System that provides continuous observation for open top freight trains so that goods can be carried safely to its destination.



5.2.3 Management through Energy Harvesting Concept:

- The objective of the Power Management through Energy Harvesting Concept project work has been designed and implemented in the power management through energy harvesting concept which deals with the power saving and optimization.
- The overall control is based on sensors of light and temperature. After installing the components, the process becomes automatic.
- If a load at a particular zone is increased then the control will trip. To overcome these drawbacks, we have designed and implemented the circuit.

- The objective is to minimize the cost of supplied power to the load point.



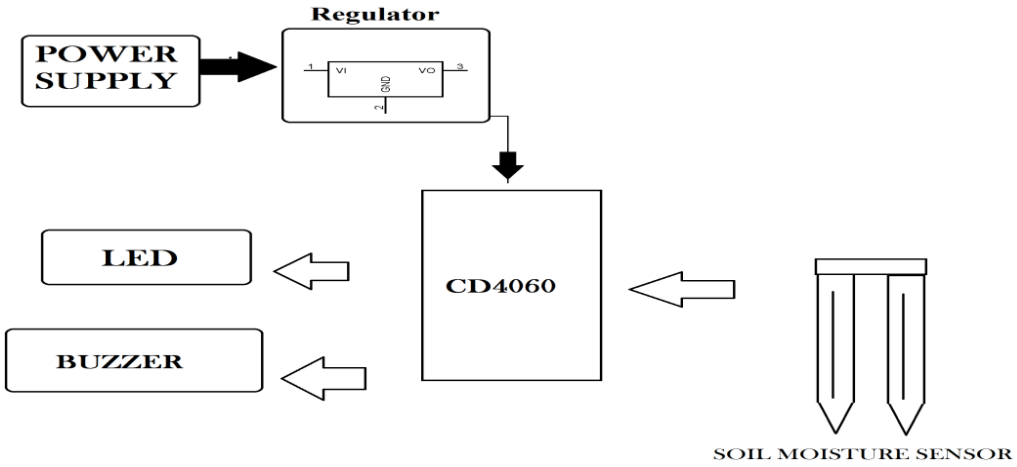
5.2.4 Moisture Monitoring System:

- Planting a tree in an environment where the seed or the plant would not get water adequately through natural sources like rain or ground water in its initial phases has been always a matter of concern for tree planters.
- This is where an autonomous moisture monitor for plants system can help.
- The system timely monitors the moisture level of the soil.
- If at the time of monitoring it comes to know that the moisture level of the soil is lower than recommended then it will raise an audio-visual alert.
- This alert is then received by the care taker of the plant.
- When the care taker waters the plant the alarm goes off and the monitoring cycle continues.
- In this system we use a timer IC to time the monitoring process. A moisture level sensor is used to detect the moisture level of the soil.
- An LED is used to give visual alarm and a Buzzer is used to give audio alarm to the care taker of the plant.
- Thus, in this project with the help of a simple combinational circuit and a sensor we can help save a plant by maintaining the moisture level of the soil of the plant, thus keeping the plant healthy.

Hardware Specifications:

Water Sensor	Diodes
Buzzer	PCB and Breadboards
Resistors	LED
Capacitors	Transformer/Adapter
Transistors	Push Buttons
Cables and Connectors	Switch
	IC Sockets

5.2.5 Home Automation using IoT / Any other methodology:



- The data is then used for monitoring, controlling and transferring information to other devices via the internet.
- This allows specific actions to be automatically activated whenever certain situations arise.
- Such systems depend on the collection of data.
- The data is then used for monitoring, controlling and transferring information to other devices via the internet.
- This allows specific actions to be automatically activated whenever certain situations arise.
- In a simple example, consider a smart kettle.
- The kettle can be programmed to automatically turn off once it reaches a specific temperature.
- It might also send a notification to the user on the same.
- Now apply the same concept to the entire home and all the devices present.
- That is a smart home powered by IoT.
- Instead of manually going up to the device and taking action, those actions can be taken at the press of a button.
- These days, most smart IoT home automation devices allow you to control them via an app or even via voice commands.
- Now imagine if you did not even need to undertake such actions. In other words, the smart home will know when to take certain actions and automatically take them.
- This is where the future of home automation and IoT lies.
- One of the most important parts of building a home automation product is to think about protocols — protocols that your device will use to communicate to gateways, servers, and sensors. a few years ago, the only way to do so was by either using Bluetooth, wi-fi, or GPS. but due to added expenses on cellular sim cards and low performance of wi-fi, most such solutions didn't work. Bluetooth survived and later evolved as Bluetooth smart or Bluetooth low energy. this helped bring a lot of connectivity in the "mobile server

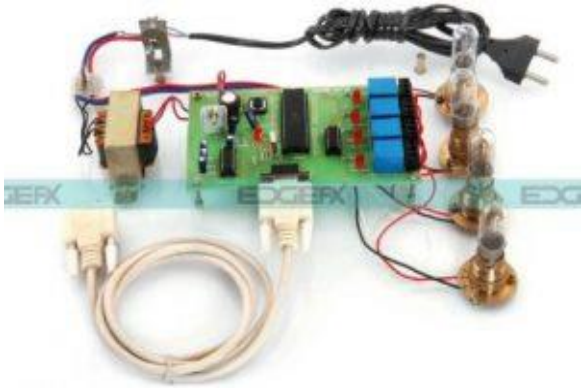
powered economy." essentially, your phone would act as a middleware to fetch data from blew-powered sensors and send it over to the internet.

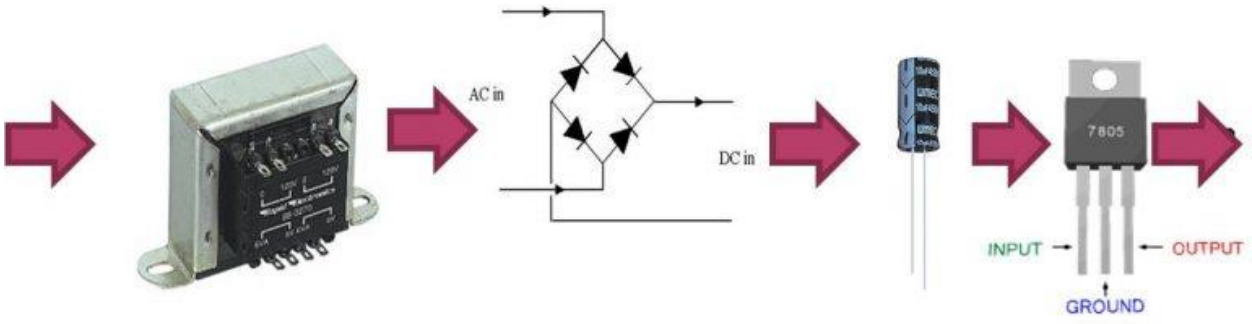
5.2.6 PC Based Electrical Load Control:

- Automation system is mostly depending upon the power systems in industrial, residential or commercial, which needs remote controlling and monitoring.
- By employing wireless technologies, it is more competent to execute a suitable technology depending upon the requirements of the proposed system like speed, cost, and distance.
- For distant controlling and monitoring of different loads and by means of efficient power usage through real time power spending with the help of a PC based graphical user interface application.
- The progress of technology equipment's is becoming simpler and easier for us.
- Automated systems have more benefits over manual system. PC based electrical load-controlled systems are highly reliable, precise and time conserving systems.
- They give number of features like rapid data storage, transfer data and data securities.

Power Supply:

- The 230V AC supply is first stepped down to 12V AC using a step-down transformer.
- This is then converted to DC using bridge rectifier.
- The AC ripples is filtered out by using a capacitor and given to the input pin of voltage regulator 7805.
- At output pin of this regulator, we get a constant 5V DC which is used for MC and other ICs in this project.





Project working:

- The main goal of this project is to control the electrical load through a PC (personal computer).
- For example, lighting in the theatre can be controlled form the PC for superior stage management.
- At present, they are physically controlled which makes it complex to organize the lighting with the particular scene.
- By employing this system, one can manage the electrical load ON/OFF by just being seated at one place using a PC.
- This system is incorporated with the electrical loads and also associated to the PC where centralized control takes place.
- It uses an MAX 232 protocol from the microcontroller to communicate with the PC.
- To switch the appliances, we employ Hyper Terminal on personal computer.
- Once the connection is established with the PC, then the system begins working.
- The 8051-family microcontroller is used in this project.
- Further, this project can be improved by implementing a GUI based control board on the PC with suitable embedded system software. The power control can also be integrated using power electronics devices
- Thus, this is all about PC based electrical load control. We hope that you have got a better understanding of this concept or to implement any electrical projects please give your feedback by commenting in the comment section below.

5.2.7 Electrical Parameters Measurements:

- Measurement of electrical quantities may be done to measure electrical parameters of a system.
- Using transducers, physical properties such as temperature, pressure, flow, force, and many others can be converted into electrical signals, which can then be conveniently measured and recorded.
- It is crucial to acquire these parameters in all environmental conditions to constantly identify the power drained from the contact line.
- An innovative sensor technology enables the operators to accurately measure the voltage and current used by rolling stock.

- All measurement devices implement digital technology and may be installed on the front panel of the switchboard (DIN format). The power meters are also capable of transmitting measurement data to a supervisor.

Parameter	Measuring Unit	Relationship
Voltage	volt (V or E)	$E = I \times R$
Current	amp (I)	$I = \frac{E}{R}$
Resistance	ohm (R or Ω)	$R = \frac{E}{I}$
Conductance	mho (G or ℧)	$G = \frac{I}{R} = \frac{I}{E}$
Power	watt (W)	$P = I \times E$ or $P = I^2R$
Inductance	henry (L or H)	$V_L = -L\left(\frac{\Delta I}{\Delta t}\right)$
Capacitance	farad (C)	$C = \frac{Q}{E}$ (Q = charge)

5.2.8 Electrical Design and Prototype Model: - Star Delta Starter

ABSTRACT

Induction motors are widely used in industries and most times get burnt upon the start of the motor. This project is designed to provide low voltage start to induction motors. This is achieved by using star to delta conversion. Star/Delta starters are probably the most common reduced voltage starters in the 50 Hz industrial motors. Star-delta is used to reduce the start current applied to the motor then after some time full load current is applied to the motor. Since in star connection current is same in different phases while line voltage is the root three times the phase voltage. The voltage is reduced if the induction motor is started as star. In delta connection the voltage is same as that of phase voltage so full voltage is applied if we run the motor as delta connection. In this project, an automatic star-delta starter was designed using electrical relays and an electronic timer. By feeding the motor with (58%) of the full load current to limit the starting current surges by starting the motor at reduced voltage and then have full supply voltage reconnected when they run up to near rotated speed. This method is commonly referred to as "Soft starting" the motor.

INTRODUCTION

Most of the machines used in the industries are three phase induction motors. They have simple and rugged construction and their robust nature make them possible to operate in all

environmental condition. Induction machines are cheaper in cost and maintenance free, have starting torque and are widely used in domestic and industrial applications. During starting of an induction motor, the starting current is around eight to ten times the rated current and this persists for a few cycles. This may be very much damaging for the machine, causing a disturbance of voltage on the supply lines due to large starting current surges. To limit the starting current surges, large induction motors are started at reduced voltage and have full supply voltage reconnected when they run up to near rotated speed. These forms of starters are known as reduced mechanical starters, they are used to replace the direct-on-line starters. This is because of their controlled starting capability with lower starting current during the soft start period.

Voltage reduction during star-delta starting is achieved by physically reconfiguring the motor winding. During starting, the motor windings are connected in star configuration and this reduces the voltage across each winding. This also reduces the voltage by a factor of three. After a period, the windings are reconfigured as delta and the motor runs normally. The star-delta starter is generally obtained from three contactors: electromechanical timer and a thermal overload relay for operating a 3-phase motor at 440 volts at ac mains supply of 50 Hz. The current through the windings are (58%) of the current in the line. The star-delta starter is simple and rugged,
relatively cheap compared to other reduced voltage methods with good torque and current performance.

Star-Delta Starter

- Star/Delta starters are the most reduced voltage starters in the 50 Hz frequency. They are used to reduce the start current applied to the motor during start as a means of reducing the disturbances and interference on the electrical supply. In star-delta starting method, the wiring connection from the power supply source to the motor is connected from star to the delta connection. With star connection, the motor takes 58 % less voltage. However, as the torque is proportional to square of the voltage, the starting torque also reduces.
- This is the reduced voltage starting method. Voltage reduction during star-delta starting is achieved by physically reconfiguring the motor windings as illustrated in the figure below. During starting the motor windings are connected in star configuration and this reduces the voltage across each winding 3. This also reduces the torque by a factor of three.
- The Star/Delta starter is manufactured from three contactors, a timer and a thermal overload. The contactors are smaller than the single contactor used in a Direct on-Line starter as they are controlling winding currents only.
- There are two contactors that are close during run, often referred to as the main contractor and the delta contactor. These are AC3 rated at 58% of the current rating of the motor. The third contactor is the star contactor and that only carries star current while the motor is connected in star.

Hardware Components

1.) TRANSFORMER (230 - 12 V AC) 2.) VOLTAGE REGULATOR (LM 7805) 3.) RECTIFIER 4.) FILTER 5.) RELAY 6.) INDUCTION MOTOR 7.) 555 TIMER 8.) BC 547 TRNSISTOR 9.) BC 558 10.) IN4007 RECTIFIER DIODE 11.) LED 12.) RESISTOR 13.) CAPACITOR

Power Supply Units

Three transformers are used in the of 230V ac and is being stepped down to 12V ac transformer with a current capacitor of 2000mA. The maximum voltage of the secondary side of the transformer can be calculated using equation 3. = √2 = *hh*

The maximum peak voltage is 16.98 volts. The average dc voltage obtained was using the formula given in equation,

= 0.636

V = Average dc voltage, V = maximum voltage

From the maximum voltage is 16.98 volts.

= 0.636 × 16.98 = 10.79

From the calculation the average dc voltage is 10.79 volts. The bridge rectifier rectifies the voltage. The dc voltage after the bridge rectifier can be expressed as,

= − 2()

V = forward voltage drops across.

Delta Starter Using Relays and Adjustable Electronic Timer for Induction Motor together with the efficient working and control of the input and control unit helps prevent motor from burden no-voltage assurance. Step-down transformer Three transformers are used in the design with a supply voltage of 230V ac and is being stepped down to 12V ac transformer with a current capacitor of 2000mA. The maximum voltage of the secondary side of the transformer can be calculated using peak voltage is 16.98 volts. The average dc voltage obtained was using the formula given voltage of the transformer. From equation the maximum voltage is 16.98 volts. From the calculation the average dc voltage is 10.79 volts. The bridge rectifier rectifies the voltage. The dc voltage after the bridge rectifier can be expressed as across the silicon diodes

= 0.7 V = V − 2(0.7) = 16.98 volts

The filter capacitor was used to filter off the ac ripples in the dc voltage, thereby reducing the ripple to a minimal level. The capacitor used in the design is 1000, the ripple voltage in the supply was obtained, V = 2

Were,

f = frequency = 50 Hz, I = regulator output current, For C = 1000uf, I = 500mA

V = 0.5

2 × 50 × 1000 × 10 = 2.27 volts

From this the dc voltage after the filter capacitor

= 16.98 − 2.27 = 14.71

Thus, this voltage obtained from the capacitor is sent into the circuit, one to the 555 timer and the other two to relay1 and relay2. The light emitting diode is connected in series to the limiting resistor. The limiting resistor reduces the current that flows through the diode to prevent high current from flowing through the light emitting diode

From Kirchhoff's voltage rule,

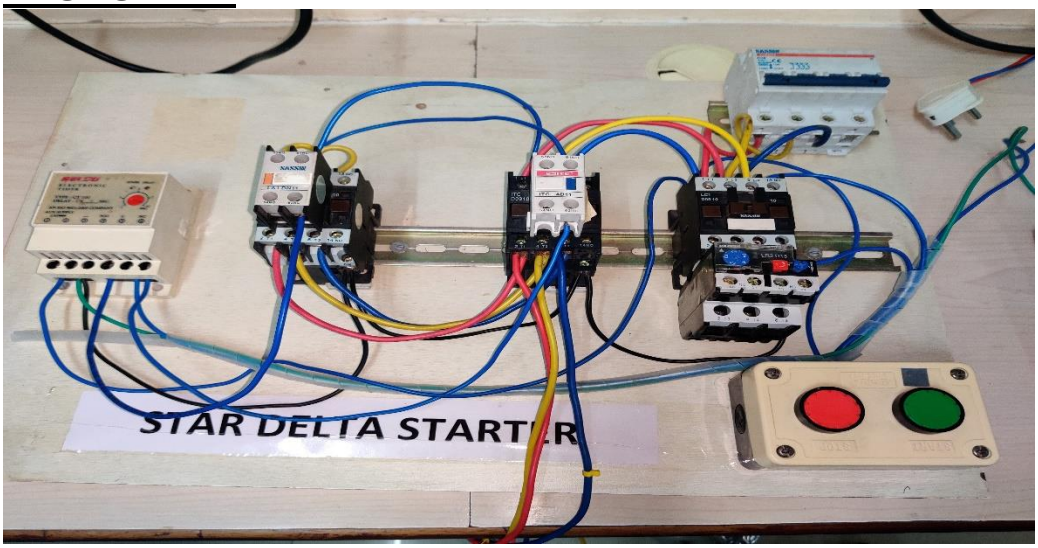
V = V + V= *h* = ×, = 2, = 14.71

Substituting this into the equation,

14.71 = × 1000 + 2

$14.71 - 2 = \times 1000$
$12.71 = \times 1000$
$= 12.71$
$1000 = 13$
The current flowing through the light emitting diode is 13 mA.

PROTOTYPE



CONCLUSION

The starting current of an induction motor is around eight to ten times the motor rated current. The high current persists for a few cycles. Since the windings of the motor are designed to carry maximum of rated current, this high current during starting of the induction motor can cause damage. The delta operation, the lamps glowed with full intensity indicating full supply voltages of 440 volts.

Hence, the authors are motivated to solving this problem. This paper presents a design and construction of an automatic star-delta starter to limit the starting current of the induction motor with the use of reduced starter. Automatic star/delta starter using relays and adjustable electronic timer is used and the starting current and torque is limited to one-third as compared to nine times in open loop.

Chapter 6: Swachh Bharat Abhiyan (Clean India)

Swachh Bharat Abhiyaan:

- Swachh Bharat Mission is a mass movement for cleanliness launched on 2nd October 2014 by the Prime Minister of India.
- The Swachhta Abhiyan has turned into a National Movement with citizens now becoming active participants in cleanliness activities across the nation.
- The dream of a 'Clean India' once seen by Mahatma Gandhi is being realized with millions of people across the country joining the cleanliness initiatives of the government departments, NGOs and local community centers to make India clean as a part of this "**Jan Andolan".**

6.1 Swatchhta needed in your village:

Low-cost toilet in village:

- Low on cost and high on water efficiency, a smart toilet solution for rural India is what the National Environmental Engineering Research Institute (NEERI) has developed.
- This toilet system hopes to encourage rural India to invest in toilet and simplify maintenance.
- Given that cost of building a toilet and the need for sufficient water to maintain it are cited as common deterrents for building toilets.
- A traditional flush urinal uses 4 liters of water in a single flush. Unavailability of a flushing system also often results I more water required than usual to wash down the waste.
- Other problems in many rural toilets are manually operated urinals which are too high or improperly mounted and prone to getting dirty.
- Maintenance of toilets and urinals is also expensive, resulting in low interest in building these, especially in rural areas.
- The urinal, which has been named as 'Low-Cost Mechanical Automatic Urinal – Toilet Flusher' was designed to overcome the basic challenges of excessive water usage in toilets and urinals.
- The objectives to develop the flush system were to ensure minimum maintenance as the flush will automatically and regularly wash the urinal every time it is used.
- The flush system can also be fixed with new and existing urinals, and hence there is no need to construct urinals afresh to fit the NEERI developed flush system.
- The flush system consists of a mechanical platform which gets compressed under the weight of a person standing on it.
- The spring mechanism with which the flush system is fitted, allows the inlet to be opened filling the in-built water reservoir, which in turn releases the water into the urinal.
- Flusher thus works without electricity and is dependent completely on its in-built mechanisms.

ZANU village system of waste disposal:

- In this photo, we can see this people are throwing garbage on the open ground because there is no waste disposal system in the village.
- And we have suggested a compost pit for all village to dump the waste so no pollution is occurred in that area and people don't get ill.
- Fertilizer that will be generated by compost pit will useful to the people of the village.
- In our village there are public toilet, individual toilet and community toilet.

But the maintenance of community toilet and public toilet is done in a proper way there is an issue regarding the cleanliness of the public and community toilet.

6.2 Guideline for the process of implementation of SBA:

Mission Objectives

- Elimination of open defecation
- Eradication of Manual Scavenging
- Modern and Scientific Municipal Solid Waste Management
- To effect behavioral change regarding healthy sanitation practices
- Generate awareness about sanitation and its linkage with public health Capacity Augmentation for ULBs to create an enabling environment for private sector participation in Capex (capital expenditure) and Opex (operation and maintenance) Mission Strategy.
- The estimated cost of implementation of SBM (Urban) based on unit and per capita costs for its various components is Rs. 62,009 Crore.
- The Government of India share as per approved funding pattern amounts to Rs. 14,623 Crore. In addition, a minimum additional amount equivalent to 25% of GoI funding, amounting to Rs. 4,874 Crore shall be contributed by the States as State/ ULB share.
- The balance funds are proposed to be generated through various other sources of fund which are, but not limited to:
- Private Sector Participation
- Additional Resources from State Government/ ULB

- Beneficiary Share
- User Charges
- Land Leveraging
- Innovative revenue streams
- Swachh Bharat Kosh
- Corporate Social Responsibility
- Market Borrowing
- External Assistance

❖ **Mission Components:**

Household toilets, including conversion of insanitary latrines into pour-flush latrines

- Community toilets
- Public toilets and urinals
- Solid waste management
- IEC & Public Awareness
- Capacity building and Administrative & Office Expenses (A&OE)

6.3 Activates done by students for village to clean:

- While traveling doesn't throw any wrapper, paper or any dry waste on road. Keep it in your bag or pocket (as it is a dry waste you can keep them in your bag/pocket).
- Keep paper bags with yourself to store wet waste and throw them in dustbin only.
- Avoid Spitting on roads (as it can be the reason of viral disease).
- Avoid chewing Pan-Masala, Gatka and Tobacco.
- Avoid use of plastic bag.
- Follow government's rules and regulations.
- If someone is breaking the rule then make them aware of it.
- Stop your friends if they are making such mistakes.
- Spread awareness to keep our village clean.

❖ Education start-ups can also partner with other schools for spreading awareness among the adults in rural areas. If the elderly populace of villages does not comprehend the value of education, they won’t allow their children to study.

Chapter 7 Village condition due to COVID-19:

- Ahmedabad: Villages and small towns in Ahmedabad's outskirts have witnessed 20 cases of Covid-19 positive.
- The Daskroi taluka has seen 13 cases including the two who tested positive for Covid-19 from Prajapati Vas in Jetalpur of Daskroi taluka on Friday.
- Dholka, Detroj and Dholera have not witnessed any case of infection.
- A total of 919 samples have been taken for tests of which 20 have tested positive for the virus. Five people have recovered from the disease.
- District officials say that 73,884 people have been screened for Covid-19 symptoms in Ahmedabad's outskirts, while 1.75 lakh people have been surveyed.
- There have been four cases from a society at Prashanti Homes in Bopal area.
- Two cases were registered from Prajapati Vas, one case each from APMC-Jetalpur and Jetalpur town.
- In Shela area, there was a single Covid-19 case from Greenwoods, while another from Vraj Home.
- In all, there are 75 people who are under quarantine who came in immediate contact with Covid-19 patients.
- Some 39 healthcare contacts too are under quarantine across various talukas.
- "We have introduced a special Covid-19 screening van which provides enough protection to our health workers and helps collect samples very efficiently.

7.1 Taken steps in allocated village related to existing situation:

Gram Yoddhas stand guard against corona:

- Ahmedabad: On the outskirts of Zanu village in Daskroi taluka, a group of youths stop a bike on Thursday morning.
- The man identifies himself as a health worker and shows his identity card after which his details are noted in a register and he is allowed to go.
- But first, his temperature is recorded with a thermal gun which was procured by the panchayat a fortnight ago.
- Harpalsinh Vaghela, talati-cum-mantri of the village, says that ever since the lockdown was announced, the village has been implementing it stringently.
- "A group of village youths are stationed right at the entrance of the village with the temperature gun and a register.
- They form our Gram Yoddha or fighters of the village," he says. "They know everybody in the village.
- Thus, they ensure that nobody goes out or comes in without a valid reason. We even encourage those working in farms to stay on the farms if possible.

7.3Any other steps taken by villagers:

- In times of a pandemic, the elderly in Ahmedabad villages step up the two elderly men, who are part of a 'Gram Yoddha (Village Warrior)' committee, were entrusted with the task of ensuring compliance of the lockdown in their village three days ago.
- As part of the initiative, they have blocked the main entrance of their village with twigs, bamboo shoots and steel wires. A notice barring the entry of any 'outsider' in the village has also been put up.
- The clock strikes four in the evening and two elderly men — donning white turbans and holding wooden sticks — arrive at the entrance of Tragad village on the outskirts of Ahmedabad. They keep a watchful eye on the minimal traffic on the road amid the nationwide lockdown in an attempt to contain the spread of coronavirus.
- The two elderly men, who are part of a 'Gram Yoddha (Village Warrior)' committee, were entrusted with the task of ensuring compliance of the lockdown in their village three days ago.
- As part of the initiative, they have blocked the main entrance of their village with twigs, bamboo shoots and steel wires. A notice barring the entry of any 'outsider' in the village has also been put up.
- However, as COVID-19 cases steadily rise in the city and hints of a lockdown extension are being dropped by various state governments, it is becoming increasingly difficult for the 'yoddhas' to implement the lockdown. Since Tragad — a village with a population over 5,000 people — is managed by the Ahmedabad Municipal Corporation (AMC), there is no sarpanch in this village, thereby making the initiative a voluntary effort on behalf of the villagers.
- "We only allow dairy owners to herd their cattle outside the village in the morning and evening as they belong to essential services.

- All other residents have been prohibited from leaving the village unless it's extremely urgent.
- Young boys and men, who have a habit of venturing out in the evening, have stopped after we issued warnings to them. Now, they are not even allowed to assemble outside their houses…but we are not sure if they will listen to us till the end of April.
- The government has to introduce some clarity on the lockdown period," said Jagabhai Thakore (68), a senior citizen of Tragad village.
- Like Tragad, there are a total of 464 villages in Ahmedabad's rural area that are now imposing voluntary lockdown and assisting the police and administration officials in the combined fight against the pandemic.
- While the walled city of Ahmedabad is being sealed and managed by the police and municipality officials, and high-rise societies have their security guards to fall back on, the responsibility of imposing the lockdown in villages is being entrusted to Gram Yoddha committees.
- According to Ahmedabad District Development Officer Arun Mahesh Babu, the initiative was introduced after the city area saw rising clusters of COVID-19 patients.
- "In each of the 464 villages, the Gram Yoddha committee consists of a sarpanch, talati, two senior citizens and a teacher, who are supposed to keep a record of who is entering and exiting the village and prohibit the entry of street hawkers.
- If it's extremely urgent, villagers may be exempted only after the permission of the committee. The committee will also ensure that there is no dearth of essentials in the village.
- In Zanu village of Daskroi taluka, the Gram Yoddha committee has charted out a schedule for villagers to step out of their houses for buying essentials.
- "We only allow residents to shop from 8 am to 11 am and the dairy owners are allowed to operate two hours each in mornings and evenings. We are a population of 6,000 people and we have not allowed anyone to leave the village for the past one week," said Baldevbhai Thakore, sarpanch of Zanu village.
- Similarly, the residents in Chharodi village have imposed a voluntary lockdown, where the elderly are seen reprimanding youths if they are seen venturing out without any valid purpose.
- Superintendent of Police, Ahmedabad (rural), RV Asari said that the initiative was introduced by the police and administration officials after realizing that villagers have a far better understanding of the threat that the pandemic poses than "educated city residents".
- "We also have 247 women who volunteered to assist the police in implementation of the lockdown at the village level.
- We have created multiple WhatsApp groups of sarpanches and volunteers to keep track of village activities.
- Whenever there is a problem, a police van immediately reaches the spot and the issue is sorted. However, that is only a rarity because villagers have a far better understanding of the crisis," said Asari.

Chapter-8: Sustainable Design Planning Proposal (Prototype Design):

8.1. Design proposal:

- In the Vishwakarma Yojana Phase-VIII Part – I we have given total six design (3 design civil and 3 design electrical) according to the village need and useful for the villagers.

The design proposals are: -

-Village entrance gate
-Primary hospital
-Post office (waste plastics go bricks panels)
-Solar Led
-Electric waste management
-Automatic motor ON/Off

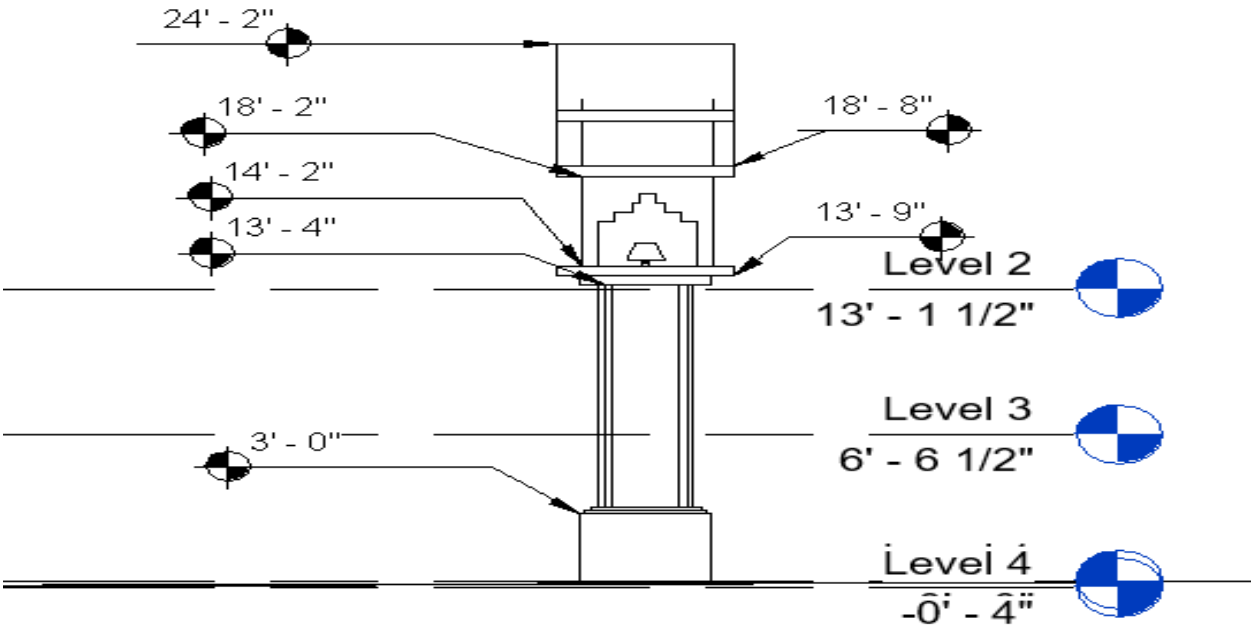
8.1.1 Entrance Gate: -

Design Entrance Gate:

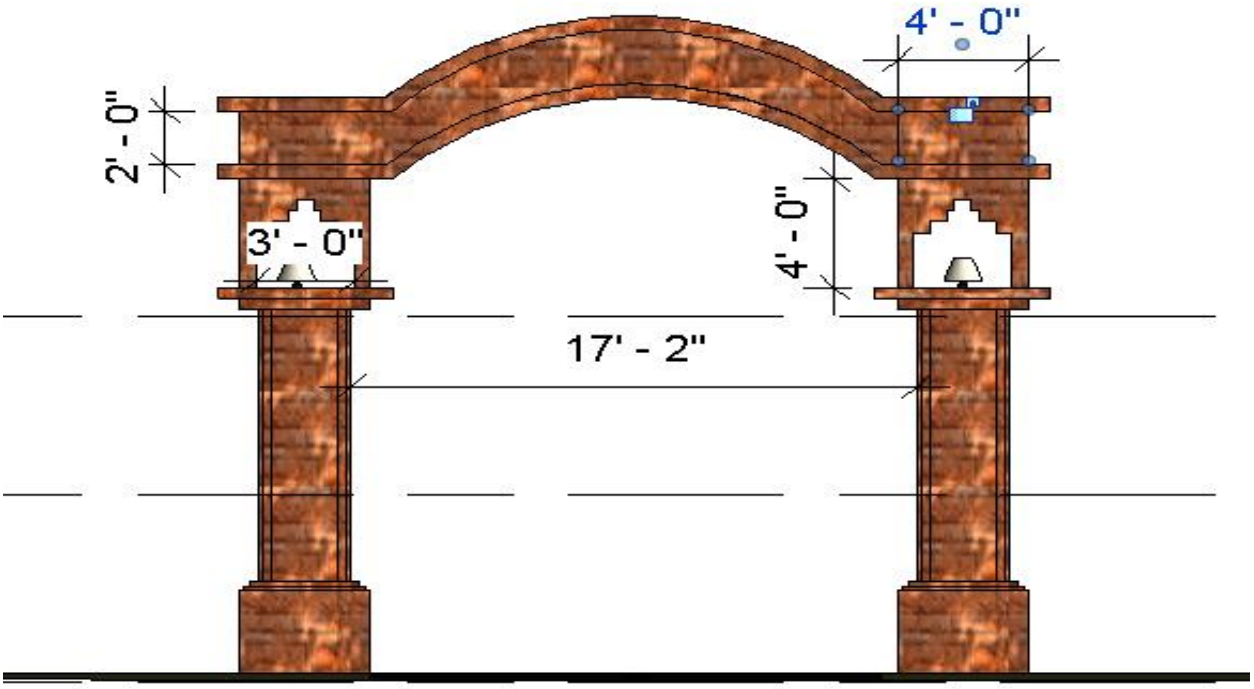
A Gate or Gateway is a point of entry to a space which is enclosed by walls. Gates may prevent or control the entry or exit of individual or they may be early decoratively. Other items of gate include yet and port for purpose of the providing aesthetic view of village gate in front of village.

Advantages:

- Increased security. One of the most important benefits to living in gated communities is the level of security offered to residents. ...
- Controlled access. …
- Slower vehicle speeds. ...
- Pedestrian Safety. ...
- Access to community grounds. ...
- Greater privacy. ...
- Quieter surroundings. ...
- Higher property values.



Side View



Front View

Design:

Design of column:

0.936 m3 * 1450=1357.2 kN
1357.2/4 = 339.3 kN
Pu=339.3 kN
Ag=Gross Section Area
Fck=20 N/m^2
Fy=415 KN/m^2
Assume Ag 2%
Ac=Ag – Asc
Ag - .02Ag
Ac =0.98Ag
Pu = 0 .4FckAc +0.67FyAsc
339.3x10^3=0 .4x20x 0.98Ag
+ 0 .67x415x 0.02Ag =7.84
Ag + 5.561 Ag 339.3x10^3 =
13.401 Ag
Ag= 25319 mm^2

3D view

For square Column

Size of Column = √25319 = 159.12mm
Provide Size of Column = 200X200 mm
Ag = 40000 mm^2
Longitudinal Reinforcement
Pu =0 .4x20x 0.98Ag + 0 .67x415x 0.02Ag
339.3x10^3= .4 x 20 x (200x200 – Asc) + .67 X 415 x Asc
339.3x10^3 = 320000 – 8Asc + 278.05 X Asc
Asc = 71.47 mm^2
Provide 8mm ∅ 2Number Steel bar
Provided Steel 702.95 mm^2
Diameter of Lateral Tie = 25 mm=6 mm
Provide 6 mm ∅ Lateral Tie
Pitch of lateral ties:
i) Least lateral Dimension = 200 mm
i) 16X dia. Of smaller bar = 16X8 = 128 mm (AS PER IS :456)
iii) 300 Provide Smaller Pitch
128 mm pitch
6 mm ∅ - 128 mm C/C

Design of Footing:

Column size = 200x200 mm

SBC (soil baring Capacity) = 280 KN/m2 M20 & Fe 415

A) Area of Footing

Load of Two Column = 2750 KN

Area of Footing = Total Load/SBC

= 2750/280 = 9.82 m2

Assume Width of Footing b=2 m.

Length of Footing = A/b=9.82/2 =4.95 m

Area of Footing = 2x4.95 =9.9 m2

B) Moment and Shear

Upward Pressure = 2750/9.9

= 277.77 < 280 SBC ok.

Factored Upward Pressure = 1.5x2750/9.9 =416.67 KN/m2

Net Upward Pressure Per m Width = 416.67x2 = 833.33 KN/m2

Shear Force Calculation ↑|↓ +Ve

S.F at left of A = 833.33x1.6 = 1333.33 KN

S.F at Just Right of B = 1333.33 – 1375 = -41.67 KN

S.F at Left Of B = -41.67+833.33 = 791.66 KN

S.F at Right of B=791.66-2062.5 = -1270.84 KN

C) B.M Calculation

MA (L.H.S) = 833.33x1.6x(1.6/2) = 1066.66 KN.M

MB (R.H.S) = 833.33x1.6x(1.6/2) = 1066.66 KN.M

ME (L.H.S) = 833.33x3.33x(3.33/2) – 1375x.875= 3413.1 KN.M

D) Depth of Footing

Mu max = 3413.1 KN.M

Mu lim. = .138 Fck bd2 (Is:456)

3413.1X106 = .138x20x1500xd2

d = 1572.66mm

d = 1600 mm

Assume effective Cover 50mm

D = 1600+50= 1650 mm

E) Reinforcement For Hogging (-Ve) B.M in Longitudinal Direction

Max Hogging Moment Between Column A&B

At Point E = 3413.1 KN.M

Area of Steel

Mu/bd2 = 3413.1X102 / 2000 x 16602

Pt = .195 % (As per IS : 456)

Pt =.195 % > .12% ok.

Ast = (.195/100)x2000x1600 = 6240 mm2

Provide 22 Ø - 17 Number 2 mm width over Top Surface

Reinforcement Below B&A

Mu/ bd2 = 1066.60x102 / 2000x16002 = .03

Pt = .058 %

AS per IS:456 minimum Pt = .12%

Ast= (.12/100) X 2000 X 16002 = 3840 mm2

Consider 20 Ø mm (Ast = 314 mm2)

No of Bars = 3840/314.15 = 12.12 NOS

13 Number Of bar is Provided

Provide 20Ø - 13 NOS Uniformly

2m Width Below Column At Bottom

Ast provided = 13x314.15 = 4083 mm2

F) Transverse Reinforcement

The Footing Will Bend Transversely Near each Column Face

Projection beyond Face Of Column = (2000-200) / 2 = 900 mm

Below Column

B= b + 2x1600 = 3450 mm

W =2038.87/(1.5x3.45) = 393.98 KN

Max B.M

$M = wl^2 / 2 = (393.78 \text{ X } 0.9^2) / 2 = 159.48$ KN.M

d for Transverse Steel = 1600 – 20 (effective cover) = 1580 mm

Assume Pt = .12 % (minimum) As Per is IS:456

Ast = (.12/100) X 1000 x 1600 = 1920 mm2

Consider 16 mm Ø(Ast = 201.6 mm2)

SPACING = (201.06 / 1920) x 1000 (b= 1000 mm Design as per meter length) = 104 .71 mm

Provide 16 mm Ø @ 100 C/C .

Measurement Sheet:

Item no.	Item description	No.	L (m)	B (m)	H (m)	Qnty.
1.	Excavation in foundation	2	9.785	2	1.8	70.45

2.	**R.C.C. Work for foundation Slab (1:1.5:3):** **Materials:** Cement Sand Aggregate **Steel:** 12 dia.-180 mm c/c 22 dia.-200 mm c/c	2 96 bags 9.5 21.06 16 12	9.785	2	1.6	63.2 96 bags 9.5 m^3 21.06m^3 272.2 kg 358.86 kg
3.	**Column:** Cement Sand Aggregate **Steel:** 8 dia. Main bar Stirrups 6 mm dia.	2 17 bags 0.68 1.2 2 34	1.45 5 1.150	0.2	5	2.9 m^3 17 bags 0.68 m^3 1.2 m^3 160 kg 340 kg
4.	**Steel bars:** 20 mm dia. 8 mm dia.	 2 3	 10 10	 - -	 - -	 24.69 kg 3.59 kg

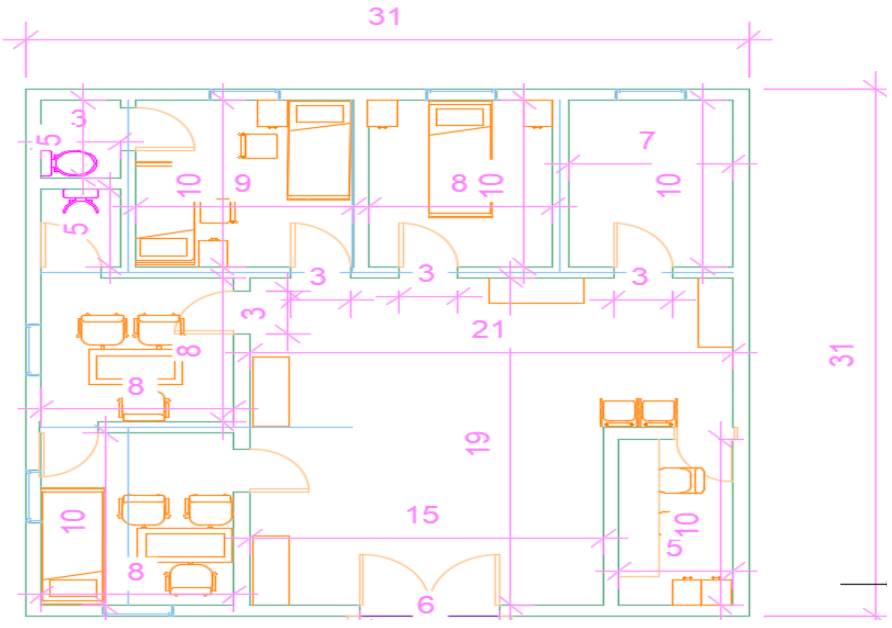
Abstract Sheet:

Item no.	Particulars of items	Qnty.	Rate	Per	Amount Rs.
1.	**Excavation in foundation**	70.45	90	M^3	6340.5Rs.
2	**R.C.C. Work for foundation Slab (1:1.5:3):** 63.2				

	Materials:				
	Cement				
	Sand	96 bags	285	Bags	27360
	Aggregate	9.5	805	M^3	7647.5
	Steel:	21.06	998	M^3	21017.88
	12 dia.-180 mm c/c				
	22 dia.-200 mm c/c				
	Labor:	272.2	50	Kg	13610
	Mistry				
	Mason	358.86	50	Kg	17943
	Male Coolie				
	Female Coolie	2	500	Day	1000
	Bhistie	4	400	Day	1600
		10	250	Day	2500
		14	200	Day	2800
		8	200	day	1600
3	**RCC Column:**				
	Cement	2.9			
	Sand	17	285	Bag	4845
	Aggregate	0.68	805	M^3	547.4
	Steel:	1.2	998	M^3	1197.6
	8 dia. Main bar				
	Stirrups 6 mm dia.				
	Binding Wire	160	50	Kg	8000
	Labour:				
	Mistry	340	50	Kg	17000
	Mason	-			150
	Male Coolie				
	Female Coolie	1	500	Day	500
	Bhistie	2	400	Day	800
		2	250	Day	500
		2	200	Day	400
		1	200	Day	200

4	**Painting:**	10.79	800	M^2	8632
5	**Steel bars:** 20 mm dia. 8 mm dia.	 24.69 3.59	 50 50	 Kg kg	 1234.5 179.5 TOTAL COST:1,47,804.88RS. + 3%contigencies=4500 Rs. + 2% for establishment=2789Rs . **GRAND TOTAL:1,55,093.88 RS.**

8.1.2 Primary hospital center



2d view

Elevation view

3d view

QUANTITY SHEET:

Table 12.7 QUANTITY SHEET OF MATERNITY HOME

Item no.	Item description	No.	Length (m)	Width (m)	Height (m)	Qty.
1	EXCAVATION FOR FOUNDATION	1	38.27	0.9	1.1	37.88m^3
2	PCC (1:4:8)	1	38.27	0.9	0.2	6.88m^3
3	BRICK MASONARY UPTO PLINTH LEVEL					
	STEP OF 0.5M WIDTH	1	41.27	0.5	0.3	6.19
	STEP OF 0.4M WIDTH	1	42.02	0.4	0.3	5.04
	FIRST STEP	1	1.2	0.6	0.150	0.108
	SECOND STEP	1	1.2	0.3	0.150	0.054
					Net brick work	11.392m^3
4	BRICK MASONARY ABOVE PLINTH LEVEL UPTO SLAB C.M (1:6)	1	43.33	0.225	3	29.24 m^3
	DEDUCTION FOR DOORS					
	D1	3	1	0.225	2	1.35
	D2	3	1	0.225	2	1.35
	WINDOWS	9	1	0.225	1	2.025
	LINTEL					
	DOORS	6	1.3	0.225	0.15	0.263
	WINDOWS	9	1.3	0.225	0.15	0.39
					Net brick work	23.86m^3
5	PARAPET WALL	1	43.33	0.225	1	9.74m^3

6	RCC WORK					
	SLAB	1	9.45	14.45	0.15	20.48

	LINTEL	1	19.5	0.225	0.15	0.658
					Total RC C work	21.13m^3
7	FLOORING	1	8.5	13.3		113.05m^2
8	INSIDE SMOOTH PLASTER OF WALL AND CELLING (10 MM THICK)					
	PATIONT ROOM 1	2	2.7		3	16.65m^2
		2	5.00		3	30
	PATIONT ROOM 2	2	2.7		3	16.65
		2	5.1		3	30.6
	PATIONT ROOM 3	2	4.2		3	25.2
		2	4.8		3	28.2
	WAITING ROOM	2	6.2		3	37.2
		2	4.1		3	24.6
	DOCTOR OFFICE	2	4.7		3	28.2
		2	4.5		3	27
	WC	2	1.5		3	9
		2	3.2		3	19.2
	CELLING					
	PATIONT ROOM 1	1	2.7	5		13.5
	PATIONT ROOM 2	1	2.7	5.1		14.2
	PATIONT ROOM 3	1	4.2	4.8		20.1

	WAITING ROOM	1	6.2	4.1		25.4
	DOCTOR OFFICE	1	4.7	4.5		21.1
	WC	1	1.5	3.2		4.8
					TOTAL PLASTER	391.6m²
	DEDUCTION FOR DOORS AND WINDOWS					
	DOORS	3	1		2	6
	WINDOWS	5	1		1	5
					NET PLASTER	380.6m²

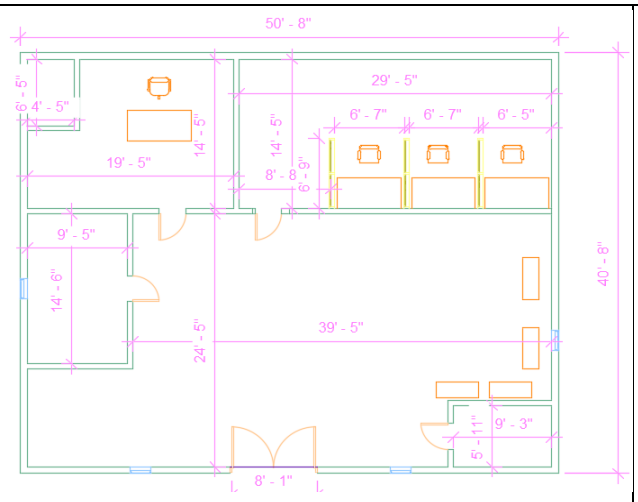
ABSTRACT SHEET:

Table 12.8 ABSTRACT SHEET

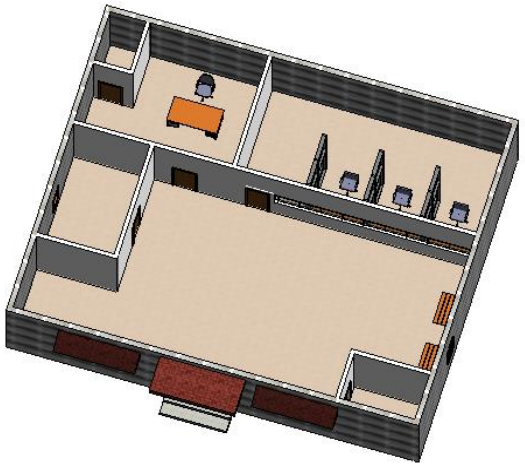
SR. NO.	ITEM DISCRIPTION	QUNTITY	RATE	PER.	AMOUNT (RS.)
1	EXCAVATION IN FOUNDATION	37.88m³	160.55	m³	6081.63
2	PCC (1:4:8) IN FOUNDATION	6.88m³	3300	m³	22704
3	BRICK MASONARY UPTO PLINTH IN C.M (1:6)	11.392m³	3250	m³	37024
4	BRICK MASONARY ABOVE PLINTH UPTO SLAB LEVEL IN C.M (1:6)	33.6m³	3500	m³	117600
5	RCC WORK IN SLAB AND LINTEL	21.13m³	8920	m³	188479
6	FLOORING	113.05m²	700.50	m²	79191.52
7	PLASTER WORK IN WALLS AND CELLING IN 10 MM THICK	380.6m²	90	m²	34254

Total Rs.485334.15

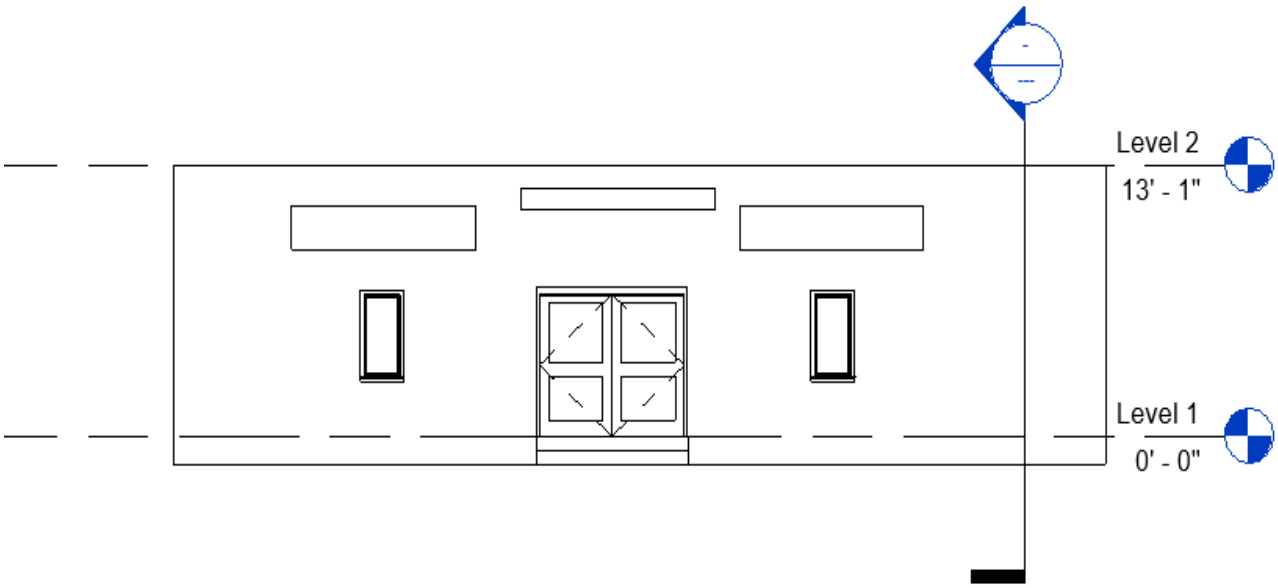
8.1.3 Physical design: -Post office (Waste plastic Lego-bricks panels)



2d plan



3d plan



ELEVATION PLAN

LEGO BRICKS

Table 39. Civil estimation of post office **Total Centre line length**						
L=9.29x2=18.58 m						
L=9.30x2=18.6 m						
L=3.348x4=13.392 m						
L=1.52x2=3.04 m						
L=1.214x1=1.214 m						
Total Centre line length = 54.83 m						
Total no of Junction=8						
Sr No.	**Item Description**	**No.**	**Length (m)**	**Width (m)**	**Height (m)**	**Quantity (m^3)**
1	**Plain cement concrete in**					
	foundation in 1:3:6	1	51.23	0.9	0.3	**13.8321**
2	**Brickwork in foundation**					
	up to plinth					
	Step 1					
	L=54.83-0.5*0.6*8					
	=52.43m	1	52.43	0.6	0.2	6.2916
	Step 2					

	L=54.83-0.5*0.5*8					
	= 52.83m	1	52.83	0.5	0.2	5.283
	Step 3					
	L=54.83-0.5*0.4*8					
	=56.43 m	1	56.43	0.4	0.2	4.5144
	Step 4					
	L=54.83-0.5*0.3*8					
	=53.63 m	1	53.63	0.3	1.2	19.3068
	h= (1.5-0.3-3*0.2) +0.6 =1.2m					
				Total Quantity		**35.3958**
3	**Parapet wall**					
	L=38.38 m	1	38.38	0.3	0.91	**10.4777**

Abstract sheet					
No.	**Item Description**	**Quantity**	**Rate**	**Per**	**Amount Rs.**
1	Plain cement concrete in	13.8321	600	m3	8299.66
	foundation in 1:3:6				
2	Waste plastic Lego brick brickwork up to plinth				
	in C.M. 1:6	35.3958 m^3	1500	m3	53093.7
3	Brickwork for parapet wall	10.4777 m^3	2200	m3	23050.94
		Add 5% contingencies			5899
				Rs.	**84444.3**

Table 39. Civil estimation of post office

8.1.7 Electrical Design 1: - Solar LED Street Light System

Abstract: -

Today, all count words are about how to enhance the electrical grid reliability during the peak instant. The direct solution for the grid is to cut off some loads to keep its stability. One of these loads is the street lighting especially during the summer period. The paper purpose as energy-free system for street lighting as there is no demand from the grid. A standalone solar street LED light system is proposed.

The lamp, Power Conditioning System (PCS) and the controller which can manage the power direction and system operation. Using LED in lighting application has many advantages compared to other lamp. It is very efficient lamps and cost effective. In additions to, it needs low dc voltage source to be operated. The storage system will be charged during the day time using the available sunlight. On the other hand, during the night time the controller will give a signal to the system to connect the LED lamp to the ready for use. Since the LED needs a low dc voltage to be operated, a simple dc-dc converter will be enough for the system resulting in decreasing the cost of the overall system. Moreover, a low-cost microcontroller is proposed to handle the operation of the whole system. Applying the idea in the Egyptian streets enables the reduction of more 50% of the total required energy by HID lamps that enable the use for small PV system. By this purposed system, streets can be illuminated with lower power lamps, no operating costs, no CO2 emissions, grid energy-free and environmentally friendly.

ZANU VILLAGE STREET LIGHT CONDITION

Index Term: -

- Energy-free system
- LED
- Microcontroller
- PV panel
- Street lighting

Introduction: -

Today world is facing an energy shortage due to the increase of the average consumption of energy per capita. This LED to continuous decrease of the world storage of oil and natural gas. Also, pollution problems have been highlighted as the source of stresses on the ground life. Therefore, Renewable Energy Technologies have drawn tremendous interest worldwide to find solutions for world energy crisis. Recently PV systems have found fairly wide applications from large scale PV plants with cumulative power reaches approximately a few tenths of GWP were connected to reaching the grid of a small-scale PV reaching approximately a few tenths of Watts in applications such as Camera, watches, Mobiles, etc. One of these PV applications is the scandal one street lighting system using the most efficient and the cost-effective Light Emitting Diode (LED) lamps. This system consists of PV panel, high quality battery, LED lamp, dc-dc converter, and a controller. This system is not only an environmentally friendly option (requiring no power input plus free of pollution), but can also be located anywhere regardless of local grid availability.

The power source is a solar power which is recognized as being an environmentally "clean" form an energy production point of view. PV arrays utilize the sun radiation to produce electricity. These modules do not require fuel to operate. On the other hand, most current street lighting uses high intensity discharge lamps. Recently, searching for new street lighting modules has gained a lot of attention to reduce the amount of energy consumed by this type of lamp and also to reduce the amount of CO2 emissions. LEDs with their current performances have proved themselves to be the most suitable solution for LED street lighting.

Due to the importance of the issue, there are many companies around the world that are now involved in developing, building, and producing these products of streetlight. Also, there is a variety of products with wide range of power and wide range of lamp type used. As shown in figure 1 and 2 the solar street LED light system produced by GEO-Technik.

Fig.1 & 2

What's in demand?

LED streetlights are designed for specific needs and requirements, such as efficiency, longer life, the ability to withstand extreme weather conditions along with the overall need to save energy. Understanding these needs and requirements, the current trend in LED product development and advancement is focused on the efficiency of the product, wherein the lumens output, longevity, thermal management and control systems are key. Overtime, the most obvious change in technology has been the movement from discrete/emitter LEDs to chip-on-board (COB) based LEDs.

How to make a purchase:

The purchase decision for LED streetlights needs to be done carefully, as the investment is high.

Product quality: This covers the streetlight's life, efficiency, ability to withstand extreme environments/weather conditions and the maintenance needed, including after sales service.

Watts: The lower the watts, the less electricity the LED will consume.
Lumens: Lumens are a measure of brightness or light output. The more the lumens per watt, the better the light. Lumens per watt vary with the beam angle.
Beam angle: Typically, an LED light has a beam angle of 120 degrees but down lighters have different beam angles, so it's important to choose the right beam angle for your specific needs.
Color: LEDs are available in various colors from white (day light) to yellow (warm light). Choose the color as per your preference.

Opportunities: -

LED streetlights will offer substantial business opportunities in the long run for lighting companies, primarily because of the government's "100 Smart Cities" program. LED street lighting systems will be a key contributor in this program, ensuring greater returns through turnkey projects. According to the report by 6W research, Central and state governments are replacing the traditional sodium vapor streetlights with LEDs in several ongoing pilot projects across cities and states including New Delhi, West Bengal, Maharashtra, Andhra-Pradesh, Gujarat and Punjab.

How it Works

The circuit can be used as an automatic day night operated light controller system or a simple light activated switch. LDR which is the prime sensing component of the circuit. The transistors are basically arranged such that they both complement each other oppositely, meaning when the left-hand side transistor conducts, the right-hand side transistor switches OFF and vice versa. The left-hand side transistor T1 is rigged as a voltage comparator using a resistive network. The resistor at the upper arm is the LDR and the lower arm resistor is the preset which is used to set the threshold values or levels. T2 is arranged as an inverter, and inverts the response received from T1.

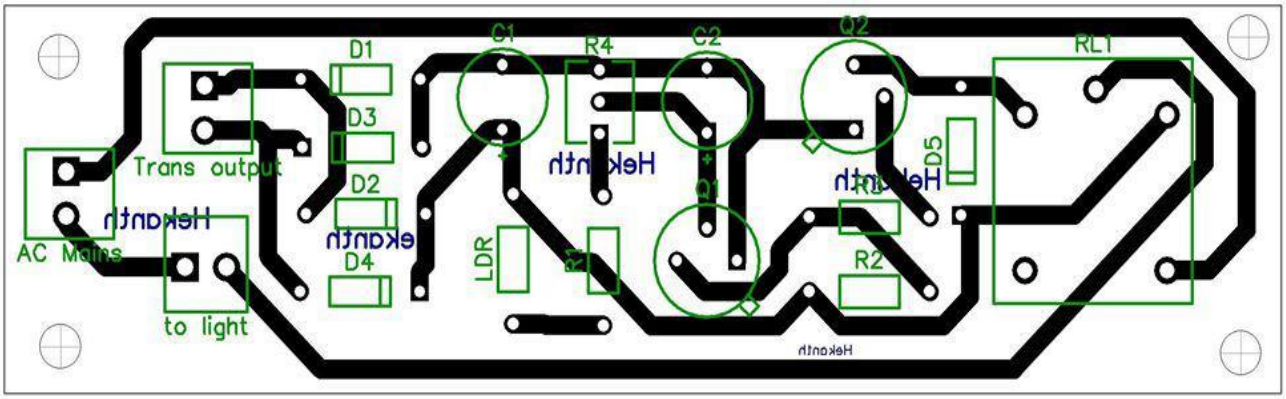
How the LDR Works

Assuming the light level is less, the LDR sustains a high resistance level across it, which does not allow enough current to reach the base of the transistor T1. This allows the potential level at the collector to saturate T2 and consequently the relay remains activated in this condition. When the light level increases and becomes sufficiently large on the LDR, its resistance level falls, this allows more current to pass through it which eventually reaches the base of T1. The transistor T1 conducts, pulling its collector potential to ground. This inhibits the conduction of the transistor T2, switching OFF its collector load relay and the connected lamp.

Power Supply Details: -

The power supply is a standard transformer, bridge, capacitor network, which supplies a clean DC to the circuit for executing the proposed actions. The whole circuit can be built over a small piece of board and the entire assembly along with the power supply may be housed inside a sturdy little plastic box. The LDR must be placed outside the box, meaning its sensing surface should be exposed toward the ambient area from where the light level is required to be sensed. Care should be taken that the light from the lamps does not in any way reach the LDR, which may result in false switching and oscillations.

PCB Design: -



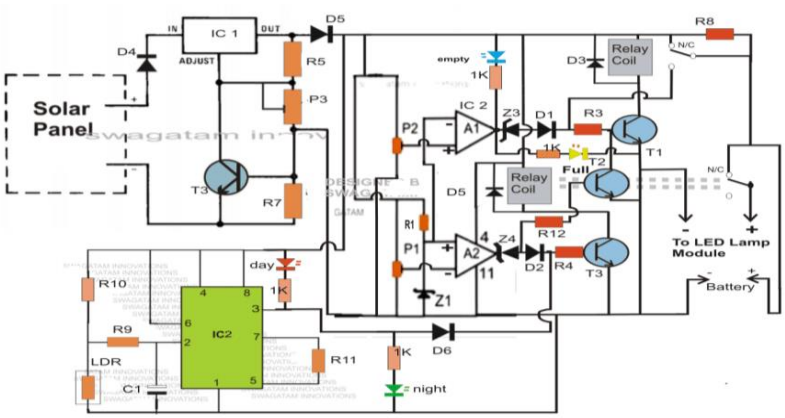
Using opamp IC 741

Working Description:

Here the IC 741 is designed as a comparator, wherein its non-inverting pin-3 is connected to a 10k preset or pot for creating a triggering reference at this pin-out. Pin-2 which is the inverting input of the IC is configured with a potential divider network made by a light dependent resistor or LDR and a 100K resistor. The 10K preset is initially adjusted such that when the ambient light on the LDR reaches to the desired darkness threshold, the pin-6 goes high. This is done with some skill and patience by moving the preset slowly until pin-6 just goes high, which is identified by the switching ON of the connected relay and the illumination of the red LED. This must be done by creating an artificial darkness threshold light level on the LDR inside a closed room and by using dim light for the purpose. Once the preset is set, it may be sealed with some epoxy glue so that the adjustment remains fixed and unchanged. After this the circuit may be enclosed inside a suitable box with a 12V adapter for powering the circuit, and the relay contacts wired with the desired road lamp. Care must be taken to ensure that the lamp illumination never reaches the LDR, otherwise it may lead a continuous oscillation or flickering of the lamp as soon as it is triggered at twilight.

LED Lamp Specifications: -

Voltage: 12 volts (12V/42AH Battery)
Current Consumption: 3.2 Amps - 12 volts
Power Consumption: 39 watts by 39nos of 1-watt LEDs
Light Intensity: Approximately around 2000 lm (lumens)



Charger/Controller Specification: -

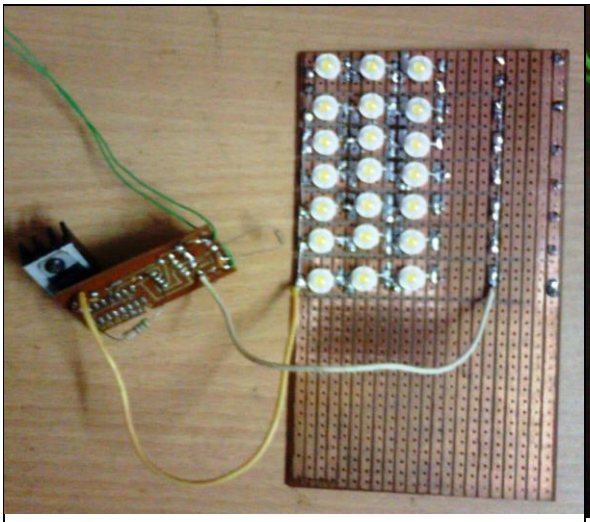
Input: 32 volts from a solar panel specified with around 32 volts open circuit voltage, and short circuit current of 5 to 7 Amps.

Output Max: 14.3 volts, current limited to 4.4 Amps
Battery Full: Cut OFF at 14.3 volts (set by P2).
Low Battery: Cut OFF at 11.04 volts (set by P1).
Battery charged at C/5 rate with float voltage restricted to 13.4 volts after "battery full cut OFF".
Automatic Day/Night Switching with LDR Sensor.
In this first part of the article, we will study the solar charger/controller stage and the corresponding over/low voltage cut-off circuit, and also the automatic day/night cut-off section.

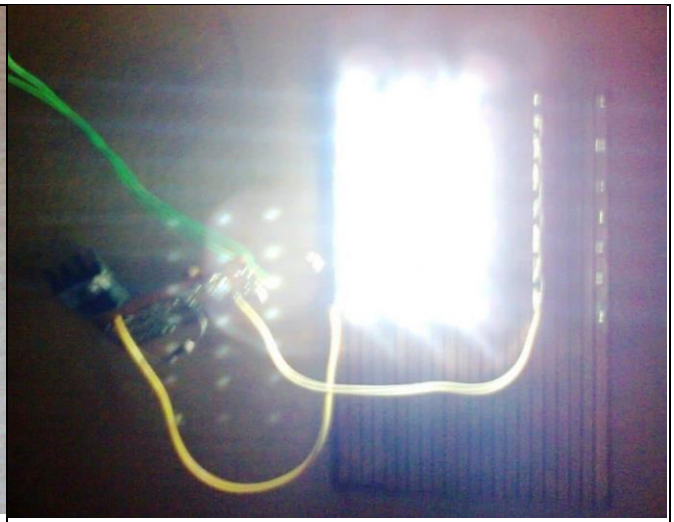
The above design can be much simplified by eliminating the IC 555 stage and by connecting the day time relay cut OFF transistor directly with the solar panel positive, as shown in figure;

Parts List: -	
R1, R3,R4, R12 = 10k	T1-T4 = BC547
R5 = 240 OHMS	A1/A2 = 1/2 IC324
P1, P2 =10K preset	ALL ZENER DIODES = 4.7V, 1/2 WATT
P3 = 10k pot or preset	D1-D3, D6 = 1N4007
R10 = 470K,	D4, D5 = 6AMP DIODES
R9= 2M2	IC2 = IC555
R11 = 100K	IC1 = LM338
R8=10 OHMS 2 WATT	RELAYS = 12V,400 OHMS, SPDT
BATTERY = 12V, 42AH	
SOLAR PANEL = 21V OPEN CIRCUIT, 7AMP SHORT CIRCUIT.	
Solar Charger/Controller, High/Low Battery Cut OFF and Ambient Light Detector Circuit	

Prototype Images: -



Simplest Street light prototype



Simplest Street Light Circuit

This simplest automatic street light circuit can be assembled quickly by newbie and installed for achieving the intended results. Built around a light activated concept, the circuit can be used for automatically switching ON and switching OFF a roadway lamp or group of lamps in response

to the varying ambient light levels. The electrical unit once built can be used for switching OFF a lamp when dawn breaks and switching it ON when dusk sets in.

Major Buyers: -

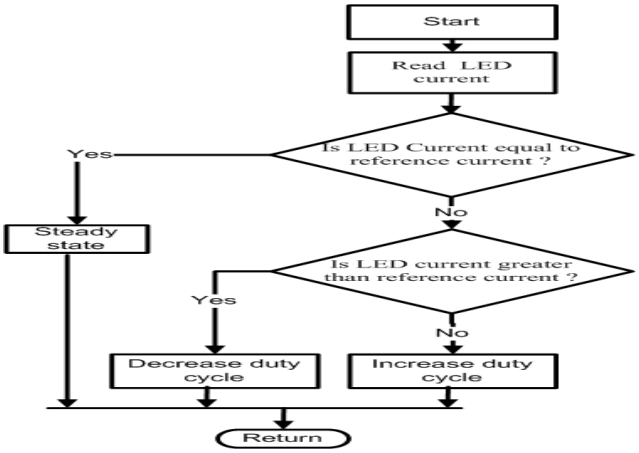
- Municipal corporations
- PSUs
- Railways
- Educational institutions
- Hospitality industry
- Housing societies
- Defense institutions/set-ups
- NHAI (National Highway Authority of India)
- Corporates

Certifications: -

- **IES LM-79**: Luminaire: Electrical and photometric measurements of solid-state lighting products
- **IES LM-80**: Method for measuring lumen maintenance for LED light sources
- **IS 10322**: For general safety, insulation resistance, high voltage, overvoltage protection, environmental tests, endurance tests, etc.
- **IS 1944**: General illumination requirements of the road
- **IS 16104**: Performance requirements for electronic control gear for LED modules.

CAUTION: -

A charge controller is a must for any street light system. You may find other designs on the internet without this feature, simply ignore them. Those can be dangerous for the battery.
Referring to the 40-watt street light circuit diagram above, the panel voltage is regulated and stabilized to the required 14.4 volts by the IC LM 338.
P3 is used for setting the output voltage to exactly 14.3 volts or somewhere near to it.
R6 and R7 forms the current limiting components and must be calculated appropriately as discussed in this solar panel voltage regulator circuit.
The relay connected to T1 specifically controls the overcharge limit of the battery.
The relay connected to T3 is responsible for holding the voltage to the LED lamp stage.
As long as the battery voltage is above the low voltage threshold and as long as no ambient light is present around the system, this relay keeps the lamp switched ON, the LED module is instantly switched OFF in case the stipulated conditions are not fulfilled.



Flow Chart

Battery

Estimate of Solar LED Street Light Configuration (B.O.M): -

The right configuration will not only make the work of the solar led street lamp system more stable, but also lower the cost. The calculation method of solar LED street light system configuration is related to the following factors: -

1.) Power of solar street lamps.
2.) Working hours of the solar panel street light lighting system per day.
3.) Average local peak sunshine duration.
4.) Consecutive rainy days.

The empirical algorithm is as follows:

1.) Power of solar cell components = Total power of LED lamps × Electricity time × Loss coefficient (1.6~2.0)/ local peak sunshine time.
2.) Battery capacity = Total power of LED lamps× Electricity time × Rainy days × System safety factor (1.4~1.8)/ System voltage.

The theoretical algorithm is as follows:

1.) Battery capacity = Total current× Duration/ Residual coefficient (0.7).
2.) Solar panel power = Total power consumption/ System utilization factor (0.6)/ Effective sunshine time. The number of hours used per day is 10 hours.

A) Calculate current I:

I = 60W÷ 12V = 5A.

B) Calculate the battery capacity C, which needs to meet the lighting requirements for 4 consecutive rainy days (4 days plus the lighting of the night before rainy days, 5 days).

Battery capacity C=5A x10h x (4+1) =5A x 50h-250Ah.

In order to prevent overcharge and over discharge of the battery, the battery is generally charged to about 90%. Discharge remaining 5%~20%. So, 250Ah is only 70 to 85 percent of the true standard in the application. In addition, the actual loss should be measured according to the different loads. The actual working current is affected by constant current source, line loss, etc.… which may increase by 15%~25% on the basis of 5A.

C) Calculate the peak demand power "WP" of the panel.

The lighting time of solar street light should be 10hrs every night, at least 20% of the reserve for solar panels should be relaxed. The average effective lighting time of the panels per day is 4.4hrs.
W p÷ 17.4V (solar panel output voltage) = (5A x10h x 120%) by 4.4h.
W p÷ 17.4 V = 13.64.
W p = 240 W.
In addition, in the solar street lamp components, the line loss and controller loss are different, and the actual application may be 15-25%. So 240W is just the theoretical value, it's going to increase depending on the actual situation. Therefore, two solar cell components with peak power of 120~125Wp are selected as the best.

PRODUCT NAME	:	SOLAR STREET LED LIGHTING SYSTEMS
PRODUCT DESCRIPTION	:	**9-watt LED Luminaire, 12V-42AH Lead acid battery, 40WpPv module, control electronics, inter connecting wires/cables, module mounting hardware, battery box.**
PRODUCT COST	:	Rs. 13,850/- with 5 years warranty
STATE SUBSIDY	:	Rs.150/- per watt or 30% of the cost of system, whichever is less from MNRE and Rs 4000/- per street lighting system from State Govt.
USER SHARE	:	Rs.9,850/- without MNRE subsidy. Rs. 5,695/- with MNRE subsidy if project is under cluster mode and subject approval from MNRE, GOI
ELIGIBILITY	:	All categories of Non-commercial institutions/organizations, SNAs, Electricity board, gram- panchayat, zilaparishad, group housing society, Registered colony and municipal councils/corporations.

8.1.8 Electrical Design 2: - E-waste (electronics)

Recycling Waste Circuit Board Efficiently and Environmentally Friendly through Small-Molecule Assisted Dissolution.

Abstract: -

With the increasing amount of electronic waste (e-waste) generated globally, it is an enormous challenge to recycle printed circuit boards (PCBs) efficiently and environmentally friendly. However, conventional recycling technologies have low efficiency and require tough treatment such as high temperature >200 °C and high pressure. In this paper, a small-molecule assisted approach based on dynamic reaction was proposed to dissolve thermosetting polymers containing ester groups and recycle electronic components from PCBs. This effective approach operates below 200 °C and the polymer could be dissolved in a short time. It has a remarkable ability to recycle a wide range of commercial PCBs, including boards made of typical anhydride epoxy or polyester substrate. Besides, it is environmentally friendly as even the recycling

solution could be reused multiple times. In addition, the wasted solution after recycling could be used for board bonding and damage repair. This work also demonstrates the advantage of using polymers containing ester groups as the PCB substrate in consideration of eco-friendly and efficient recycling.

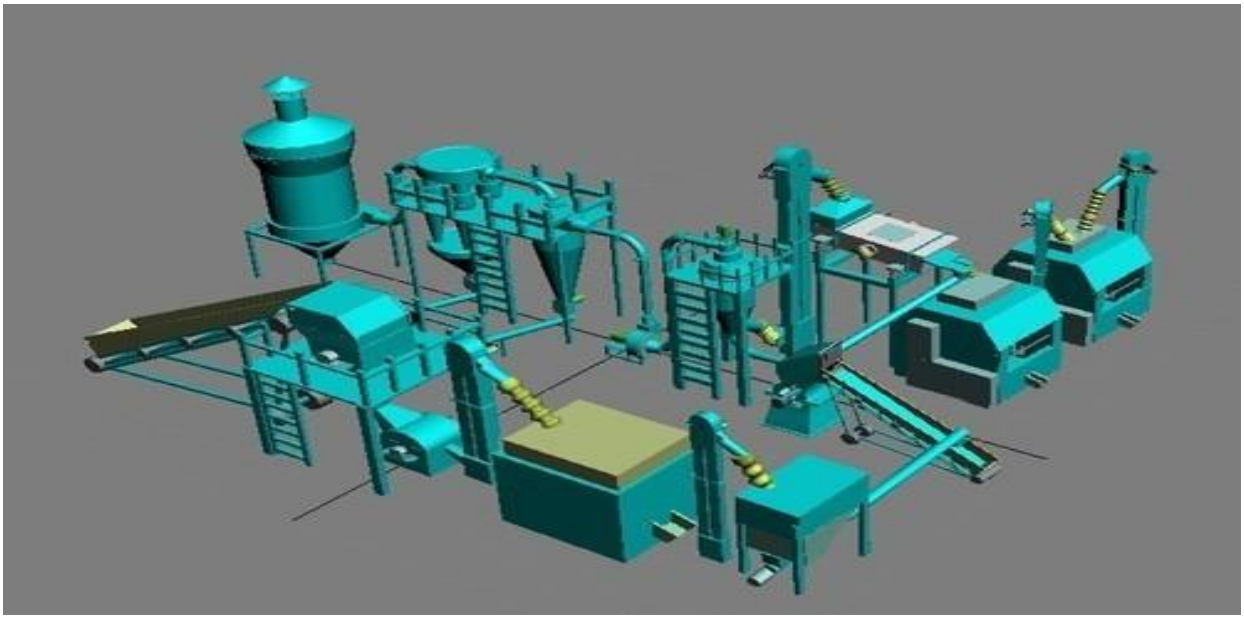
Introduction: -

With the rapid development of the economy, electronic products, such as personal computers, mobile phones, control equipment, and machines, are ubiquitous in modern society. Due to the increasing usage of electronic products, the total amount of electronic waste (e-waste) generated globally has continued to grow at a rate of 3-5% annually. How to manage the e-waste has become a hotly debated issue in the 21st century.

To achieve a sustainable economy, it is necessary to develop innovative green chemistries towards the end-of-life recovery of used products and reuse of recovered materials.
Printed circuit boards (PCBs), the integral part of any electronic products, accounts for a great percentage of the total weight among those typical components dismantled from the e-waste. On one hand, waste PCBs contain heavy metal elements, organic matters such as resin, flame retardants and chemical residuals that may cause a serious threat to the environment as well as human health. In addition, the metallic grade in PCBs is more than a hundred times of that in natural mineral resources. Therefore, recycling waste PCBs plays a critical role in both environmental protection and economic development.

PCBs are commonly composed of fiberglass reinforced epoxy composites, electronic components, and various additives. The most critical step in recycling PCBs is to separate electronic components from the composites through removing or degrading organic materials. In addition, it is better to recycle the fiberglass and other materials like epoxy resin for the further reuse. To date, several recycling technologies using mechanical, chemical and thermal approaches have been investigated. In traditional mechanical recycling methods, waste PCBs are selectively dismantled and crushed and then physical separation using magnetic or electrostatic methods is used to obtain various metal particles. The non-metallic fraction from waste PCBs could also be added as fillers to fabricate high-strength composites. This approach is relatively low cost and environment-benign, making it widely used in many countries.

In addition, the exhaust hazardous fumes and strong chemicals like acid/alkali in the primitive recycling process may lead to serious environmental pollution. Although significant efforts have been invested, efficiently and environmentally friendly recycling PCBs still remains an enormous challenge. One critical issue is how to remove organic materials, which are chemically cross-linked and are designed to be intrinsically stable. To address this issue, research has been conducted to seek alternative matrix material for PCBs. For example, paper-based electronics have been reported to show advantages over traditional organic PCBs in terms of their environmental impacts. However, they are only applicable to some special fields due to their intrinsic drawbacks, such as reliability in the presence of humidity.



E-waste Recycle Machine

E-waste Defined: -

E-waste is any electrical or electronic equipment that's been discarded. This includes working and broken items that are thrown in the garbage or donated to a charity reseller like Goodwill. Often, if the item goes unsold in the store, it will be thrown away. E-waste is particularly dangerous due to toxic chemicals that naturally leach from the metals inside when buried.

What is E-waste? Definition and Why It's Important: -

E-waste is electronic products that are unwanted, not working, and nearing or at the end of their "useful life." Computers, televisions, VCRs, stereos, copiers, and fax machines are everyday electronic products.

The ongoing challenge of how best to dispose of used and unwanted electronics isn't a new one and dates back at least to the 1970s. But a lot has changed since then, particularly the number of electronics being discarded today.

We also have something else today: a term for this issue. After several terms got suggested, including "Digital rubbish," a consensus formed around the simple word "e-waste."

E-Waste Management Recycling Products: -

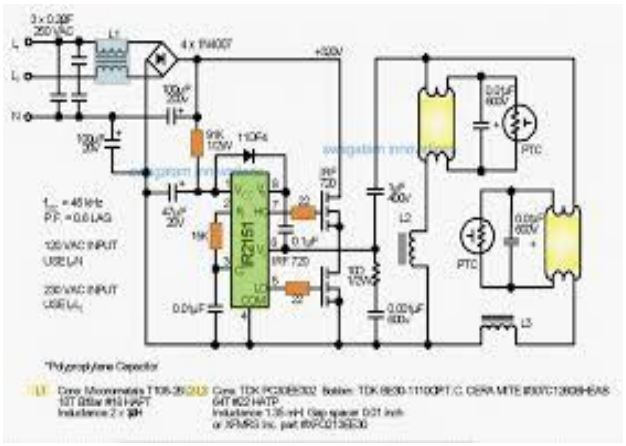
Electronic waste recycling plant is a kind of machinery used to recycling waste appliance, such as waste refrigerator, air conditioner, washing machine, waste computers. When directly put waste appliance into electronic waste recycling plant, the waste appliance goes through first crushing, second crushing, air classification, foam collection, dust removal, magnetic separation, eddy current separation, electronic separation to separated and recycle the iron, copper, aluminum, plastic, insulation foam membrane and others.

Range of Products for E-Waste recycling plants are:

PCB Circuit Board Recycling Machine
Scrap Cable Wire Recycling Machine
Aluminum Plastic Separation Machine
Waste Electric Appliance Recycling Machine

Preparation of composite and circuit board: -

The manual impregnation method was used to prepare the composite materials in this work. Epoxy resin was firstly prepared as follows: DGEBA and MTHPA in solid-state were melted under 100 °C and then DMP-30 (weight ratio 0.02) was added to promote the solidification process. The mole ratio between the epoxy group and the acyl group was 1:1. The glutinous liquid was mixed together at a stirring speed of 300 rpm and then placed in a vacuum chamber to remove the remaining bubbles.



To prepare the composites, an 80 mm × 100 mm glass mold with a specified thickness was prepared and covered with Teflon tape, which was used to prevent epoxy resin from bonding with glass during the curing process. A fiberglass sheet was placed on the mold and was manually impregnated using the mixture obtained in the first step. Then, other layers of glass fiber were placed and the same operation was repeated. After the manual impregnation, the mold was sealed by a Teflon covered glass plate and a 2 kg weight was placed on top to excrete excess resin and ensure the dimensional accuracy. Lastly, curing process was carried out thoroughly in an oven at 80 °C for 2 hr. and at 130 °C for additional 4 hours. After being cooled to room temperature, multilayered epoxy composites were prepared for the following experiments.

To make circuit boards in the lab, a copper foil was firstly used to cover the composite and then an oily pen was used to draw electric lines as designed. Iron (III) chloride solution was used to etch away exposed copper at 50 °C for 20 min. Then, the oily ink was cleaned by alcohol and the desired electronic circuits were obtained. The etching process could be seen in Fig.2. Lastly, electronic components, such as LED, resistors, and capacitors, were soldered onto the circuit board by a welding gun and soldering tin.

E-waste includes:

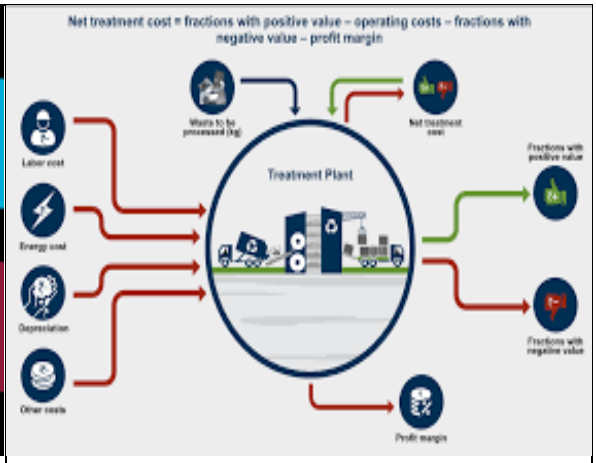
Non-ferrous and precious metals, alloys, glass, ceramics, organic polymers with toxic content, other substances like stabilizers, fillers and pigments.
According to European legislation producers are obliged to ensure the collection of individual types of e-waste from customers.
The collection applies to all types of household e-waste.

Similarly, e-waste is collected from legal and natural persons. Electrical and electronic equipment becomes waste after its delivery to a processor.

E-waste types:

Type 1- Major appliances (refrigerators, washing machines, dryers etc.)
Type 2 – Small appliances (vacuum cleaners, irons, blenders, fryers etc.)
Type 3 – Computer and telecommunication appliances (laptops, PCs, telephones, mobile phones etc.)
Type 4 – Consumer electronics (video and audio equipment, musical instruments)
Type 5 – Lighting devices (incandescent light bulbs, fluorescent tubes, gas-discharge lamps etc.)
Type 6 – Electrical and electronic tools (drills, saws, gardening devices etc.)
Type 7 – Toys, leisure (electronic toys, models, sports equipment)
Type 8 – Medical devices (all medical equipment with the exception of implants)
Type 9 – Monitoring devices (detectors, thermostats, laboratory equipment etc.)
Type. 10 – Vending machines

Management



Policy

1	**Motor power**	**5 hp**
2	**Capacity**	**200 to 300 kg/hr**
3	**Rate of cleaning out water**	**>97%**
4	**Machine size**	**3600(L)x 600 (W) x 1800 (H)**

Conclusion: -

In summary, we proposed a small-molecule assisted method based on dynamic reaction to recycle waste circuit boards effectively and environmentally friendly. Thermoset resins containing ester groups in waste circuit boards were efficiently dissolved through the transesterification reaction at temperatures below 200 °C. Subsequently, the electronic components with reserved electronic properties could be readily separated from the circuit boards. Experimental results showed that this approach had an appealing capability to recycle a wide range of commercial PCBs, including boards made of typical epoxy-anhydride and polyester resin substrate. The concept can also be extended to other types of substrate polymers

containing ester groups. This also suggests that introducing ester groups into the substrate polymer network may be a promising route for efficiently and eco-friendly recycling. More notably, the wasted solution after recycling procedure was proved to have the potential value in the multilayer board fabrication. Adhesive solution containing similar chemical components with the waste solution after removing EG and organic solvent was used to join boards by triggering the bond exchange reactions between polymer networks. This intrinsic bonding strategy has a great potential for practical industrial applications, especially in composites.

Estimate of E-Waste Machine (B.O.M): -

Data of materials	
Length of Blades	460mm
No. of Blades	5
Rotary blades	3 (460 x 3)
Stationary blade	2 (460 x 2)
Throat Size	460 x 400 mm
Grinding Capacity	100 to 150Kgs/Hr.
Power Required	15 HP (11.25 KW)
Screen Area	3500 sq.cm.
Floor Space (L&W) in mm	1650 X 1250
Tank Size	760M.M. X 760M.M.
Blade Size	12m.m. x80m.m.x215m.m.
Main Drive	25 H.P A.C Motor
POWER REQURED	25 HP (Approx.)
Production Capacity (KGS. Kg/HR.)	90 to 150 (Depends Up on Materials)

TECHNICAL DATA FOR RECYCLING MACHINE	
SCREW SIZE	100 M.M
L/D Ratio	26:1
Material	En 41-B
Made Process	Nitride polished special heat treatment 120 hr. H.R.C 65 to 68º
BARREL SIZE	165 M.M
Made Process	Nitride polished special heat treatment 120 h\r H.R.C 68 to70 º
BARREL HEATING ZONE	5 Zone
Barrel Heating Load per Zone	3 KW
Screen Changer Heating Zone	2 Zone
Screen Changer Heating Load	9 KW

GEAR BOX	Helical (Inbuilt Thrust Housing)
Gear material	20 MN CR 5
Made process	Profile hardened, grinding
Gear box Body	Casting Body
MAIN DRIVE PALLETIZER	30 H.P A.C Motor (Crompton Make)
Blade Size **Rotating Blade** **Fix Blade** **Electric Motor**	150 mm 16 No. 1No. 2 H.P A.C Motor (Crompton/Bharat Bijlee Make)
PANEL BOARD	7 Zone
PRODUCTION CAPACITY (KGS. /HR.)	90 To 120 (Depend up on materials. (10%+-)

Power Consumption

Plastic Washing Machine	18.75 kW
Dryer Machine	3.75 kW
Extruder main motor	22.5 kW
Heating load on Barrel	15 kW
Heating load on Screen changer	9 kW
Palletizer cutter motor	1.5 kW
Plastic Scrap Grinder	11.25 kW
Total connecting load	82 kW
Total power requires to run the machine	50 kW

Design Cost Estimation

Products	**Price/pc**
Semi-Automatic Washing Line	3,45,958.00
Recycling Machine	3,90,458.00
Total	7,36,416.00
GST @ 18 %	1,32,555.00
Transportation	As actual
Total Amount	8,68,971.00

8.1.9 Electrical Design 3: - Automatic Water Pump Controller: -

Abstract: -

A city of water authority supplies the clean water and pumps it into large ground-level storage tanks. A resident's water pump then pumps the water to a water tank on top of his/her house. When the water level in the ground-level storage tank becomes too low, the pump siphons air and shuts down, requiring a resident to manually prime the water pump to get it running again. Residents struggle to monitor the water level of the tanks effectively and keep the pump running properly. To remedy the issue, the Automatic Water Pump Controller (AWPC) system monitors the water levels and controls the pump as necessary to prevent breakdown and maximize water storage without overfilling the rooftop tank and wasting water.

Specifications: -

1) Pump-controller
2) Start and stop water pump automatically
3) Electric switch used in water systems
4) Customized setting

Parameters: -

1) Rate voltage: 220V/240V, 2) Max. Rated Current: 10A, 3) Frequency: 50HZ/60HZ, 4) Max. power: 1.1KW, 5) Joint screw: G1", 6) Protection Guard: IP65, 7) Pressure setting: -1bar-3.5 bar, 8) Max allowable pressure: 10 bar (1Mpa), 9) Max ambient temperature: 60°C

Descriptions: -

Electric switch used in water systems. Start and stop water pump automatically according to the pressure and water storage. It starts the electric pump automatically after a pressure decrease (taps opening) and stops it when the fluid flow interrupts at the maximum pressure level of the electric pump (taps closed). Stop the water pump in the case of water shortage.

Direction for operation: -

It will indicate the pump has started when the green light Power on lights up after connecting the power. When the yellow light Pump on lights up, it indicates the pump has been started. The pump continues to operate for a few minutes enabling the system to fill in the pipes and to reach the required pressure.

If this lapse is insufficient, the red-light failure will light up. In this event, keep the Restart button pressed and wait, with a tap opened till the red light is off. Once released the button and closed the tap, the product will keep the pump at its maximum pressure.

Working: -

Here's an Automatic Water Pump Controller circuit that controls the water pump motor. The motor gets automatically switched on when water in the overhead tank (OHT) falls below the lower limit. Similarly, it gets switched off when the tank is filled up. Built around only one NAND gate IC (CD4011), the circuit is simple, compact and economical. It works off a 12V DC power supply and consumes very little power. The circuit can be divided into two parts: -

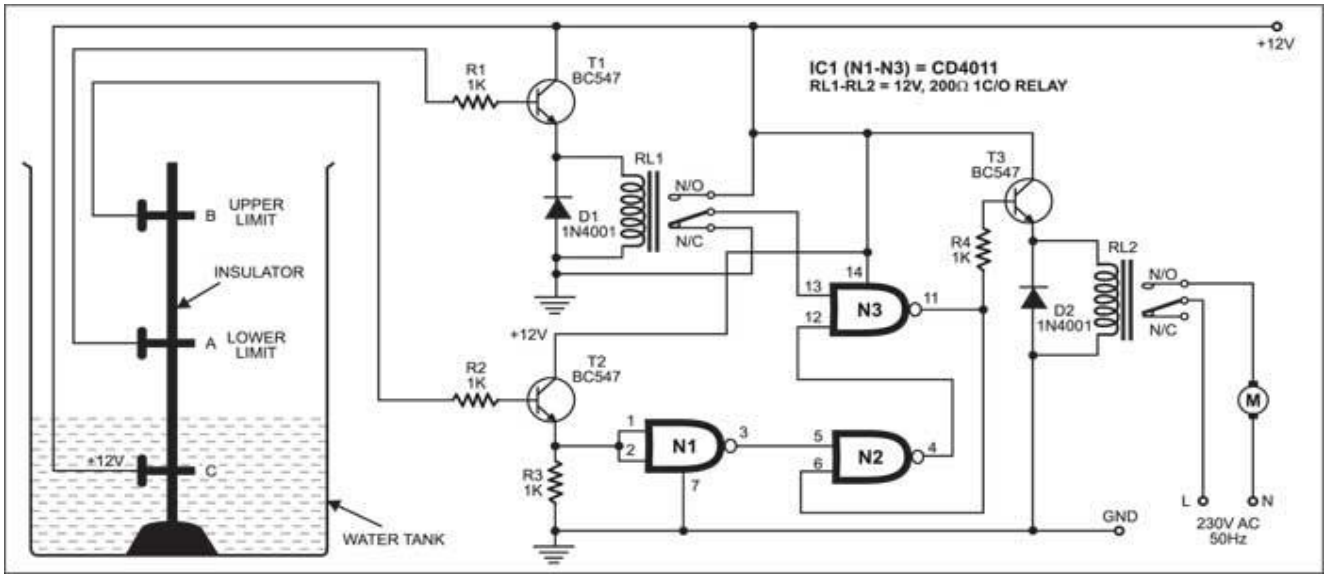
Automatic water pump controller circuit

Controller circuit and indicator circuit

Therefore, in Fig. 1 shows the controller circuit. Let us consider two reference probes 'A' and 'B' inside the tank, where 'A' is the lower-limit probe and 'B' is the upper-limit probe. The 12V

DC power supply is given to probe C, which is the limit for minimum water always stored in the tank.

Fig. 1: Automatic water pump controller circuit



The lower limit 'A' is connected to the base of transistor T1 (BC547), the collector of which is connected to the 12V power supply and the emitter is connected to relay RL1. Relay RL1 is connected to pin 13 of NAND gate N3.

Similarly, the upper-limit probe 'B' is connected to the base of transistor T2 (BC547), the collector of which is connected to the 12V power supply and the emitter is connected to pins 1 and 2 of NAND gate N1 and ground via resistor R3. The output pin 4 of NAND gate N2 is connected to pin 12 of NAND gate N3. The output of N3 is connected to input pin 6 of N2 and the base of transistor T3 via resistor R4. Relay RL2 connected to the emitter of transistor T3 is used to drive the motor.

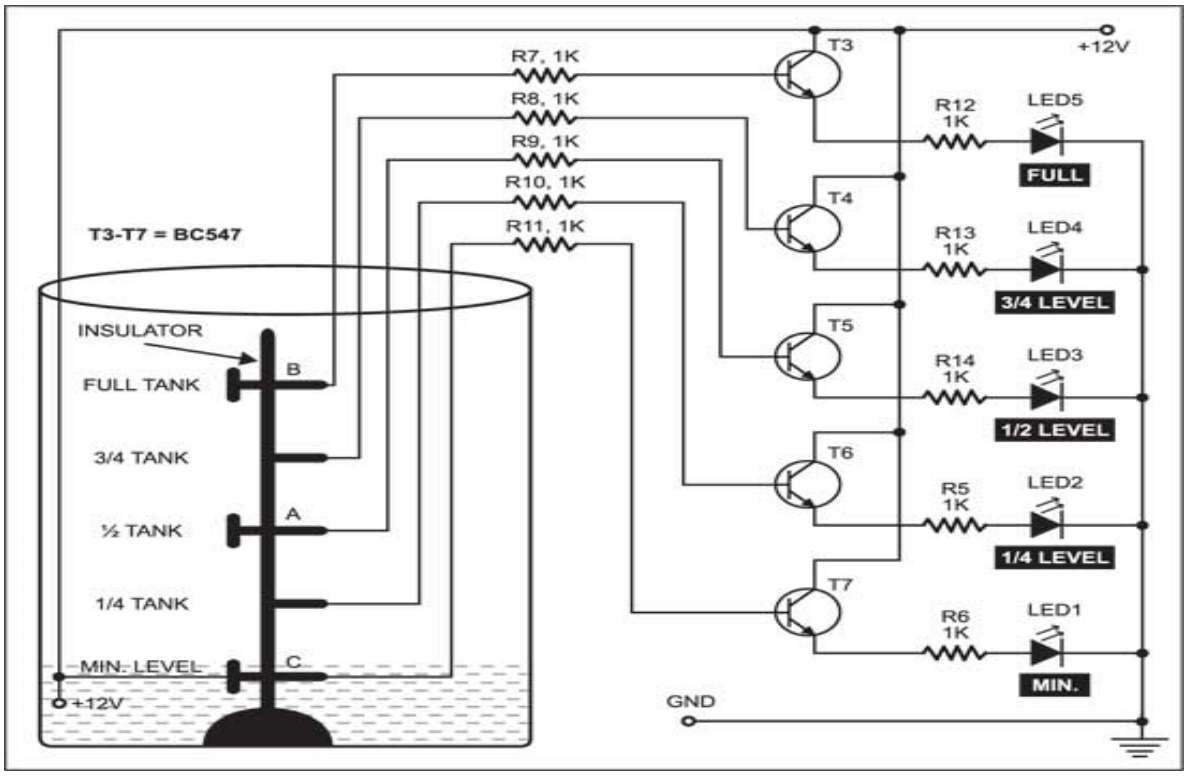
Water-level Indication by LEDs

Level of water inside the tank	Glowing of LEDs
Full tank	LED1, LED2, LED3, LED4, LED5
¾ Tank	LED1, LED2, LED3, LED4
½ Tank	LED1, LED2, LED3
¼ Tank	LED1, LED2
Min. level	LED1

Indicator-Table

Circuit operation: -

If the tank is filled below probe A, transistors T1 and T2 do not conduct and the output of N3 goes high. This high output energies relay RL2 to drive the motor and it starts pumping water into the tank. When the tank is filled above probe A but below probe B, water inside the tank provides base voltage to drive transistor T1 and relay RL1 energies to make pin 13 of gate N3 high. However, water inside the tank does not provide base voltage to transistor T2, so it does not conduct and the logic built around NAND gates N1 and N2 outputs low to pin 12 of gate N3. The net effect is that the output of N3 remains high and the motor continues pumping water into the tank. When the tank is filled up to probe B level, water inside the tank still provides base voltage to transistor T1 and relay RL1 energies to make pin 13 of gate N3 high. At the same time, water inside the tank also provides base voltage to drive transistor T2 and the logic built around NAND gates N1 and N2 outputs high to pin 12 of gate N3. The net effect is that the output at pin 11 of N3 goes low and the motor stops pumping water into the tank. When water level falls below probe B but above probe A, water inside the tank still provides base voltage to transistor T1 and relay RL1 remains energized to make pin 13 of gate N3 high. However, transistor T2 doesn't conduct and the logic built around NAND gates N1 and N2 outputs high to pin 12 of N3. As a result, the output of N3 remains low and motor remains stopped. When water level falls below probe A, both transistors T1 and T2 do not conduct. NAND gate N3 gives a



high output to drive relay RL2 and the motor restarts pumping water into the tank.

Fig. 2 Indicator/monitoring circuit

It consists of five LEDs, which glow to indicate the level of water in the overhead tank. Since 12V power supply is given to water at the base of the tank, transistors T3 through T7 get base

voltage and conduct to light up the LEDs. When water in the tank reaches the minimum at level C, transistor T7 conducts and LED1 glows. When water level rises to one-fourth of the tank, transistor T6 conducts and LED1 and LED2 glow. When water level rises to half of the tank, transistor T5 conducts and LED1, LED2 and LED3 glow. When water level rises to three-fourth of the tank, transistor T4 conducts and LED1 through LED4 glow. When the tank is full, transistor T3 conducts and all the five LEDs glow. So, from glowing of LEDs, one can know water level in the tank. The LEDs can be mounted anywhere for easy monitoring.

Sr. No.	Automatic controllers starting pressure	Water pump lift (meters)	Distance of valve and automatic controllers (meters)
1	1.2 bar	>22m	<12m
2	1.5 bar	>25m	<15m
3	2.2 bar	>35m	<22m

Advantage: -

1) It has the features of stable performance, low maintenance and long life etc.…
2) Completely replaced the complicated traditional pump control system composed of pressure gauge, pressure switch, T-valve, check valve and pressure tank.
3) Its starting flow is about 36-60L/h and is convenient for home application.

Function: -

The product is designed especially for all control operation of automatic water pump. If the particular breakdowns occur, suction pipe etc., the product recognizes the breakdowns and the red-light failure lights up. Meanwhile, a stop signal is sent to the pump to prevent damages caused by its working in the absence of water. Rectification of the failures that have caused the blockage, allows the system to be restarted by pressing the restart button. The controller can ensure a constant pressure for the water supplying system and thus reduce the water hammer effect inside pipeline during water delivering. The controller also possesses the features of reset after power failure.

Note: -

The user can adjust the level to which water must be filled in the tank by adjusting the heights of probes A and B. The stand and adjusting screws should be insulated to avoid shorting.

Estimate of Automatic Water Pump Controller Configuration:-(B.O.M)

BILL OF MATERIALS

Part	Description	Quantity	Price
Float Switch pack	5 pack	1	686
Relay	min 3Vdc ctrl, rated 24-380Vac	1	1026
Water Pump	.5W, 110Vac	1	2110
AC to DC converter	80 -264 VAC input, 3.3V output	1	1105
Fuse Holder Lid	For use with 36-4527-ND	1	20
Fuse Holder	for 5mm x 20mm fuses	1	50
Fuses	1A, SloBlo	5	661

Thread Tape	white	1	89
WD 40	Lubricant in can	1	208
Pipe Glue	Adhesive for use with PVC pipes	1	345
Pump Tubing + connectors	1” PVC pipes and 1” threaded connectors	1	807
Check Valve	1” for PVC Tubing	1	852
Large containers for water	intended for storage	2	1313
14 AWG wire	white, rated for up to 15A, 25'	1	454
14 AWG wire	Black, rated for up to 15A, 25'	1	454
Type B Socket	AC 125V 15A	1	395
Banana Socket pack	2 black, 2 red	1	437
Rocker Switch	5 pack	1	355
Preboard Set	Variety of sizes	1	559
Microcontroller	3.6V supply	1	189
22 AWG Wire	100' Stranded Black Wire	1	830
Enclosure Material	7.5"x4.3"x2.2", black, plastic	1	1106
3 wire Plug	NEMA 5-15 Grounded	1	409
Test Materials Total		6165	
Device Materials Total		8303	
Grand Total		**14,006**	

Project Cost Estimates

	Item	Cost
System Parts		
	Enclosure Material	2800
	Controller	1050
	Circuitry & Wires	2100
	Sensors	1750
	Subtotal	**7700**
Testing Parts		
	Water Pump	7000
	Tubing	1400
	Containers	1400
	Subtotal	**9800**
	Grand Total	**17,500**

8.2 Student recommendations of the Designs:

- The Solid Waste Management system of the village must be improved for the sake of the cleanliness and health of the people of village because there is no provision for disposal of solid waste generated. People through the waste out in open land areas.
- Recreational facilities can be provided like public garden, playground etc. for the recreational purpose because there are no such provisions made in the village.
- Renewable energy sources can be used for energy conservation and to reduce load on conventional energy sources like windmill.
- Primary health center can be provided as there is no facility of medical treatment in the village. Villagers need to go out of the village for their medical treatment.
- For the gatherings of all the villagers for any activity an assembly can also be provided.

8.3 Design Suggestions /Benefits of the villagers:

- **Sustainable design**: The Solid Waste Management system of the village must be improved for the sake of the cleanliness and health of the people of village because there is no provision for disposal of solid waste generated. As all the villagers throw their household waste near their house according their convenience. So, we decided to facilitate the village by compost pit.
- **Physical design**: There is no facility of medical treatment available in the village. Villagers need to go out of the village for their medical treatment i.e., at VEHLAL which is 1km away from the village.
- **Social Design**: Health of all the villagers is the main aim of our project, so we decided to provide a meditation hall in the village, so they can gather there and can maintain body fitness and health. They can also use that place for the gatherings of all the villagers for any kind of activity.
- **Socio cultural design**: In this we can provide Samaj seva mandal for betterment of villagers, where various programmer regarding progress of the villages can be conducted.
- **Smart village design**: Renewable energy sources can be used for energy conservation and to reduce load on conventional energy sources, so we can provide a Windmill out there in the farm according to the direction of the wind.

Chapter 9: Proposing designs for future Development of the village (for the part -2 design):

Our designs in part-2 will be,

CIVIL	ELECTRICAL
Library	3 Phase Induction Motor with Soft Start
Solid waste management plan	Fire Detection and Alarm mini project
Plastic roads	Automated Smoking Zone Monitoring & Alerting project

1) Library (reading hall): - In our ZANU village not any reading room or library are there so we can design the library (reading hall) so village's child's easily to study in library.

2) Solid waste management plan: - in our ZANU village not have any solid waste management plant to manages daily wastes like house hold waste, plastic waste, cow dung, etc. so we can design the solid waste management plant design and also, we plastic waste management to reduce, reuse, recycle.

3) Plastic roads: - plastic road are made entirely of plastic or of composites of plastic with other materials. In villages asphalt roads are very bad conditions after the monsoon seasons and cost of the asphalt road is so high with respect to the plastic roads. 1km plastic road cost is 33 lakhs Rs and the asphalt 7.8 crore per kilometer. So, we can design plastic roads for in-to-in village road and the one village to another village.

4) 3 Phase Induction Motor with Soft Start: - A 3 Phase induction motor is a rotating electric machine that is design to operate on a three- phase supply. A 3-phase induction motor requires a high power to start since it directly attends its full speed. This leads to a high electrical mechanical jerking as well as generation of high electrical electric stress on induction motor windings. This three-phase motor as an asynchronous motor. These AC motors are of two types: squirrel and slip-ring type induction motors.

5) Fire Detection and Alarm mini project: - We are proposing a fully automated smoking zone alerting monitoring system to sound an alarm in case a smoker is detected in a smoking zone.
No smoking zones are meant to ensure smoke free areas which promote good health and well-being. Especially in public places no smoking zones ensure smoke free environment for people and children. But it is not feasible to manually monitor these zones to ensure a smoke free environment and an automated system is required to ensure this. The system uses a combination of smoke sensing with 555 timer IC circuitry to ensure this purpose.

6) Automated Smoking Zone Monitoring & Alerting project: - We propose a fully automated smoking zone alerting monitoring system to sound an alarm in case a smoker is detected in smoking zone. The system uses a combination of smoke sensing with 555 timer IC circuitry to ensure this purpose

Chapter 10: Conclusion: -

The motive of Vishwakarma Yojana phase - VIII is to uplift the lifestyle of the rural areas to its certain extent up to the level of an ideal village situated at the nearby location of that particular jurisdiction. It is an effective government scheme to develop the rural areas under economical cost with good workability and efficiency during its usage. The project tends to improve the physical, social as well as socio-cultural aspects of the village by implementing and improvising various infrastructures with regards to lesser or least hindrance to its rural authenticity.

Main Smart Aim: Developing village with a rural soul 'but with all Smart urban amenities that a city may have. This will help in developing Smart villages in sustainable manner, reduce migration from villages and prevent the cities from the urban pressure. The study of various energy saving concepts and renewable and/or sustainable energy programmed have led us to the **conclusion** that the goal of "**Vishwakarma** Yojana **Project**" can be achieved by taking proper efforts towards development of rural areas by developing the required infrastructure and implementing the applicable. This should lead to some rethinking about the meaning of efficiency beyond the usual conceptions of economic or technical efficiency. Indeed, employment expansion is at least as important as growth in productivity.

In a sense, both represent the utilization of labor as a resource. Why, then, does thinking about efficiency focus on one and neglect the other It is important to reflect on this question? The answer, which calls for change in both economics and politics, cloud make a real difference. With Gap Analysis, we conclude that some of different Smart Village facilities are required as basic or primary level which still lack in village. So, according to Gap Analysis of ZANU village, we observed condition of existing infrastructure facilities in village such as- Primary school, Aanganwadi etc. Smart Village can solve their problem itself can become a smart village example to another village too. According to UDPFI norms, lacking in basic amenities And Smart Amenities can be suggested as:

- Solid waste management
- primary health center
- windmill
- meditation hall

Chapter 11: References: -

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18. Mohammed Sonebi, Mohamed Bassuoni, Ammar Yahia, Pervious concrete: mix design, properties and applications, RILEM Technical Letters, 1, 2016, 109 – 115.

Chapter 12: Annexure: -

12.1 Scanned copy for Ideal village:

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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

For

Vishwakarma Yojana: Phase VIII

IDEAL VILLAGE SURVEY

An approach towards Rurbanisation for Village Development

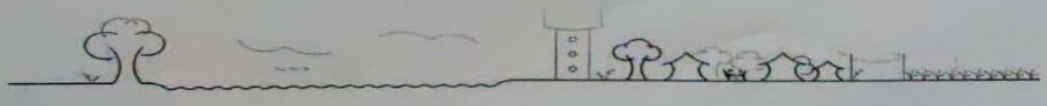
Name of Village:	VAHELAL
Name of Taluka:	DASKROI
Name of District:	AHMEDABAD
Name of Institute:	AHMEDABAD INSTITUTE OF TECHNOLOGY
Nodal Officer Name & Contact Detail:	Prof- TANHA SHAH (MO:- 9687173796)
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	ARVIND NARANBHAI PATEL (SARPANCH) (MO:- 9979774225)
Date of Survey:	24th October, 2020

1. **Demographical Detail:**

Sr. No.	Census	Population	Male	Female	Total House Holds
i)	2001				
ii)	2011	3,074	1,560	1,514	684

2. **Geographical Detail:**

Sr. No.	Description	Information/Detail
i)	Area of Village (Approx.) (In Hector) Coordinates for Location:	794.93 hectares.
	Forest Area (In hect.)	NO
	Agricultural Land Area (In hect.)	
	Residential Area (In hect.)	
	Other Area (In hect.)	NO
	Water bodies	River
	Nearest Town with Distance:	AHMEDABAD



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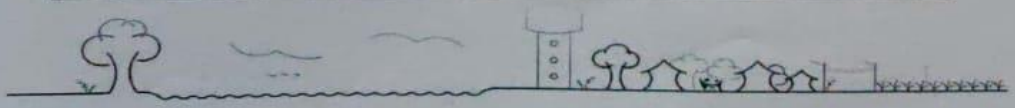
Techno Economic Survey

3. Occupational Details:

Name of Three Major Occupation groups in Village	1. Farming 2. Labour 3. Business

4. Physical Infrastructure Facilities:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
	• Tap Water (Treated/ Untreated) • RO Water • Well (Covered/ Uncovered) • Hand pumps • Tube well/ Borehole • River/ Canal/ Spring/ Lake/ Pond	No Yes Yes	✓ ✓		Narmada 80%
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: 2,50000 lit	✓		
	Underground Sump	Capacity: 2,00,000 lit	✓		
Suggestions if any:					
C.	**Drainage Facility**				
	Available (Yes/ No)	Yes	✓		95%
Suggestions if any:					
D.	**Type of Drainage**				
	Closed/ Open	closed	✓		
	If Open than Pucca / Kutchcha	Pacca	✓		
	Whether drain water is discharged directly in to Water bodies/ Sewer plants	In River	✓		
Suggestions if any:					



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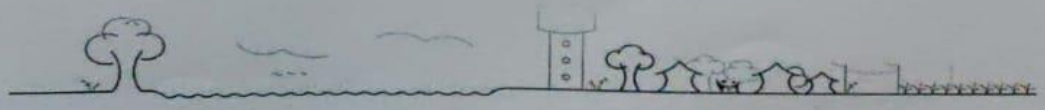
E.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes	✓		RCC/block
	Main road	No			
	Internal streets	Yes	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.	6 km			
Suggestions if any:					
F.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	No Kalupur			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		
Suggestions if any:					
G.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Govt. more than 6 hrs	✓		UGVCL
	Power supply for Domestic Use	24 hr	✓		
	Power supply for Agricultural Use	10 hr	✓		
	Power supply for Commercial Use	24 hr	✓		
	Road/ Street Lights	24 hr	✓		



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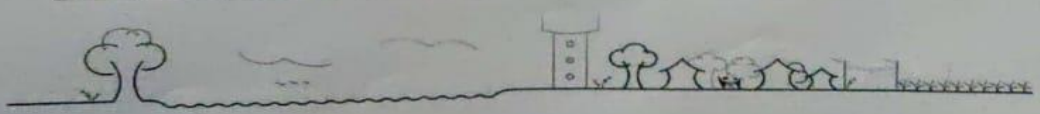
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	No			
	LED Facilities	Yes	✓		
Suggestions if any:					
H.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes (1)	✓		Male-2 Female-2 Attach-1
	Location Condition	Good			
	Community Toilet (With bath/ without bath facilities)	Yes	✓		
	Solid & liquid waste Disposal system available	Yes	✓		Distance 1 km
	Any facility for Waste collection from road	Yes	✓		Tractor
Suggestions if any:					
I.	**Irrigation Facility:**				
	Main Source of Irrigation (Stream/River/ Canal/ Well/ Tube well/ Other)	Yes	✓		
Suggestions if any:					
J.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	80% Pucca	✓		

5. **Social Infrastructural Facilities:**

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks



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K.	**Health Facilities:**				
	Sub center/ PHC/ CHC /Government Hospital/ Child welfare & Maternity Homes (If Yes than specify No. of Beds) Condition:	Yes Three Good	✓		
	Private Clinic/Private Hospital/ Nursing Home	Yes	✓		1 Private Clinic
	If any of the above Facility is not available in village than approx. distance from village: ..13..kms.				
Suggestions if any:					

L.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		
	Primary School	Yes	✓		
	Secondary school	Yes	✓		
	Higher sec. School	Yes	✓		
	ITI college/ vocational Training Center	Yes	✓		
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes	✓		
	If any of the above Facility is not available in village than approx. distance from village: 20-25kms.				
Suggestions if any:					

M.	**Socio- Culture Facilities**				
	Community Hall (With or without TV) Location:	Yes	✓		One (Private)

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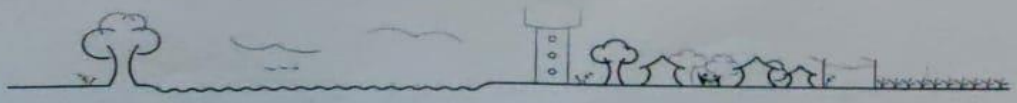
	Condition:				
	Public Library (With daily newspaper supply: Y/N) Location: Condition:	Yes Good	✓		
	Public Garden Location: Condition:	Yes Good	✓		
	Village Pond Location: Condition:	~~No~~ Yes ~~Good~~ Bad	✓		No water
	Recreation Center Location: Condition:	No			
	Cinema/ Video Hall Location: Condition:	No			
	Assembly Polling Station Location: Condition:	No			
	Birth & Death Registration Office Location: Condition:	Yes (In Panchayat Building)	✓		
If any of the above Facility is not available in village than approx. distance from village: .....kms.					
Suggestions if any:					
N.	**Other Facilities**				
	Post-office	Yes	✓		On rent
	Telecommunication Network/ STD booth	No			



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	General Market	Yes	✓		
	Shops (Public Distribution System)	Yes	✓		
	Panchayat Building	Yes	✓		
	Pharmacy/Medical Shop	Yes	✓		
	Bank & ATM Facility	Yes	✓		2 - Bank 1 - ATM
	Agriculture Co-operative Society	Yes	✓		
	Milk Co-operative Soc.	No			
	Small Scale Industries	Yes	✓		
	Internet Cafes/ Common Service Center/Wi Fi	Yes	✓		only panchayat level
	Other Facility	NO			

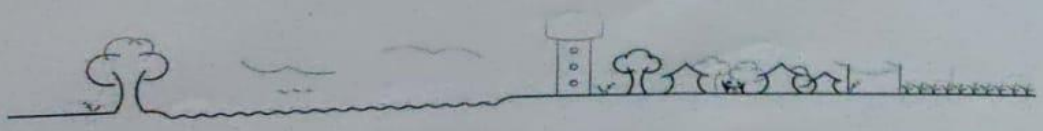
Suggestions if any: They need POST OFFICE space because due to more population they require.

6. **Sustainable /Green Infrastructure Facilities:**

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
O.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	NO			
P.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	NO			
Q.	Any Other	NO			

7. **Data Collection From Village**

Village Base Map Available: Hard Copy/Soft Copy	NO



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Vishwakarma Yojana: Phase VI
Techno Economic Survey

Recent Projects going on for Development of Village	No
Any NGO working for village development	Yes

8. **Additional Information/ Requirement:**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities(School Building, Health Center, Panchayat Building, Public Toilets & any other)	Yes	- Aanganvadi - Bank - Health care - Garden
2.	Additional Information/ Requirement	Yes	- Garden

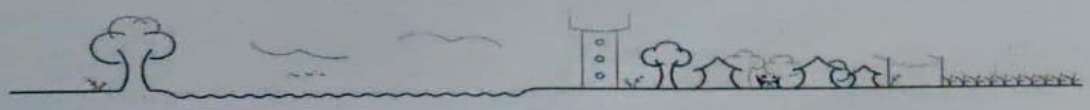
9. **Smart Village Proposal Design**

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	Windmill	Required.

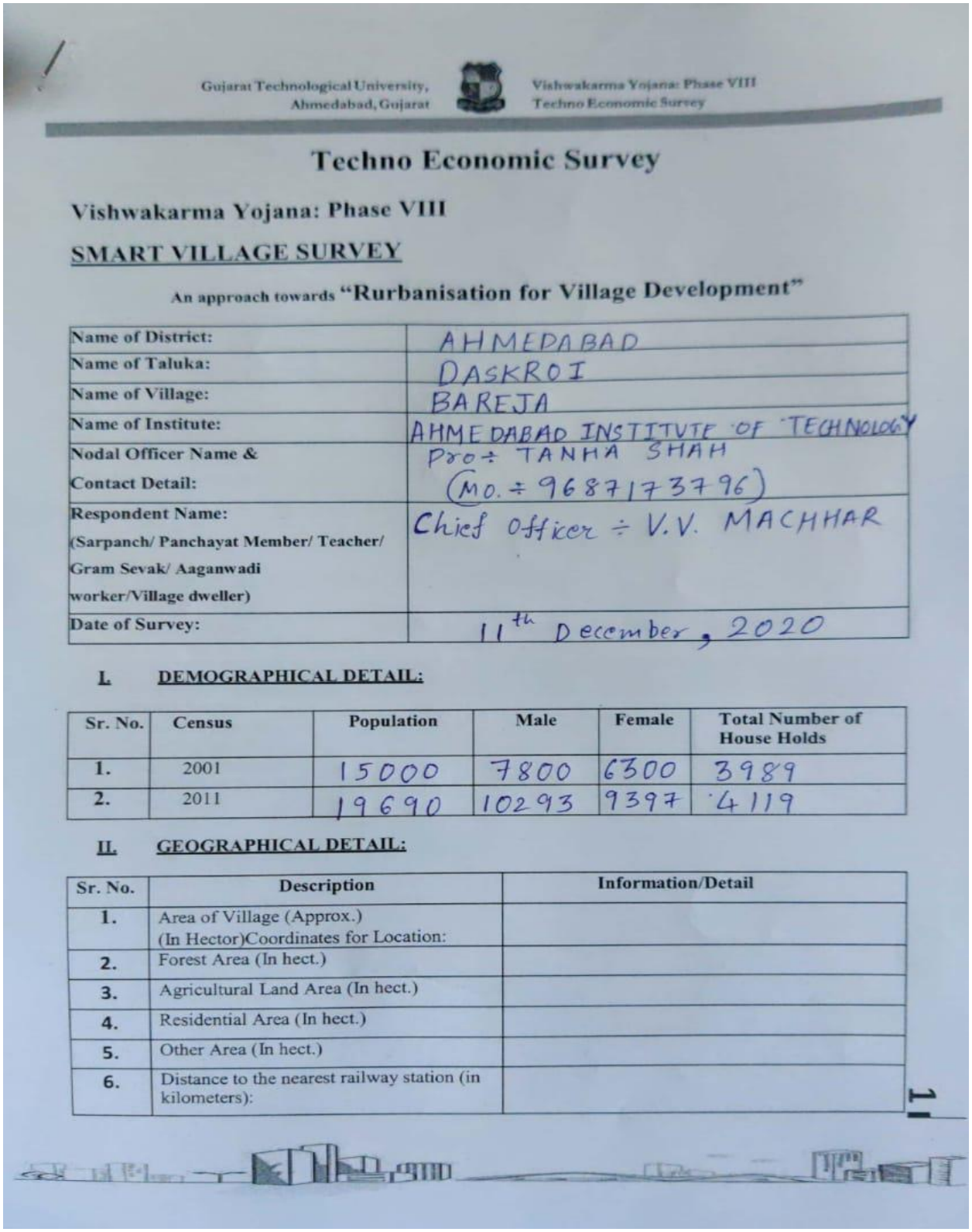
Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

For Any Administration queries/ Difficulties:
GTU VY Section:
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

સરપંચ
વહેલાલ ગ્રામ પંચાયત
તા.દસ્ક્રોઇ, જિ.અમદાવાદ



12.2 Scanned copy for Smart village:



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Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

SMART VILLAGE SURVEY

An approach towards **"Rurbanisation for Village Development"**

Name of District:	AHMEDABAD
Name of Taluka:	DASKROI
Name of Village:	BAREJA
Name of Institute:	AHMEDABAD INSTITUTE OF TECHNOLOGY
Nodal Officer Name & Contact Detail:	Pro÷ TANHA SHAH (Mo.÷ 9687173796)
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	Chief Officer ÷ V.V. MACHHAR
Date of Survey:	11th December, 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001	15000	7800	6300	3989
2.	2011	19690	10293	9397	4119

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	
2.	Forest Area (In hect.)	
3.	Agricultural Land Area (In hect.)	
4.	Residential Area (In hect.)	
5.	Other Area (In hect.)	
6.	Distance to the nearest railway station (in kilometers):	

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

7.	Name of Nearest Town with Distance:	AHMEDABAD (20 km)
8.	Distance to the nearest bus station (in kilometers):	BAREJA CHOKDI (800 m)
9.	Whether village is connected to all road for the any facility or town or City?	NO

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1.	Agriculture
	2.	Industries.
	3.	Information Technology

Major crops grown in the village:	1.	Paddy
	2.	Wheat
	3.	Mustard, Castor

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER**				
	Piped Into Dwelling				
	Piped To Yard/Plot				
	Public Tap/Standpipe	Yes	✓		
	Tube Well Or Bore Well				
2.	**DUG WELL**				
	Protected Well	Yes (Protected)	✓		
	Un Protected Well				
3.	**WATER FROM SPRING**				
	Protected Spring	NO			
	Unprotected Spring	NO			
	Rainwater	Yes			
	Tanker Truck	Yes			
	Cart With Small Tank	Yes			
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/**				
	Irrigation Channel	Yes			
	Bottled Water	NO			
	Hand Pump	Yes			
	Other(Specify)**Lake/ Pond**	Yes			

21

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: (1,00,000) Ltrs	Yes	✓	
	Underground Sump	Capacity:	Yes	✓	
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1 2 B. OPEN WITH OUTLET C. OPEN WITHOUT OUTLET	Yes Yes	✓ ✓		
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes	✓		
	Main road	Yes	✓		
	Internal streets	Yes	✓		
	Nearest NH/SH/MDR/ODR Dist. in kms.				
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	✓		
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Yes	✓		

3

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use	24 hr	✓		
	Power supply for Agricultural Use	8 hr	✓		
	Power supply for Commercial Use	24 hr	✓		
	Road/ Street Lights	Yes	✓		LEDs
	Electrification in Government Buildings/ Schools/ Hospitals	Yes	✓		
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	Yes	✓		

Suggestions if any:

G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Yes	✓		
	Location Condition	Yes			
	Community Toilet (With bath/ without bath facilities)	Yes	✓		
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	Yes	✓		Door to door collection

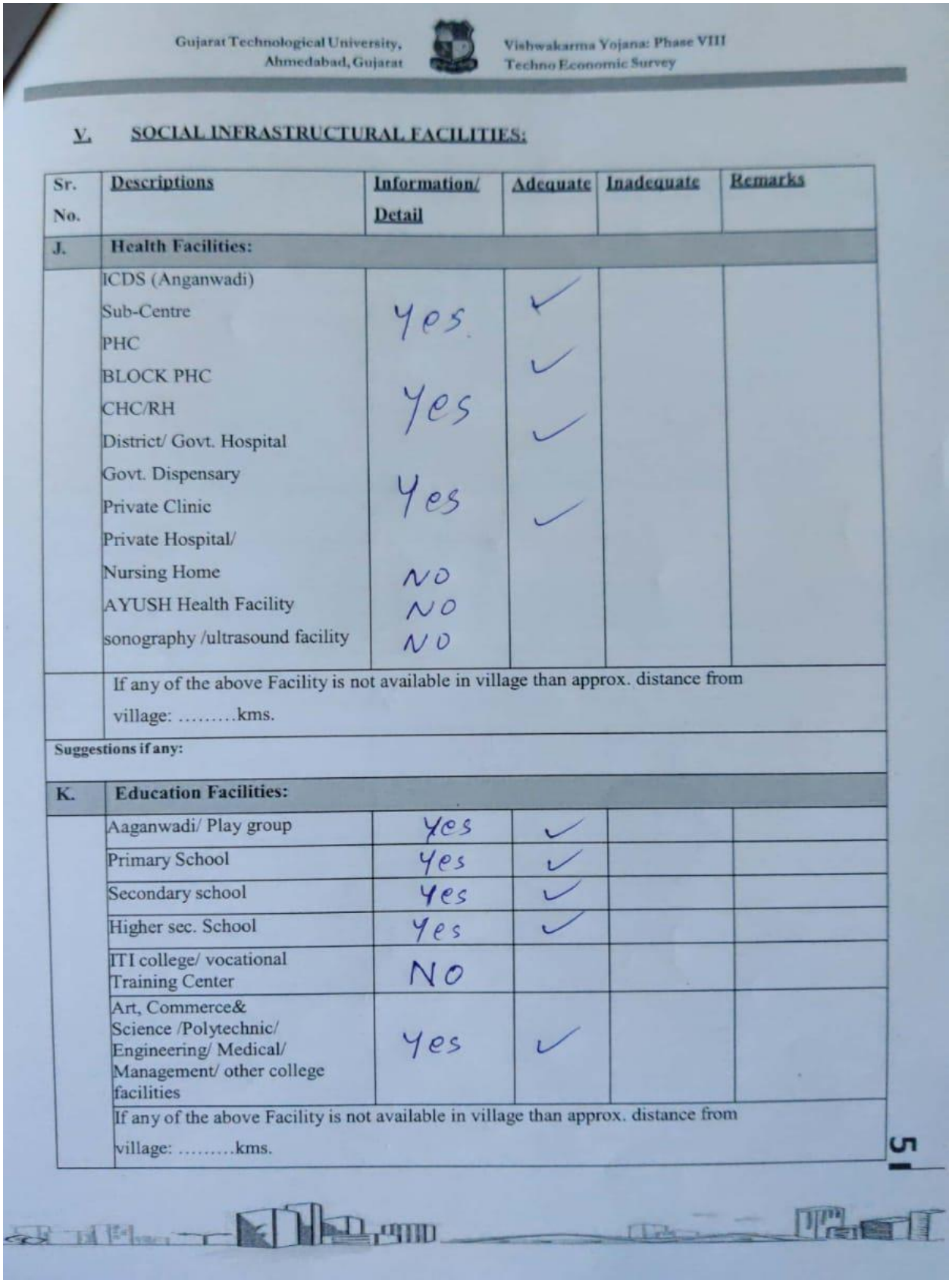
Suggestions if any:

H.	**Main Source of Irrigation Facility:**				
	TANK/POND	Yes	✓		
	STREAM/RIVER	NO			
	CANAL	NO			
	WELL	Yes	✓		
	TUBE WELL	Yes	✓		
	OTHER (SPECIFY)	NO			

Suggestions if any:

I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	80% Pucca 20% Kutchha	✓		

41



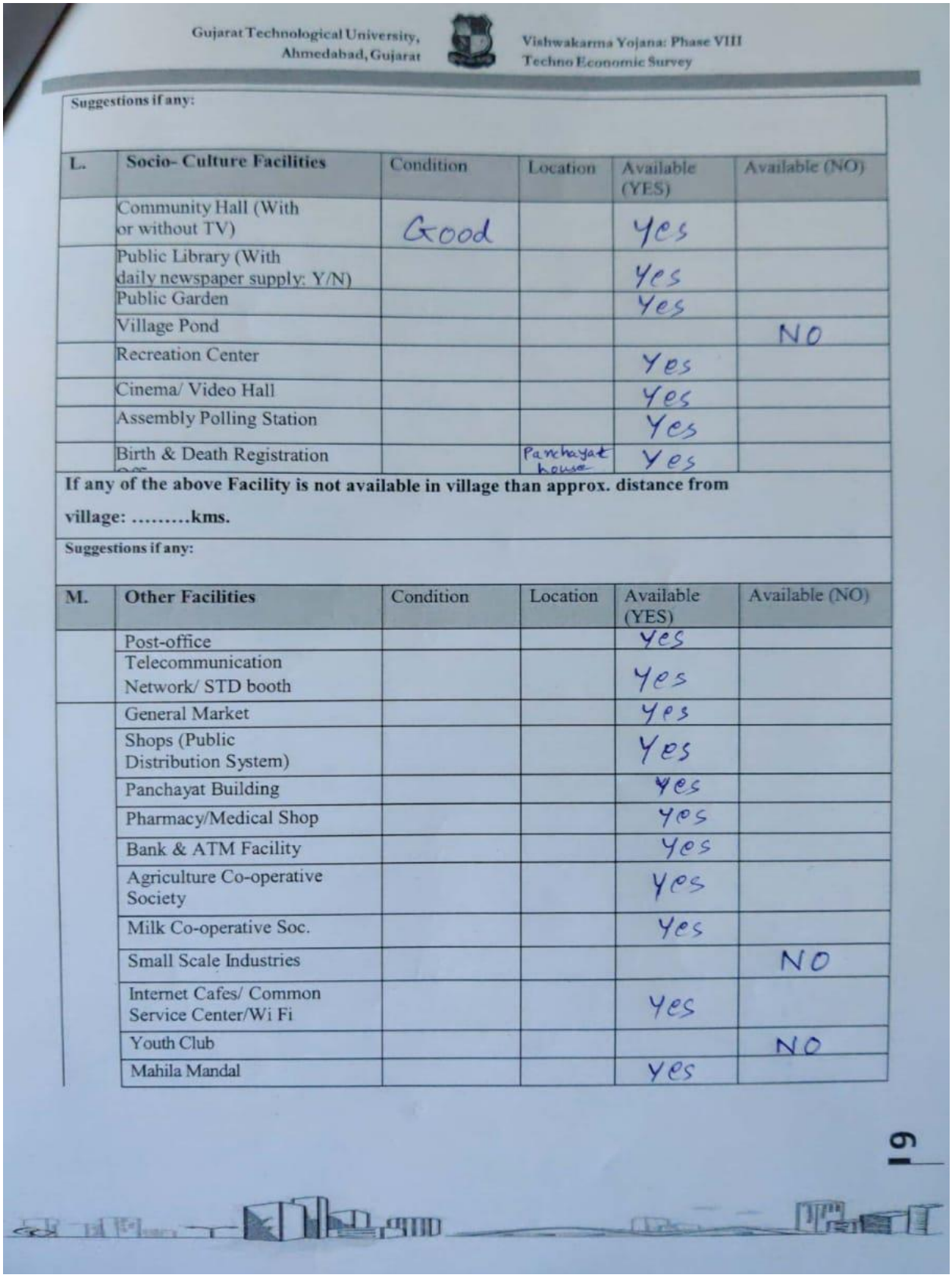
Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)	Yes	✓		
	Sub-Centre				
	PHC		✓		
	BLOCK PHC	Yes			
	CHC/RH		✓		
	District/ Govt. Hospital				
	Govt. Dispensary	Yes	✓		
	Private Clinic				
	Private Hospital/ Nursing Home	NO			
	AYUSH Health Facility	NO			
	sonography /ultrasound facility	NO			
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				
Suggestions if any:					
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		
	Primary School	Yes	✓		
	Secondary school	Yes	✓		
	Higher sec. School	Yes	✓		
	ITI college/ vocational Training Center	NO			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	Yes	✓		
	If any of the above Facility is not available in village than approx. distance from village: .....kms.				

51



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Suggestions if any:

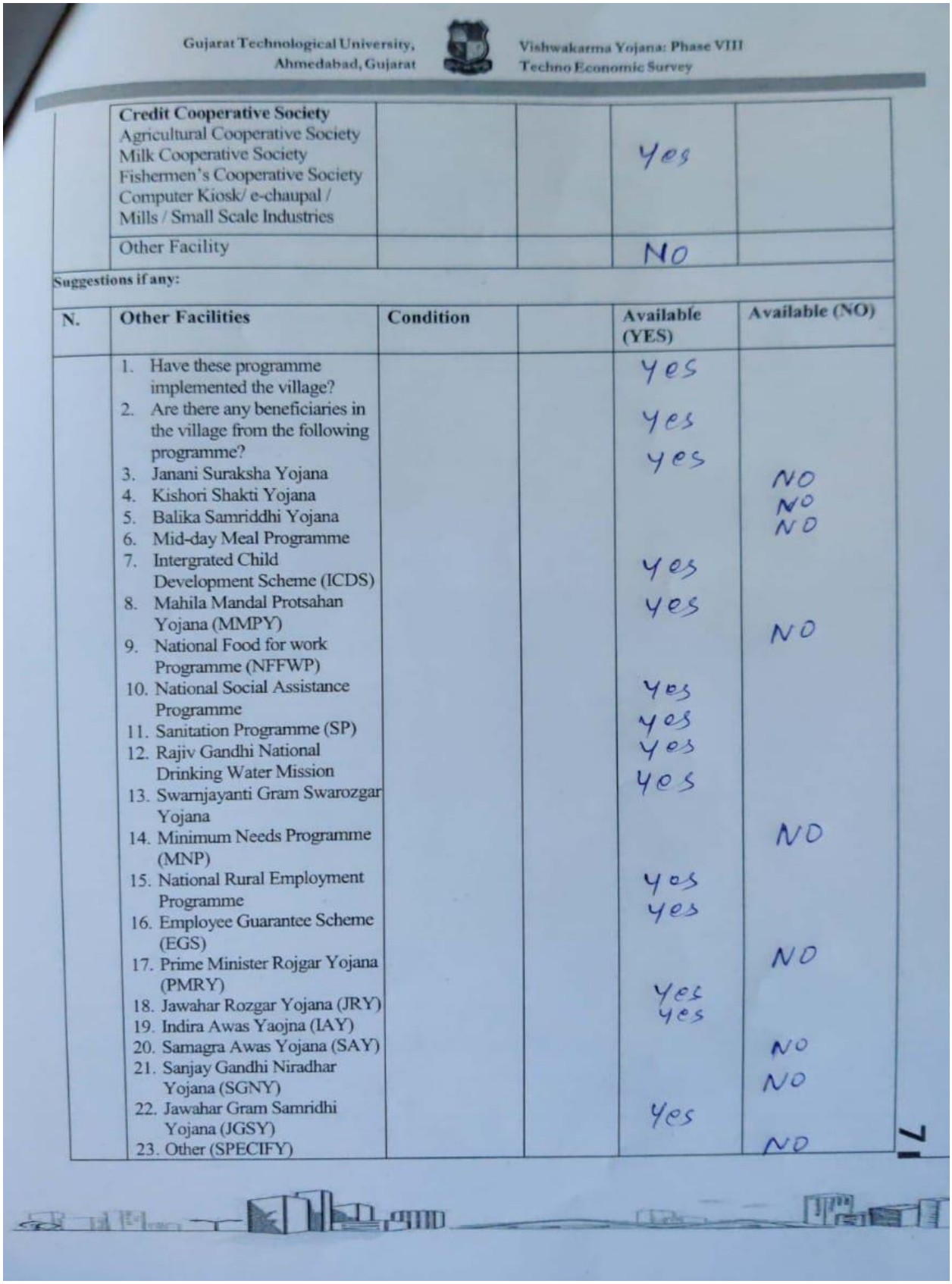
L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Good		Yes	
	Public Library (With daily newspaper supply: Y/N)			Yes	
	Public Garden			Yes	
	Village Pond				NO
	Recreation Center			Yes	
	Cinema/ Video Hall			Yes	
	Assembly Polling Station			Yes	
	Birth & Death Registration		Panchayat house	Yes	

If any of the above Facility is not available in village than approx. distance from village: .....kms.

Suggestions if any:

M.	Other Facilities	Condition	Location	Available (YES)	Available (NO)
	Post-office			Yes	
	Telecommunication Network/ STD booth			Yes	
	General Market			Yes	
	Shops (Public Distribution System)			Yes	
	Panchayat Building			Yes	
	Pharmacy/Medical Shop			Yes	
	Bank & ATM Facility			Yes	
	Agriculture Co-operative Society			Yes	
	Milk Co-operative Soc.			Yes	
	Small Scale Industries				NO
	Internet Cafes/ Common Service Center/Wi Fi			Yes	
	Youth Club				NO
	Mahila Mandal			Yes	

19



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries			Yes	
	Other Facility			NO	

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?			Yes	
	2. Are there any beneficiaries in the village from the following programme?			Yes	
	3. Janani Suraksha Yojana			Yes	
	4. Kishori Shakti Yojana				NO
	5. Balika Samriddhi Yojana				NO
	6. Mid-day Meal Programme				NO
	7. Intergrated Child Development Scheme (ICDS)			Yes	
	8. Mahila Mandal Protsahan Yojana (MMPY)			Yes	
	9. National Food for work Programme (NFFWP)				NO
	10. National Social Assistance Programme			Yes	
	11. Sanitation Programme (SP)			Yes	
	12. Rajiv Gandhi National Drinking Water Mission			Yes	
	13. Swarnjayanti Gram Swarozgar Yojana			Yes	
	14. Minimum Needs Programme (MNP)				NO
	15. National Rural Employment Programme			Yes	
	16. Employee Guarantee Scheme (EGS)			Yes	
	17. Prime Minister Rojgar Yojana (PMRY)				NO
	18. Jawahar Rozgar Yojana (JRY)			Yes	
	19. Indira Awas Yaojna (IAY)			Yes	
	20. Samagra Awas Yojana (SAY)				NO
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				NO
	22. Jawahar Gram Samridhi Yojana (JGSY)			Yes	
	23. Other (SPECIFY)				NO

71

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	Yes	✓		
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	Solar Street Lights Rain Water Harvesting	✓		
3.	Any Other	NO			

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	NO			
2.	Recent Projects going on for Development of Village	NO			
3.	Any NGO working for village development	NO			
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	NO			

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks

8

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other	Yes	
2.	Additional Information/ Requirement	NO	
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	–	

IX. Smart Village / Heritage Details

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	–	

Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

For Any Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

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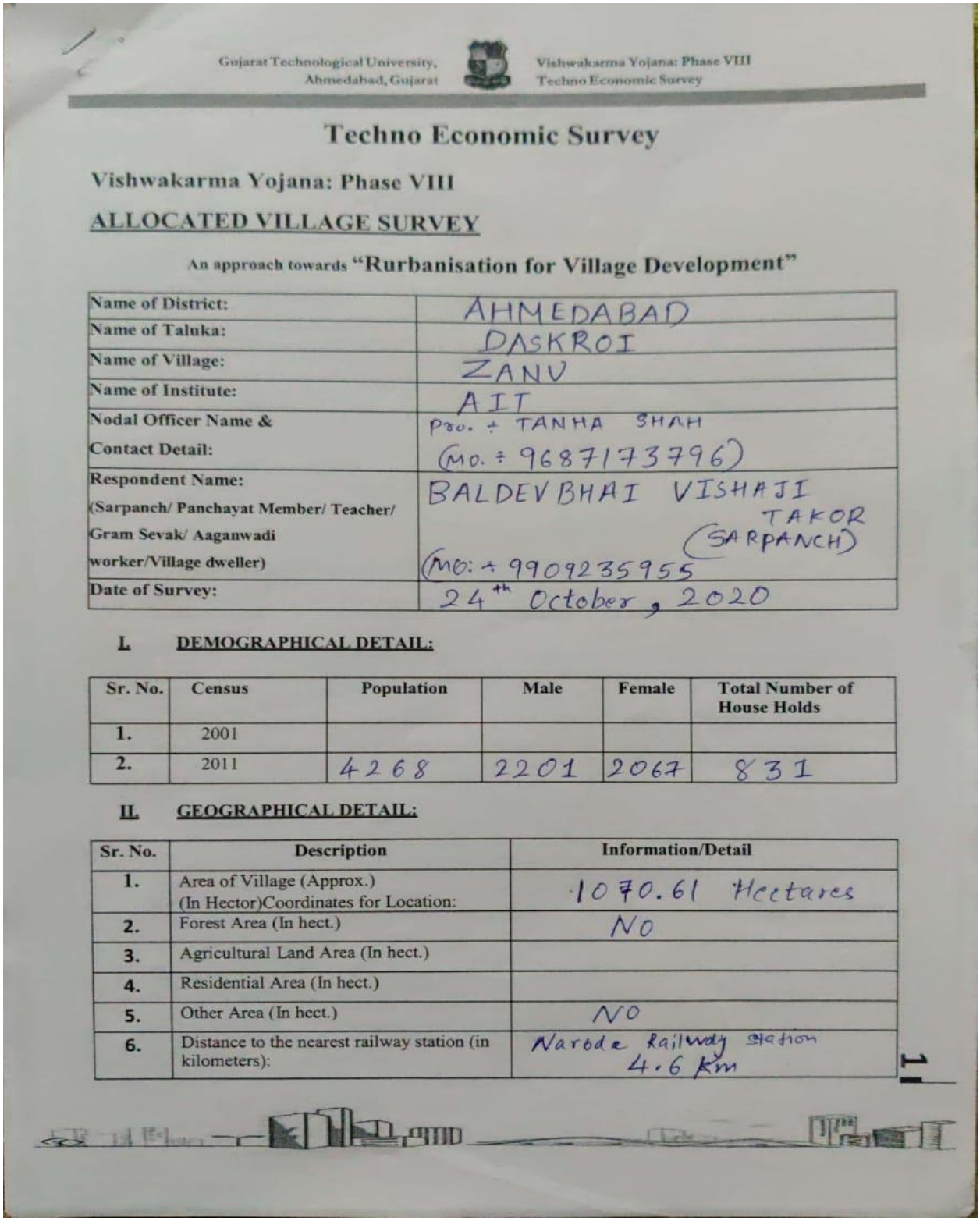
91

12.3 Scanned copy for Allocated village:



Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

Techno Economic Survey

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards "Rurbanisation for Village Development"

Name of District:	AHMEDABAD
Name of Taluka:	DASKROI
Name of Village:	ZANU
Name of Institute:	AIT
Nodal Officer Name & Contact Detail:	Prof. : TANHA SHAH (Mo. : 9687173796)
Respondent Name: (Sarpanch/ Panchayat Member/ Teacher/ Gram Sevak/ Aaganwadi worker/Village dweller)	BALDEV BHAI VISHAJI TAKOR (SARPANCH) (Mo: : 9909235955
Date of Survey:	24th October, 2020

I. DEMOGRAPHICAL DETAIL:

Sr. No.	Census	Population	Male	Female	Total Number of House Holds
1.	2001				
2.	2011	4268	2201	2067	831

II. GEOGRAPHICAL DETAIL:

Sr. No.	Description	Information/Detail
1.	Area of Village (Approx.) (In Hector)Coordinates for Location:	1070.61 Hectares
2.	Forest Area (In hect.)	No
3.	Agricultural Land Area (In hect.)	
4.	Residential Area (In hect.)	
5.	Other Area (In hect.)	NO
6.	Distance to the nearest railway station (in kilometers):	Naroda Railway station 4.6 Km

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

7.	Name of Nearest Town with Distance:	AHMEDABAD (14 km)
8.	Distance to the nearest bus station (in kilometers):	0.1 km
9.	Whether village is connected to all road for the any facility or town or City?	NO

III. OCCUPATIONAL DETAILS:

Name of Three Major Occupation groups in Village	1. Farming 2. Labour work 3. Private job
Major crops grown in the village:	1. Wheat 2. Arenda 3. ~~Bajara~~ Pearl Millet

IV. PHYSICAL INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Detail	Adequate	Inadequate	Remarks
A.	**Main Source of Drinking water**				
1.	**PIPED WATER** Piped Into Dwelling Piped To Yard/Plot Public Tap/Standpipe Tube Well Or Bore Well	Yes	✓		3 - Tube well (Bore)
2.	**DUG WELL** Protected Well Un Protected Well	NO			
3.	**WATER FROM SPRING** Protected Spring Unprotected Spring	NO			
	Rainwater	Yes	✓		
	Tanker Truck	Yes	✓		
	Cart With Small Tank	Yes	✓		
4.	**SURFACE WATER (RIVER/DAM/ LAKE/POND/STREAM/CANAL/** Irrigation Channel Bottled Water Hand Pump	Yes	✓		

21

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Other(Specify)**Lake/ Pond**	NO			
Suggestions if any:					
B.	**Water Tank Facility**				
	Overhead Tank	Capacity: (1,80,000 Ltrs)	✓		2 Tanks
	Underground Sump	Capacity:	X		
Suggestions if any:					
C.	**The Type of Drainage Facility**				
	A. UNDERGROUND DRAINAGE 1	NO			
Suggestions if any:					
D.	**Road Network :All Weather/ Kutchha (Gravel)/ Black Topped pucca/ WBM**				
	Village approach road	Yes	✓		
	Main road	Yes	✓		
	Internal streets	~~No~~ Yes			
	Nearest NH/SH/MDR/ODR Dist. in kms.	Indore (NH) 5 km (Kathlal)	✓		
Suggestions if any:					
E.	**Transport Facility**				
	Railway Station (Y/N) (If No than Nearest Rly Station---Kms)	NO (Naroda)			
	Bus station (Y/N) Condition: (If No than Nearest Bus Station---Kms)	Yes	✓		Zana stop
	Local Transportation (Auto/ Jeep/Chhakda/ Private Vehicles/ Other)	Yes	✓		Auto rickshaw, AMTS
Suggestions if any:					
F.	**Electricity Distribution**				
	(Y/N) Govt./ Private (Less than 6 hrs./ More Than 6 hrs)	Govt more than 6 hrs	✓		UGIVCL

3

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Power supply for Domestic Use	24 hr	✓		
	Power supply for Agricultural Use	8 hr	✓		
	Power supply for Commercial Use	24 hr	✓		
	Road/ Street Lights	Yes	✓		CFL, LED
	Electrification in Government Buildings/ Schools/ Hospitals	NO			
	Renewable Energy Source Facilities (Y/ N)	NO			
	LED Facilities	Yes			
Suggestions if any:					
G.	**Sanitation Facility**				
	Public Latrine Blocks If available than Nos.	Three Common	✓		Good Condition
	Location Condition	Yes			
	Community Toilet (With bath/ without bath facilities)	NO			
	Solid & liquid waste Disposal system available	NO			
	Any facility for Waste collection from road	NO			
Suggestions if any:					
H.	**Main Source of Irrigation Facility:**				
	TANK/POND STREAM/RIVER CANAL WELL TUBE WELL OTHER (SPECIFY)	Yes Yes Yes 	✓		Canal for farming purpose
Suggestions if any:					
I.	**Housing Condition:**				
	Kutchha/Pucca (Approx. ratio)	50% Pucca 50% Kutchha	✓		

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

V. SOCIAL INFRASTRUCTURAL FACILITIES:

Sr. No.	Descriptions	Information/ Detail	Adequate	Inadequate	Remarks
J.	**Health Facilities:**				
	ICDS (Anganwadi)				4 Anganwadi
	Sub-Centre				
	PHC	Yes	✓		
	BLOCK PHC				
	CHC/RH				
	District/ Govt. Hospital				
	Govt. Dispensary				
	Private Clinic	Yes	✓		1 Private clinic
	Private Hospital/ Nursing Home				
	AYUSH Health Facility				
	sonography /ultrasound facility				
	If any of the above Facility is not available in village than approx. distance from village: 5-7 kms.				
	Suggestions if any:				
K.	**Education Facilities:**				
	Aaganwadi/ Play group	Yes	✓		
	Primary School	Yes	✓		
	Secondary school	NO			
	Higher sec. School	NO			
	ITI college/ vocational Training Center	NO			
	Art, Commerce& Science /Polytechnic/ Engineering/ Medical/ Management/ other college facilities	NO			

5

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

If any of the above Facility is not available in village than approx. distance from village: ..1.5...kms.

Suggestions if any:

L.	Socio- Culture Facilities	Condition	Location	Available (YES)	Available (NO)
	Community Hall (With or without TV)	Yes (Good)	✓	2-Hall 1-working	
	Public Library (With daily newspaper supply: Y/N)	NO			
	Public Garden	NO			
	Village Pond	Yes			
	Recreation Center	NO			
	Cinema/ Video Hall	NO			
	Assembly Polling Station	NO			
	Birth & Death Registration Office	Yes			

If any of the above Facility is not available in village than approx. distance from village: .....kms.

Suggestions if any:

M.	Other Facilities	Condition	Location	Available (YES)	Available (NO)
	Post-office	Yes	✓	4	
	Telecommunication Network/ STD booth	NO			
	General Market	NO			
	Shops (Public Distribution System)	Yes	✓		
	Panchayat Building	Yes	✓		
	Pharmacy/Medical Shop	NO			
	Bank & ATM Facility	NO			
	Agriculture Co-operative Society	Yes			Zanu Seva Sastari mandal
	Milk Co-operative Soc.	Yes			
	Small Scale Industries	NO			
	Internet Cafes/ Common Service Center/Wi Fi	Yes			
	Youth Club	NO			
	Mahila Mandal	Yes			

19

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

	Credit Cooperative Society Agricultural Cooperative Society Milk Cooperative Society Fishermen's Cooperative Society Computer Kiosk/ e-chaupal / Mills / Small Scale Industries	Yes	✓		
	Other Facility				

Suggestions if any:

N.	Other Facilities	Condition		Available (YES)	Available (NO)
	1. Have these programme implemented the village?	Yes		✓	
	2. Are there any beneficiaries in the village from the following programme?	Yes		✓	
	3. Janani Suraksha Yojana	Yes		✓	
	4. Kishori Shakti Yojana				✓
	5. Balika Samriddhi Yojana	Yes			
	6. Mid-day Meal Programme			✓	
	7. Intergrated Child Development Scheme (ICDS)	Yes			
	8. Mahila Mandal Protsahan Yojana (MMPY)	Yes			✓
	9. National Food for work Programme (NFFWP)				
	10. National Social Assistance Programme				
	11. Sanitation Programme (SP)	Yes		✓	
	12. Rajiv Gandhi National Drinking Water Mission				
	13. Swarnjayanti Gram Swarozgar Yojana				
	14. Minimum Needs Programme (MNP)				
	15. National Rural Employment Programme				
	16. Employee Guarantee Scheme (EGS)				
	17. Prime Minister Rojgar Yojana (PMRY)				
	18. Jawahar Rozgar Yojana (JRY)				
	19. Indira Awas Yaojna (IAY)	Yes		✓	
	20. Samagra Awas Yojana (SAY)				
	21. Sanjay Gandhi Niradhar Yojana (SGNY)				
	22. Jawahar Gram Samridhi Yojana (JGSY)				
	23. Other (SPECIFY)				

71

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Techno Economic Survey

VI. SUSTAINABLE /GREEN INFRASTRUCTURE FACILITIES:

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Adoption of Non-Conventional Energy Sources/ Renewable Energy Sources	NO			
2.	Bio-Gas Plant Solar Street Lights Rain Water Harvesting System	NO			
3.	Any Other	NO			

VII. DATA COLLECTION FROM VILLAGE

Sr. No.	Descriptions	Information/ Details	Adequate	Inadequate	Remarks
1.	Village Base Map Available: Hard Copy/Soft Copy	NO			
2.	Recent Projects going on for Development of Village	Yes	✓		Community Hall
3.	Any NGO working for village development	NO			
4.	Any natural calamity in the village during the last one year: EARTHQUAKES FLOODS CYCLONE DROUGHT LANDSLIDES AVALANCHE OTHER (SPECIFY)	NO			

8

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VII
Techno Economic Survey

VIII. ADDITIONAL INFORMATION/ REQUIREMENT:

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	Repair & Maintenance of Existing Public Infrastructure facilities, School Building Health Center Panchayat Building Public Toilets & any other	Yes	Anganwadi
2.	Additional Information/ Requirement	No	
3.	During the last six months how many times CLEANING ..... FOGGING..... Drive was undertaken in the village?	Yes	1 Week Panchayat

IX. Smart Village / Heritage Details

Sr. No.	Descriptions	Information/ Detail	Remarks
1.	IS THEIR ANY THING FOR THE VILLAGE ENHANCEMENT POSSIBLE ?	No	

Note: Photographs/ Video/ Drawings of all existing Infrastructure facilities & conditions should be taken by students of respective villages for their record and information.

For Any Administration queries/ Difficulties:
Ms.Darshana Chauhan,Project Co-ordinator
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

B.V. Patel
સરપંચ
ઝાણુ ગ્રામ પંચાયત
તા. કઠોડ, જી. અમદાવાદ

16

12.4 Gap Analysis:

Facilities	Planning commission/UDPFI Norms	Village	ZANU	
		Population	Required as per norms	1160
Social Infrastructural Facilities				
Education				
Aganwadi	Each or per 2500 population	1	1	0
Primary School	Each per 2500 population	1	1	0
Secondary School	Per 7500 population	0	0	0
Higher Secondary School	Per 15000 population	0	0	0
College	Per 125000 population	0	0	0
Technical training Institute	Per 100000 population	0	0	0
Agriculture Research center	Per 100000 population	0	0	0
Health Facility				
Govt/ Panchayat dispensaries or Sub PHC or Health center	Each village	0	1	-1
PHC and CHC	Per 20000 population	0	0	0
Child welfare and Maternity hall	Per 10000 population	0	0	0
Hospital	Per 1 lakh population	0	0	0
Public Latrines	One for fifty families (if toilet is not there in home, especially for slum pockets and kutcha house)	0	1	-1
Physical Infrastructure Facilities				
Transportation		**Adequate**	**Inadequate**	
Pucca village approach road	Each village	yes		
Bus/ Auto stand provision	All village connected by personal transport		Yes	
Drinking Water (min 70 lpcd)		**Adequate**	**Inadequate**	
Overhead tank	One third of total demand	yes		
Underground Sump	Tow third of total demand	yes		
Drainage Network		**Adequate**	**Inadequate**	
Open			Yes	
Cover		yes		
Waste Management System		**Adequate**	**Inadequate**	
Electricity Network		**Adequate**	**Inadequate**	

12.5 Summary of All Villages Designs as Part-I:

Sr no.	Village	Discipline	Part I
1.	ZANU	CIVIL	Entrance gate Primary Hospital Centre Post Office
		ELECTRICAL	Solar LED street light system E-waste Plant Automatic water pump controller
2.	VAHELAL	CIVIL	Public Toilet Library Play Ground
		ELECTRICAL	Solar PV Panel Rain Water Harvesting
3.	BAREJA	CIVIL	Aanganwadi School Classroom School Stage Garden Public Health Centre
		ELECTRICAL	Solar Street System Compose System Smart water pump controlling system

-Village entrance gate
-Primary hospital
-Post office (waste plastics go bricks panels)
-Solar Led
-Electric waste management
-Automatic motor ON/Off

- A Gate or Gateway is a point of entry to a space which is enclosed by walls. Gates may prevent or control the entry or exit of individual or they may be early decoratively.
- Other items of gate include yet and port for purpose of the providing aesthetic view of village gate in front of village.
- Today, all count words are about how to enhance the electrical grid reliability during the peak instant. The direct solution for the grid is to cut off some loads to keep its stability. One of these loads is the street lighting especially during the summer period.
- With the increasing amount of electronic waste (e-waste) generated globally, it is an enormous challenge to recycle printed circuit boards (PCBs) efficiently and environmentally friendly. However, conventional recycling technologies have low efficiency and require tough treatment such as high temperature >200 °C and high pressure.

12.7 Summary of Good photographs:

12.8 Village interaction Report:

A Report on Interactive Presentation (Vishwakarma Yojana: Phase- VI) At ZANU Village, Ahmedabad District.

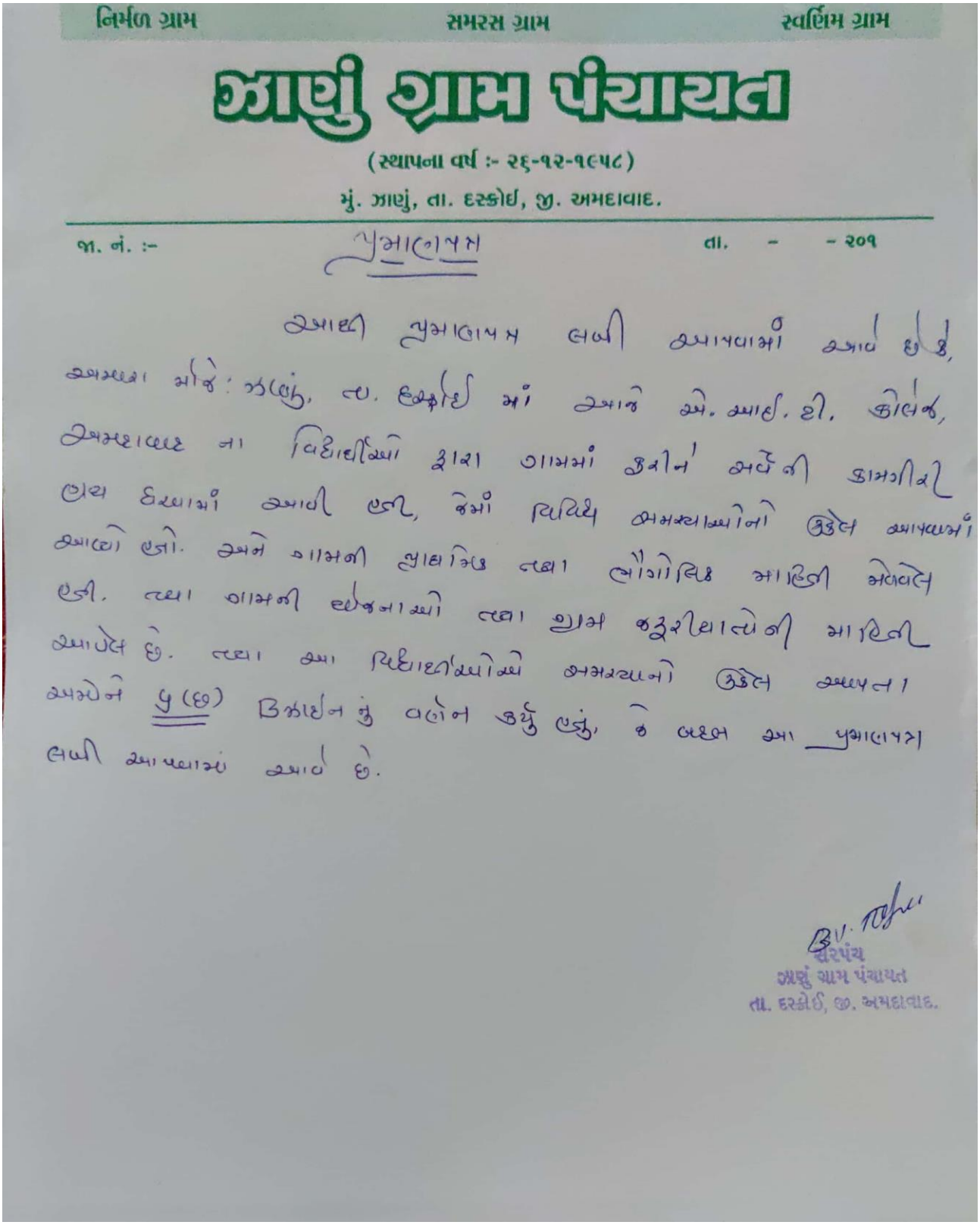
24th October, 2020

As per the circular GTU guideline dated 24th October 2020, GTU informed all the teams of Vishwakarma Yojana to present their work in village for the effective implementation of Vishwakarma Yojana. Under this guideline Student's team of ZANU village presented the village development plan of ZANU village at Panchayat office on 24th October 2020.

Sarpanch, Talati, All the Panchayat members and Village dwellers remained present to know how the development of ZANU village is possible and to give their feedback. We presented our work under Vishwakarma Yojana. We explained core theme of Vishwakarma Yojana, various benefits of village development and issues prevailing in villages.

We explained various designs under Physical infrastructure, Social infrastructure and Socio-cultural facilities such as Repair & Maintenance of Internal road, Public toilet blocks and Bus stand repair & maintenance and Sustainable/ Renewable Energy source Planning.

12.9 Sarpanch letter:



નિર્મળ ગ્રામ સમરસ ગ્રામ સ્વર્ણિમ ગ્રામ

ઝાણું ગ્રામ પંચાયત

(સ્થાપના વર્ષ :- ૨૬-૧૨-૧૯૫૮)

મું. ઝાણું, તા. દસ્ક્રોઈ, જી. અમદાવાદ.

જા. નં. :- પ્રમાણપત્ર તા. - - ૨૦૧

આથી પ્રમાણપત્ર લખી આપવામાં આવે છે કે, અમારા ગામે : ઝાણું, તા. દસ્ક્રોઈ માં આજે એ. આર. ટી. કોલેજ, અમદાવાદ ના વિદ્યાર્થીઓ દ્વારા ગામમાં ઇનોન્ સર્વેની કામગીરી હાથ ધરવામાં આવી હતી, જેમાં વિવિધ અમસ્યાઓનો ઉકેલ આપવામાં આવ્યો હતો. અને ગામની ભૌગોલિક તથા ભૌગોલિક માહિતી મેળવેલ હતી. તથા ગામની વસ્તીનાઓ તથા શ્રમ કરનારાઓની માહિતી આપેલ છે. તથા આ વિદ્યાર્થીઓએ અમસ્યાનો ઉકેલ આપવા અમને પુ (છ) Bકાર્ડ નું વર્ણન કર્યું હતું, તે બદલ આ પ્રમાણપત્ર લખી આપવામાં આવે છે.

B.V. Rajput
સરપંચ
ઝાણું ગ્રામ પંચાયત
તા. દસ્ક્રોઈ, જી. અમદાવાદ.

Part: II

(IMPLEMENTATION, AND DEVELOPMENT & REAL PICTURE OF YOUR VILLAGE ONE ENHANCEMENT STEPS FORWARD TO DEVELOP THE VILLAGE)

Chapter – 13: From the chapter-9 future design of the aspects (Feasibility, Construction, Operation and Maintenance of various design options in Rural Areas along with cost with AutoCAD designs/planning with any software: -

13.1 Design Proposals:

In order to improve the situation and help resolving the issue of open defecation, we will build public Toilets in our village ZANU of Ahmedabad District. They will be poor flush toilets, functioning as any toilet of this kind. The content of the septic tanks will be used ecologically as a fertilizer.

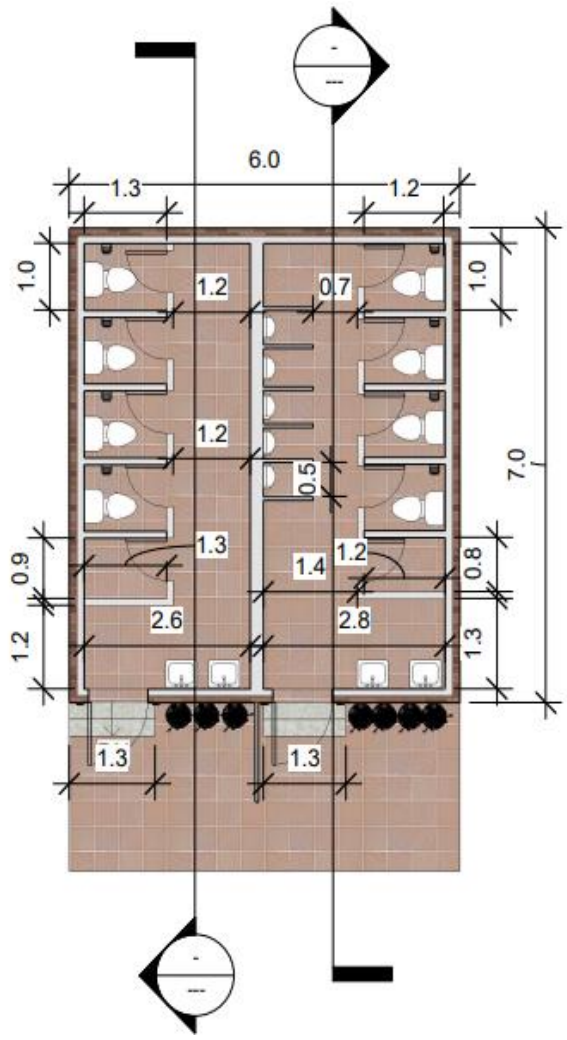
In order to ensure the usefulness of the built toilets, we will organize an awareness outreach phase to educate the beneficiaries for the use of the new toilets. This capacity building will be achieved thanks to a pre-education phase (focused group discussion), technical support and helping beneficiaries getting used to this new practice.

13.1.1 Civil Designs 1:

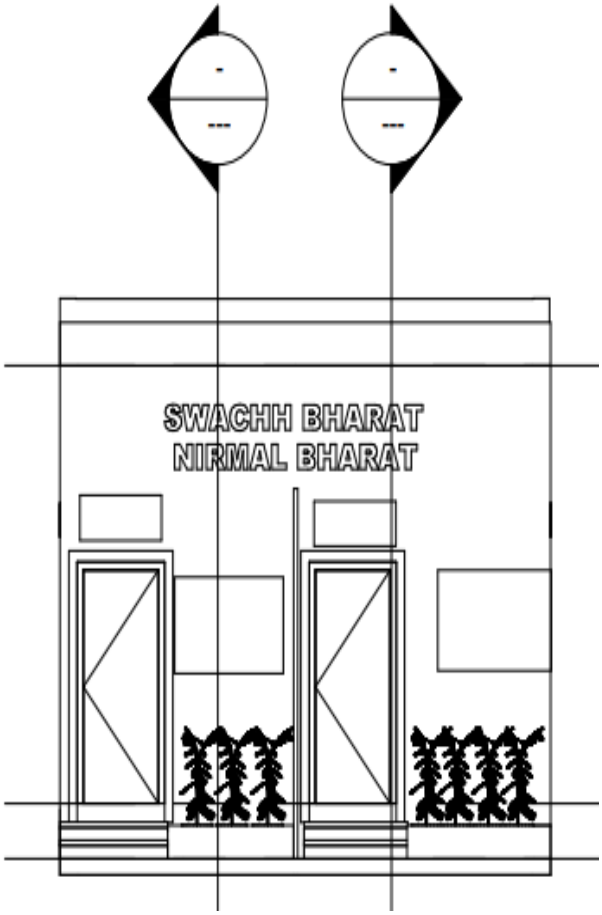
Public Toilet:

- **Main Important points of public Toilet:**

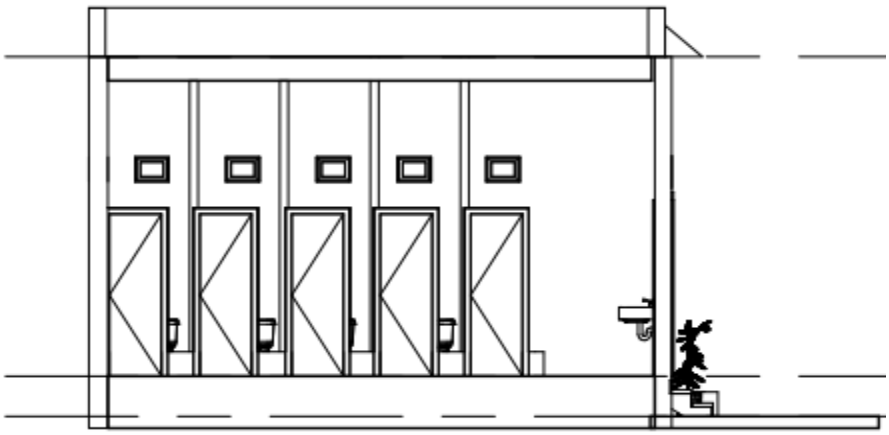
- Toilets and all that is related—loosely called sanitation—play a hugely important role for all of us: not only in our daily lives as we spend time to relieve ourselves, but also for our sustainable, inclusive development.
- Toilets are crucial for the healthy development of people, not to mention children.
- So is sanitation – facilities and services for safe disposal of human urine and faeces includes maintaining hygiene through services such as garbage collection and wastewater disposal.
- The overall purpose of good sanitation is to provide a healthy living environment for everyone, protect natural resources such as surface water, groundwater, and soil, and provide safety, security, and dignity for people when they defecate or urinate.



Toilet Plan Plan



Public Elevation



Section Plan

3D View

Table 1 MEASUREMENT SHEET

SR. NO.	DESCRIPTION	NO.	LENGT-H (M)	BREAD-TH (M)	HEIG-HT (M)	QUANTITY
1	**Excavation in Foundation**					
	Total C. L=47.14 m					
	Actual Length=46.24 m	1	46.24	0.9	1.2	49.93 m^3
	Total					**49.93 m^3**
2	**Plain cement concrete (P.C.C) in Foundation (1:4:8)**					
	PCC	1	46. 24	0.9	0.3	12. 48 m^3
	Total					**12.48 m^3**
3	**Brickwork in Foundation up to Plinth level**					
	First step	1	46.54	0.6	0.3	8.377 m^3
	Second step	1	46.84	0.3	0.2	2.81 m^3
	Third step	1	46.92	0.228	0.8	8.55 m^3

	Total					**19.737 m^3**
4	**Brickwork in superstructure in cement mortar 1:6**					
	For Ground Floor					
	External Wall	1	31.42	0.228	3	21.49 m^3
	Internal Wall	1	15.5	0.112	3	5.2 m^3
						26.69 m^3
	Deduction for Door/Ventilation :					
	D1	2	1.0	0228	2.1	0.957 m^3
	D2	10	0.8	0.112	2.1	1.88 m^3
	V	16	0.6	0.228	0.6	1.313 m^3
						(-) 4.15 m^3
	Deduction for lintels:					
	Bearing = 0.15 m					
	D1	2	1.3	0.228	0.15	0.089
	D2	10	1.1	0.112	0.15	0.18
	V	16	0.9	0.228	0.15	0.49

						(-)0.759 m^3
	Total					**21.78 m^3**
5	**RCC Work**					
	Slab	2	7	6	0.12	10.08
	Lintel					0.759
	Total					**10.839 m^3**
6	**2 cm thick marble flooring**					
	Blocks	10	1.3	1.0		13
	Passage		6.6	2.4		15.70
	Extra space	2	0.98	2.8		5.48
	Total area					**34.188 m^2**
7	**Smooth plaster on inside walls and ceiling in cm. (1:3)**					

	Wall	4	2.772		4	44.35
		4	6.54		4	104.64
	Ceiling	1	5.54	6.54		36.23
	Total					**185.22 m^2**
9	**Earth filling in Excavation**					
	Total excavation for walls					49.93 m^3
	Brickwork up to G.L.					(-)19.737 m3
	PCC					(-)12.48 m^3
	Total					**17.713 m^3**

Table 2 ABSTRACT SHEET

SR. NO.	PARTICULARS	QUANTITY	UNIT	RATE	PER	AMOUNT
1	**Excavation in Foundation**	49.93	m3	85	m3	4244
2	**Plain cement Concrete (P.C.C) in Foundation (1:4:8)**	12.48	m3	3000	m3	37440
3	**Brickwork in Foundation up to Plinth level**	19.737	m3	3200	m3	63158
4	**Brickwork in superstructure in cement mortar 1:6**	21.78	m3	3500	m3	76230
5	**RCC Work**	10.839	m3	8800	m3	95383.2

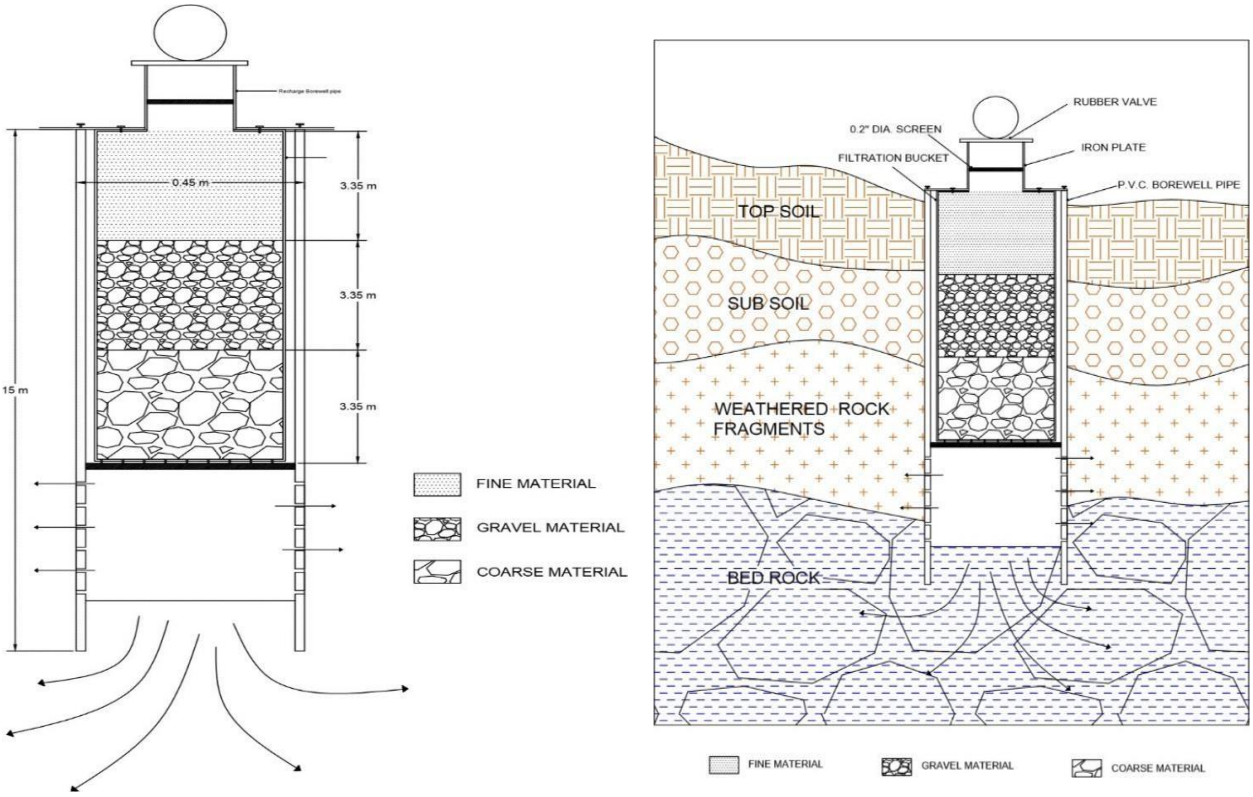
6	**2 cm thick marble flooring**	34.188	m^2	500	m^2	17094
7	**Smooth plaster on inside walls and ceiling in cm. (1:3)**	185.22	m^2	150	m^2	27783
9	**Earth filling in Excavation**	17.713	m^3	50	m^3	885.65
	Total					**3,22,228 Rs.**
	Add 5% contingencies					**16,109**
	Grand Total					**3,38,339 Rs.**
					say	**3,40,000 Rs.**

13.1.2 Civil Designs 2:

Ground Water Recharge by Vertical Shaft (Socio-Economic Design):

- **Introduction of Vertical Shaft: -**
  - It will Fixed at Sloppy area in because flowing water can easily pass through the vertical shaft
  - Main source of water in village is ground water. Due to excessive use and population expansion ground water level is depleting.
  - To maintain round water level and conserve it for future generation Ground water recharge is necessary.
  - In an Artificial groundwater recharge, we will use vertical recharge shaft method. In this shaft the top portion we use PVC ball & Rubber lip which is help in whenever river water level gone up & rubble lip will automatically open fill with water.
  - The diameter of shaft is 0.45 M. depth of PVC pipe is 15 M.
  - It should end in more permeable strata below the top impermeable strata.
  - It may not touch water table. To begin with in PVC pipe on top portion provide rubber valve.
  - Below it 0.20 Inches diameter screen is placed to remove rags, paper and plastic to prevent damage.

- In PVC pipe 10 M deep filtration bucket is connected with bolt. In which there are three layers of fine, gravel and coarse material placed. At bottom there is one extra screen provided which is prevent filter material to the ground.
- In PVC pipe provide hole to spread water in to confined aquifer.



Vertical recharge shaft Section

Table 3 ABSTRACT SHEET

SR. No.	Particulars	Amount (Rs.)
1	PVC Pipe	230
2	Geo Net (Screen)	1700
3	Rubber Valve	3000
4	Bolt	200
5	Iron Plate	10000
6	Bucket	11000
7	Sand	70
8	Gravel	40
9	Coarse Aggregate	80

10	Labour	15000
11	Excavation Equipment rent (Per Month)	3000
	Sub Total	**44420/-**

13.1.3 Civil Designs 3:

Bio gas plant: -

- **Information: -**
  - Bio gas plant is one of the economical solutions for renewable energy sources for a rural area.
  - It transforms rural village in to clean village and also provide gas as energy source and gives fertilizer at end.
  - The system consists of digester tank, Gas holder, Inlet and outlet, fixtures to burn gas.

Data taken: -

Numbers of animals to one of the villagers = 09 (As per survey) As per standard data, assume per day dung of animal =10 Kg.
So total per day dung = 9 X 10 = 90 Kg/day

Design of Digester tank: -

Assume retention period (RT) = 60 days.
Assume mixing proportion of solid and water is 1:1
Now total amount of slurry per day (Sd) = Total per day dung + Water amount
= 90 + 90
= 180 Kg/day
= 180 lit/day

= 0.18 m3 / day

Volume of digester tank (Vd) :-

= Sd X RT
= 0.18 X 60
= **10.8 m3**

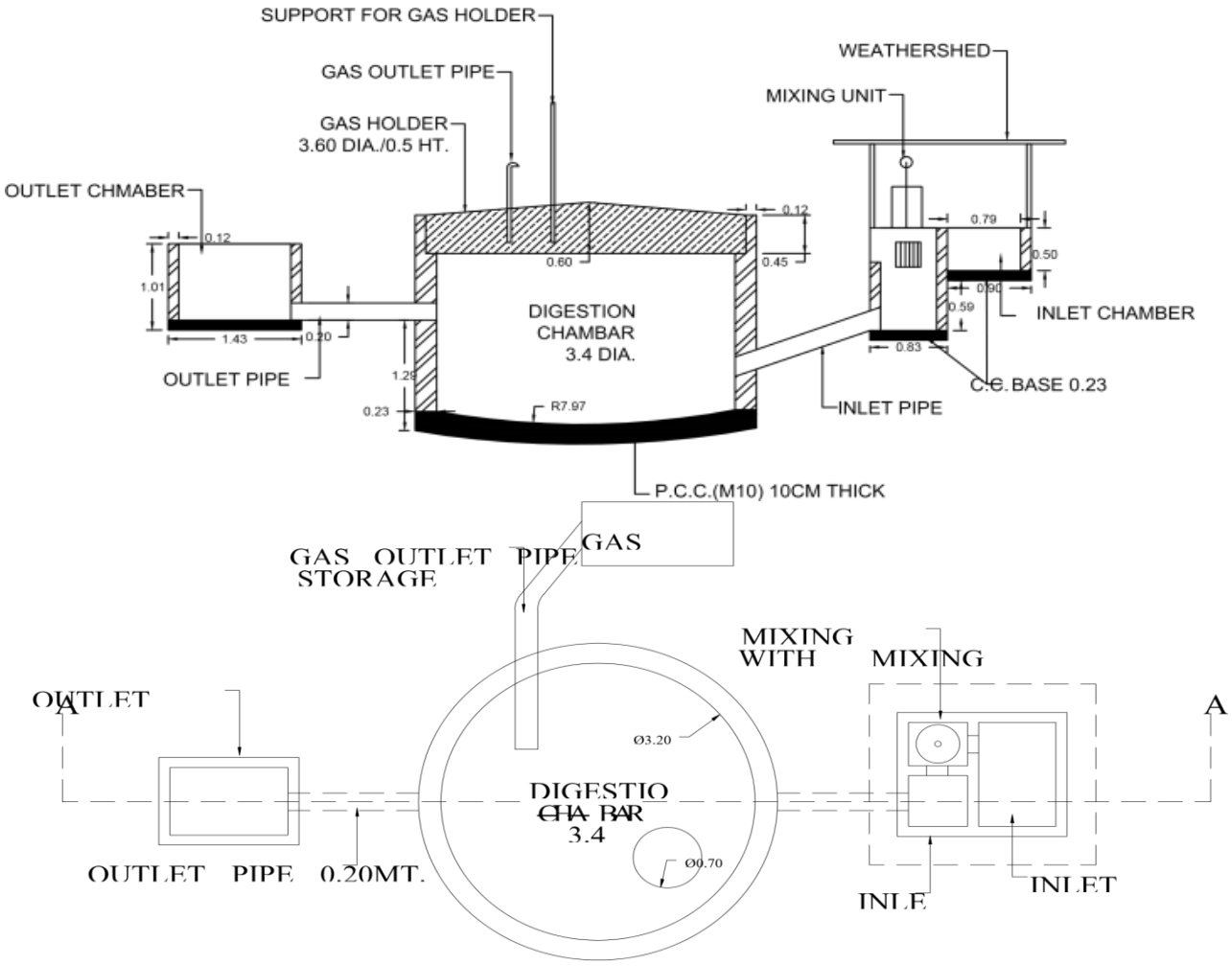


Figure 30 Design of biogas plant

Assume shape of digester tank is cylinder. (Digester volume for one unit)

Total digester volume (Vd) = π R2 h

18 = π R2 X1.5 (Assume h = 1.5 m)

R = 1.51 m

So, dimension of digester tank is **R = 1.6 m & h = 1.5 m (Provided)**

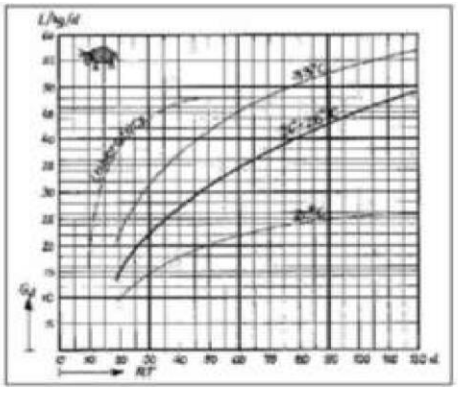


Figure 31Gd V/s RT Graph

Design of Gas Holder

Assume digester temperature = 26-28 ˚C
From fig find Gd by taking RT = 60 days

Specific gas production Gd = 34 Lit /Kg/day
Daily gas production (G) = Gd X Feed volume

= 34 X

180
= 6120 Lit.

Sr. No.	Description of Item	Nos.	Length (m)	Width (m)	Height (m)	Quantity (cum)	Total Quantity (Cum)

= 6.120 m3

Now assume gas holder capacity = 48 %

Gas holder volume = Daily gas production X Capacity of holder

= 6.12 X 0.48

= **2.94 m3**

Gas holder volume = 3.1 m3 (Provided)

Assume shape of gas holder is **cylinder.**

Volume = π r2 h

3.1 = π x r2 x 0.40 (Assume h = 0.40 m)

r = 1.57 m

So, dimension of gas holder is **r = 1.7 m & h = 1 m (Provided)**

Design of Inlet and Outlet

Total volume of slurry mixes per unit = 0.18 m3 / day

Total volume of slurry = 0.18 m3 / day (Assume Single time filling operation)

Provide rectangular tank

Total volume for one time mixing of slurry = L × B × H

0.18 = L × B × H (Take H = 0.50 m)

0.18 = 0.5B X B X 0.50 (Assume Rectangle chamber With L=0.5B)

B = 0.72 m

Provide B = 0.80 m L = 0.50 m

Dimension of inlet are 0.5 m X 0.8 m X 0.5 m

Here, **0.18 m3 / day required < 0.2 m3/day provided.**

Provide same size for outlet tank also.

MEASUREMENT SHEET

1.	Excavation for foundation.						
	Inlet chamber	1	0.90	1.29	0.25	0.29	
		1	0.79	0.80	0.25	0.158	
		1	0.79	0.80	0.75	0.367	28.10
	Digester chamber	1	9.07	1.29	2.19	25.63	
	Outlet chamber	1	1.43	1.00	1.01	1.44	
	For Inlet and Outlet pipe.	2	0.90	0.30	0.80	0.216	
2.	P.C.C. in foundation.						
	Inlet chamber.	1	0.90	1.29	0.10	0.116	0.385
		1	0.79	0.80	0.10	0.063	
		1	0.79	0.80	0.10	0.063	
	Outlet chamber.	1	1.43	1.00	0.10	0.143	
3.	Cement Concrete for foundations.						
	Inlet chamber.	1	0.90	1.29	0.23	0.267	
		1	0.79	0.70	0.23	0.127	
		1	0.79	0.70	0.23	0.127	3.018
	Digester chamber.	1.10	$\Pi r^2 = 3.14 \times 1.7^2 = 9.07$		0.23	2.29	
	Outlet chamber.	1	0.90	1.00	0.23	0.207	
			Total C.C. work in foundation			3.018	
4.	Masonry work.						
		1	4.5	0.12	0.5	0.27	
		1	1.4	0.12	0.7	0.117	
	Digester chamber Length = $2\pi r$ = 2 x 3.14 x 1.7 = 10.676	1	10.676	0.23	1.73	4.25	4.69
	Outlet chamber	1	0.10	0.45	0.780	0.0351	
		1	0.10	0.85	0.323	0.027	

	Plastering double coat water proof						
5.	Inlet chamber.	1	3.4	-	0.5	1.7	
		1	2.7	-	1.00	2.7	65.49
6.	Digester chamber.	1	21	-	1.72	36.12	
7.		1	22.25	-	1.00	22.25	
	Outlet chamber.	1	3.4	-	0.8	2.72	
	200mm Dia. Pipe required.	1	2.4 m				2.4
	Mechanical mixing unit.	1	90 Numbers				90

Abstract Sheet

Sr. No	Description of item	Quantity	Unit rate	Unit	Total Amount
1.	Excavation for foundation for depth 1.5mt to 3.0mt including sorting out and stacking of useful material and disposing off the excavated stuff up to 50mt lead.	28.10	95	Cumec	2669
2.	Providing and laying cement concrete 1:4:8 and curing complete in foundation.	0.385	1900	Cumec	731.5
3.	Providing and laying cement concrete work 1:1:2 and complete curing excluding cost of for work and reinforcement.	3.018	3400	Cumec	10261
4.	Brick work using common burnt clay building brick in foundation in C: M (1:5).	4.69	3300	Cumec	15477
5.	Providing 20mm thick plaster in single coat in single or half brick walls smooth in 1:3 (C:M).	65.49	140	Sq. Mt	9168.6
6.	R.C.C heavy duty pipe.	2.4	250	Rmt	600
		Total cost			38907.1 Rs.
		Add 1.5 % Water charges			583.6 Rs.
		Add 10 % Contractor profits			3890.71 Rs.
		Net Cost			**43381.41 Rs.**

13.1.4 Electrical Designs 1: - Touchless Hand Sanitizer

ABSTRACT

An automatic hand sanitizer dispensing machine is automated, non-contact, alcohol-based hand sanitizer dispenser, which finds its use in hospitals, work places, offices, schools and much more. Alcohol is basically a solvent, and also a very good disinfectant when compared to liquid soap or solid soap, also it does not need water to wash off since it is volatile and vaporizes instantly after application to hands. It is also proven that a concentration of >70% alcohol can kill Coronavirus in hands. Here, an ultrasonic sensor senses the hand placed near it, the Arduino uno is used as a microcontroller, which senses the distance and the result is the pump running to pump out the hand sanitizer.

The COVID-19 pandemic has radically affected life for almost everyone around the globe, and makers are no exception. With everyone being more careful of their interactions with humans and objects, personal hygiene has taken serious precedence over all other factors in public space. A lot of public places have hand sanitizers for visitors, but they need to be manually pressed. To avoid any contact at all, some no-touch hand sanitizer dispensers are commercially available, but they are expensive and most off-the-shelf commercial sanitizers cannot be automated. In this project, we create a contactless hand sanitizer dispenser that can be used for any press-to-release hand sanitizer available in the market.

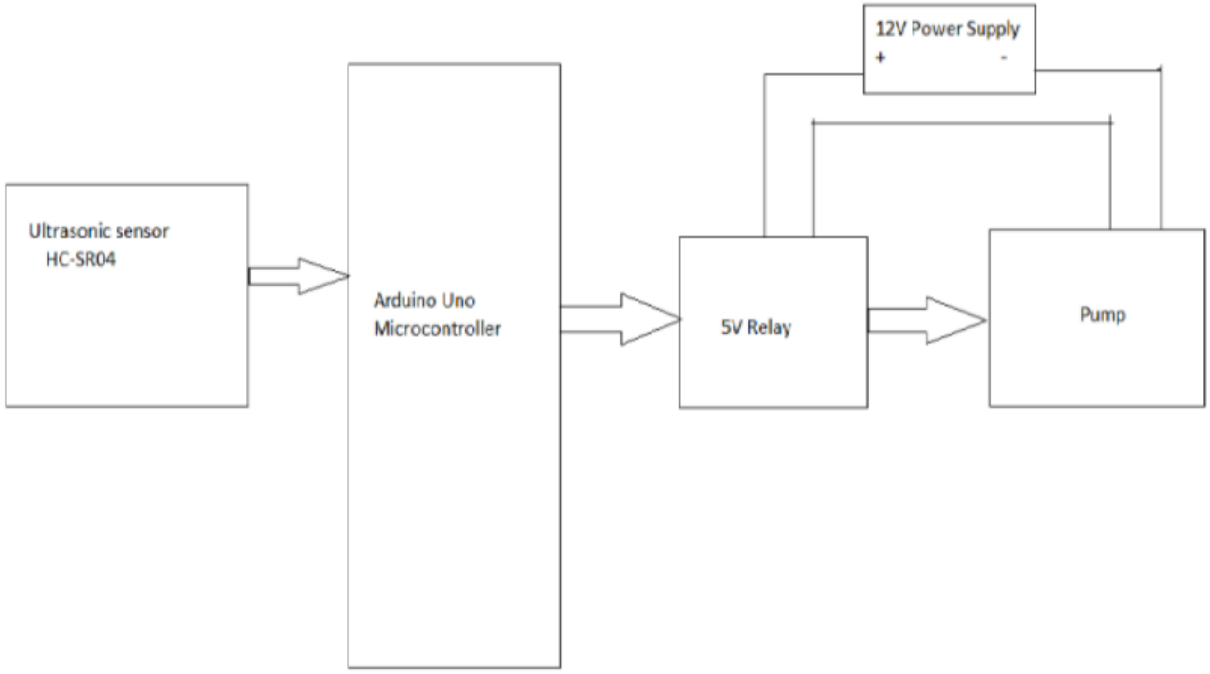
INTRODUCTION

Sanitization means cleaning or sterilizing an object or body part like hands or whole body. Sanitization can be done in many ways including UV Sanitization, Soap Sanitization, Alcohol Sanitization, Bleach Sanitization and so on. Of the above methods, alcohol was found to be more useful for human beings since it is harmless on skin surface, vaporizes easily and kills most of the viruses, bacteria, and also removes dirt in our hands. Alcohol may be expensive for mass scale sanitization of buildings or rooms and a major disadvantage is that, alcohol is highly inflammable and requires careful storage to avoid catastrophe. Alcohol also makes hands dry since it absorbs moisture, and hence also needs addition of moisturizers. Alcohol based hand sanitizers are also provided with antiseptic disinfectants like Chlorohexidine Gluconate. Minimum concentration of alcohol in hand sanitizers must be greater than 70% for effectiveness against viruses. But, repeatedly touching the hand sanitizer containers to get a drop of sanitizer again initiates contact with persons, which may be risky.

Hence there is need for non-contact-based hand sanitizer dispenser. It also says that handwashing is important and also effective with proper hand washing steps, but washing with soap and water is time consuming for peak hours in hospitals. This paper also showed the effectiveness of the alcohol-based hand sanitizers, which reduced infection rates by whopping 30%. They used hand sanitizers with 60 to 70 percent ethanol or isopropanol for reducing significant number of pathogens. The patients were also given about 4.25-ounce containers of hand sanitizer alongside their beds. The input to the Arduino is given using an ultrasonic sensor, which is used to sense the distance, it emits ultrasonic frequency from one side and the notes the time taken by sound wave to get reflected back. When the sensor senses the hand, at a distance less than 7cm from the sensor, the Arduino gives a 100ms pulse from its digital output pin. The pump cannot be used

directly, hence a relay is used as a switch. The relay accepts the pulse from Arduino and makes the pump run. The pump is 3 to 12V submersible type, which pumps out a few drops of hand sanitizer on to the hands, after pumping, the distance is sensed for every 1000ms(1s) for scanning purposes.

METHODOLOGY



Hardware Components

1.) Arduino UNO Microcontroller –

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

The 14-digital input/output pins can be used as input or output pins by using Pin Mode (), digital Read () and digital Write () functions in Arduino programming. Each pin operates at 5V and can provide or receive a maximum of 40mA current, and has an internal pull-up resistor of 20-50 K Ohms which are disconnected by default. Out of these 14 pins, some pins have specific functions as listed below:

Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip.
External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

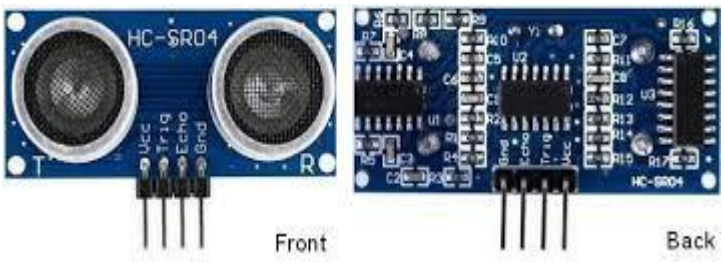
PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analog Write () function.
SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication.
In-built LED Pin 13: This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off.
Along with 14 Digital pins, there are 6 analog input pins, each of which provide 10 bits of resolution, i.e., 1024 different values. They measure from 0 to 5 volts but this limit can be increased by using AREF pin with analog Reference () function.

Analog pin 4 (SDA) and pin 5 (SCA) also used for TWI communication using Wire library.
Arduino Uno has a couple of other pins as explained below:

AREF: Used to provide reference voltage for analog inputs with analog Reference () function.
Reset Pin: Making this pin LOW, resets the microcontroller.

Arduino can be used to communicate with a computer, another Arduino board or other microcontrollers. The ATmega328P microcontroller provides UART TTL (5V) serial communication which can be done using digital pin 0 (Rx) and digital pin 1 (Tx). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The ATmega16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. There are two RX and TX LEDs on the Arduino board which will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328P also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

2.) Ultrasonic Sensor HC-SR04 –



HC-SR04

The HC-SR04 ultrasonic sensor uses sonar to determine distance to an object like bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package. It comes complete with ultrasonic transmitter and receiver modules. HC-SR04 distance sensor is commonly used with both microcontroller and microprocessor platforms like Arduino, ARM, PIC, Raspberry Pie etc.

The following guide is universally since it has to be followed irrespective of the type of computational device used.

Power the Sensor using a regulated +5V through the VCC ad Ground pins of the sensor. The current consumed by the sensor is less than 15mA and hence can be directly powered by the on board 5V pins (If available). The Trigger and the Echo pins are both I/O pins and hence they can be connected to I/O pins of the microcontroller. To start the measurement, the trigger pin has to be made high for 10uS and then turned off. This action will trigger an ultrasonic wave at frequency of 40Hz from the transmitter and the receiver will wait for the wave to return. Once the wave is returned after it getting reflected by any object the Echo pin goes high for a particular amount of time which will be equal to the time taken for the wave to return back to the sensor. The amount of time during which the Echo pin stays high is measured by the MCU/MPU as it gives the information about the time taken for the wave to return back to the Sensor.

3.) 5V Relay –

Relays are most commonly used switching device in electronics. We have to consider two important parameters of the relay. Once is the Trigger Voltage; this is the voltage required to turn on the relay that is to change the contact from Common->NC to Common->NO. Our relay here has 5V trigger voltage, but you can also find relays of values 3V, 6V and even 12V so select one based on the available voltage in your project. The other parameter is your Load Voltage & Current, this is the amount of voltage or current that the NC, NO or Common terminal of the relay could withstand, in our case for DC it is maximum of 30V and 10A. Make sure the load you are using falls into this range. Relay is an electromechanical device that uses an electric current to open or close the contacts of a switch. The single-channel relay module is much more than just a plain relay, it comprises of components that make switching and connection easier and act as indicators to show if the module is powered and if the relay is active or not.

The above circuit shows a bare-minimum concept for a relay to operate. Since the relay has 5V trigger voltage we have used a +5V DC supply to one end of the coil and the other end to ground through a switch. This switch can be anything from a small transistor to a microcontroller or a microprocessor which can perform switching operating. You can also notice a diode connected across the coil of the relay; this diode is called the Fly back Diode. The purpose of the diode is to protect the switch from high voltage spike that can produced by the relay coil. As shown one end of the load can be connected to the Common pin and the other end is either connected to NO or NC. If connected to NO the load remains disconnected before trigger and if connected to NC the load remains connected before trigger.

The single-channel relay module is much more than just a plain relay, it contains components that make switching and connection easier and act as indicators to show if the module is powered and if the relay is active. First is the screw terminal block. This is the part of the module that is in contact with mains so a reliable connection is needed. Adding screw terminals makes it easier to connect thick mains cables, which might be difficult to solder directly. The three connections on

the terminal block are connected to the normally open, normally closed, and common terminals of the relay.

The 'relay status LED' turns on whenever the relay is active and provides an indication of current flowing through the relay coil. The input jumper is used to supply power to the relay coil and LEDs. The jumper also has the input pin, which when pulled high activates the relay. The switching transistor takes an input that cannot supply enough current to directly drive the relay coil and amplifies it using the supply voltage to drive the relay coil. This way, the input can be driven from a microcontroller or sensor output. The freewheeling diode prevents voltage spikes when the relay is switched off.

4.) Water Pump –

The working principle of a water pump mainly depends upon the positive displacement principle as well as kinetic energy to push the water. These pumps use AC power otherwise DC power for energizing the motor of the water pump whereas others can be energized other kinds of drivers like gasoline engines otherwise diesel.

The water pump is a portable device and can be applied in several household applications. These pumps are used for pumping the huge amount of water from one place to another. The main purpose of a water pump is versatile. A quality pump which can be selected carefully may be perfect for draining water from a low flooded region, refilling the swimming pool, and bathtub, circulating pesticides otherwise fertilizers. The collection of water pumps is very large, therefore, while selecting a strong and consistent one, one should think about the requirement.

These pumps are applicable in several applications like building as well as the water system. These pumps are used to provide water supplies for buildings and well-matched with pneumatic systems where the no-suction lift is necessary. The main purpose of these water pumps is to pump water from wells in homes & to increase water pressure in intake lines. Centrifugal pumps offer a nonstop pressure supply for fire guard systems, and they can supply like sump pumps in horizontal otherwise vertical configurations.

Centrifugal pumps are horizontal to numerous general problems. These may require liquid circulation to stop overheating which is caused by low supplies. These types of pumps must be prepared to work properly. As a head of the positive suction system is very less while selecting the pump, it can consequence to cavitation's, a situation wherever air bubbles form closes to the impeller, then leads to shock signals within the water pump. At last, wear of the impeller of the pump can be degenerated by delayed solids within the fluid.

Sometimes, these pumps are also called rotary pumps, and these are very competitive because of the fact that they remove air from the lines and therefore get rid of air leakage. These are also efficient while dealing with high-viscosity fluids. The main disadvantage of these pumps is that they need extremely little clearance among the revolving pump & the external edge of the unit.

Consequently, the revolution must happen at extremely slow speeds. When the water pump is functioned at high speeds, then the fluid can ultimately decrease the efficiency of the pump.

5.) 12V Power Supply –

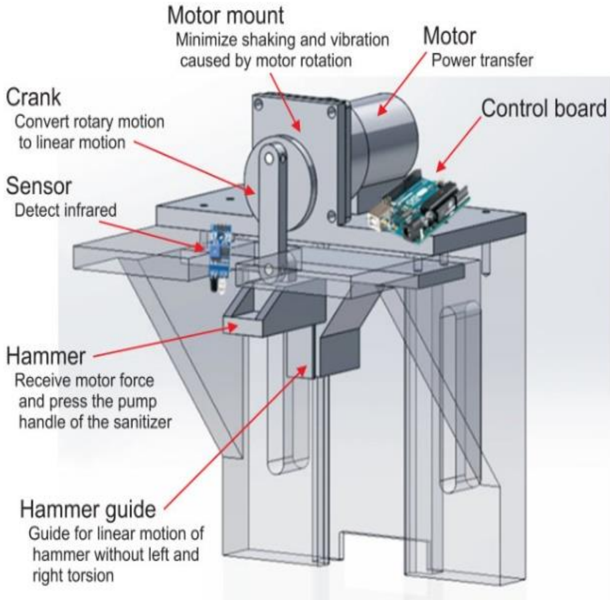
This is a simple approach to obtain a 12V and 5V DC power supply using a single circuit. The circuit uses two ICs 7812(IC1) and 7805 (IC2) for obtaining the required voltages. The AC mains voltage will be stepped down by the transformer T1, rectified by bridge B1 and filtered by capacitor C1 to obtain a steady DC level. The IC1 regulates this voltage to obtain a steady 12V DC. The output of the IC1 will be regulated by the IC2 to obtain a steady 5V DC at its output. In this way both 12V and 5V DC are obtained. 12V power supplies (or 12VDC power supplies) are one of the most common power supplies in use today. In general, a 12VDC output is obtained from a 120VAC or 240VAC input using a combination of transformers, diodes and transistors. 12V power supplies can be of two types: 12V regulated power supplies, and 12V unregulated power supplies.12V regulated power supplies come in three styles: Switching regulated AC to DC, Linear regulated AC to DC, and Switching regulated DC to DC.

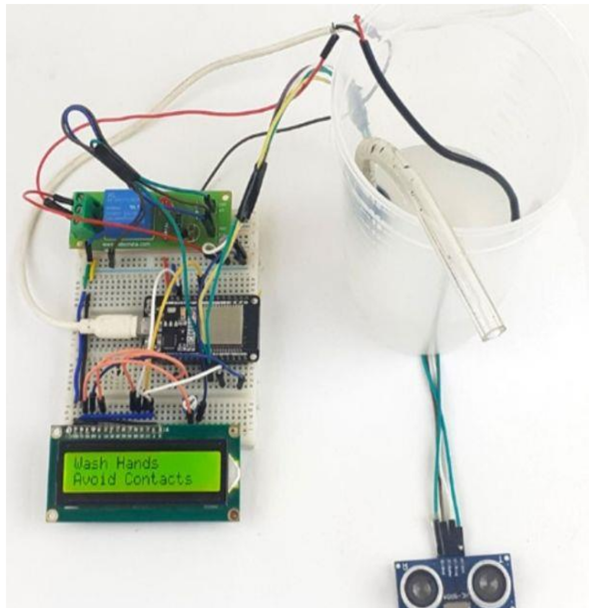
Switching regulated 12VDC power supplies, sometimes referred to as SMPS power supplies, switchers, or switched mode power supplies, regulate the 12VDC output voltage using a complex high frequency switching technique that employs pulse width modulation and feedback. Acapnia switching regulated power supplies also employ extensive EMI filtering and shielding to attenuate both common and differential mode noise conducted to the line and load. Galvanic isolation is standard in our 12VDC switchers, affording our users input to output and output to ground isolation for maximum versatility. Acapnia switching regulated power supplies are highly efficient, small and lightweight, and are available in both AC-DC single and wide-adjust output and DC-DC configurations. Our Low Profile wide adjust output switchers can be voltage or current regulated and are externally programmable.

Linear regulated 12VDC power supplies regulate the output using a dissipative regulating circuit. They are extremely stable, have very low ripple, and have no switching frequencies to produce EMI. Galvanic isolation is standard in our 12VDC linear, affording our users input to output and output to ground isolation for maximum versatility. Acapnia linear regulated power supplies are available AC to DC single and wide adjust outputs.

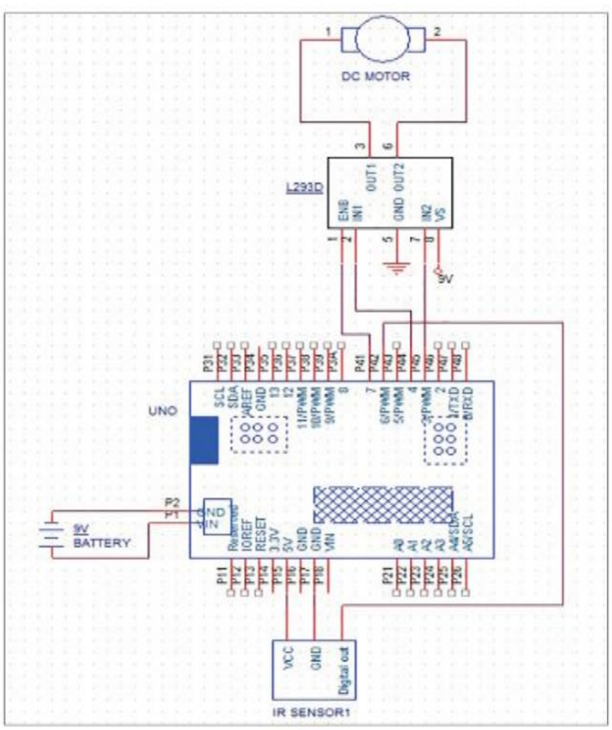
Unregulated 12VDC power supplies are basic power supplies with an AC input and an unregulated 12VDC output. The output voltage changes with the input voltage and load. These power supplies are inexpensive and extremely reliable.

PROTOTYPE





Model Design	Prototype




```
Void setMotor (int speed, Boolean reverse)
{
 analogWrite (enablePin, spped) ;
 digitalWrite (inlPin, ! reverse) ;
 digitalWrite (in2Pin, reverse) ;
}
```
(A)

```
If (Obstacle == Hand)
{
 DigitalWrite (LED, HIGH)
 setMotor(255, 1) ;
 delay (324, 3243243243243243243243243432432) ;
 setMotor (0, 1) ;
 delay (3000) ;
}
else if (Obstacle == NoHand)
{
 digitalWrite (LED, LOW) ;
 setMotor (0, 1) ;
}
```
(B)

Circuit	Coding in Arduino

Cost Estimation

SR. NO.	COMPONENTS	PRICE
1	Arduino UNO	499
2	Ultrasonic Sensor HC-SR04	225
3	5V Relay	59
4	Water Pump	140
5	12V Power Supply	359
6	Jumper wires	100
7	On-Off switch	49
8	Hand Sanitizer	150
9	Plastic tube	50
10	**TOTAL**	**1631**

CONCLUSION

The automatic hand sanitizer device proposed in this paper is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention. Additionally, it is economical and eco-friendly by decreasing waste emissions.
Hand sanitizers usually operate by squirting sanitizer liquid when one presses a pump with one's hand. Some hand sanitizers on the market are automatically pumped. However, sanitizer containers and pump devices are designed to be compatible only between products produced by the same manufacturer.

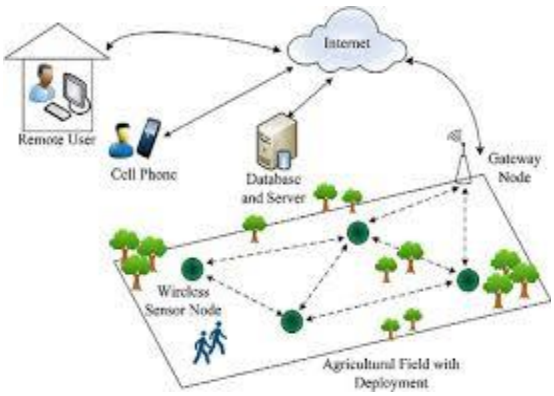
To address this problem, we have designed an automatic hand sanitizer system that is compatible with various containers. With the proposed device, it is possible to avoid many people coming into contact with the pump handle, thus preventing fomite viral transmission and making the use of hand sanitizer much more convenient. Moreover, the system squirts a certain amount of hand sanitizer at all times, making it easy to manage refills and replacement. Furthermore, it can operate compatibly with various designs of sanitizer containers, so consumers do not need repurchase a container for the liquid if they replace the hand sanitizer. Thus, it is economical and eco-friendly by decreasing waste emissions. The automatic hand sanitizer device proposed by this paper is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention.

13.1.5 Electrical Designs 2: - IOT Based Smart Farming

ABSTRACT

Smart Farming is focused on the use of data acquired through various sources in the management of farm activities. Technologically advanced doesn't essentially mean that it is a smart system. Smart systems differentiate themselves through their ability to record the data and make sense out of it. Smart farming employs hardware (IoT) and software (SaaS) to capture the data and give actionable insights to manage all the operations on the farm, both pre- and post-harvest. The

data is organized, accessible all the time and full of data on every aspect of finance and field operations that can be monitored from anywhere in the world. The concern over Smart Farming is growing, where Internet of Things (IoT) technologies are highlighted in the farm management cycle. Also, a large amount of data is generated via different channels such as sensors, Information Systems (IS), and human experiences. A timely right decision-making by monitoring, analyzing, and creating value from these Big Data is a key element to manage and operate the farms smartly, and is also bound to technical and socio-economic constraints. Given the fact, in this research, we work on the implication of Big Data technologies, IoT, and Data Analysis in agriculture. Internet of Things (IoT) plays a crucial role in smart agriculture. Smart farming is an emerging concept, because IoT sensors capable of providing information about their agriculture fields.



Agriculture is the backbone of any developing country for their sustainable development. So, it is our responsibility to educate the society regarding the sustainable development of agriculture. In the last 10-15 years, technology has been developing at a rapid speed. Various researchers are giving more emphasis to applying technology to agriculture. This is called smart farming. Smart farming uses computer technology and communication for greater yield and production of crops. This chapter studies the various technological developments in the field of smart farming. A few of them are related to internet of things (IOT), wireless communication, irrigation system, and agriculture automation. This helps the new researchers in the field of smart farming to understand the current technological developments.

INTRODUCTION

The biggest problem faced during production of crops, leading to wastage or below par production is non timely watering in the field or inaccurate amount of water being poured in the field. At times, due to the human tendency, either greater or lesser amount of water is allowed to enter the field thereby destroying the crop. This marks the first major problem. Also, water-level in the source tank sometimes goes low or sometimes get over-drained. Thus, information regarding scarcity or abundance of water in the reservoir is the second major problem. Over sprinkling of pesticides and chemicals for large production of products lowers the life-span of field. Many times, the farmer is far away from the field and is therefore unable to get Smart Farming Using IoT the current status of the field.

Hence his periodic visit is must on the field to take care of the water requirement, chemical requirement, and other production related issues. Thus, for timely observation, automatic control over such parameters would ease the burden of any individual. Traditional methods of cultivation like manual ploughing, two crop pattern and old system of irrigation are mainly responsible for low productivity of agriculture. Due to the use of these old implement's agriculture is backward. Lack of proper understanding of the need to grow crop sustainability will push farmers in to vicious circle of debts, heavy use of chemical (fertilizers), water mismanagement, and low productivity and thus more debts for the new cycle. This problem is avoided by making the

control of water automatic with the help of digital pins of any microcontroller. Basically, any pump (automatic) can be controlled with the help of a microcontroller and a current amplifying device. In this project Arduino is being used as a microcontroller and bc147 as a current amplifier and as a switching device. In order to read the information of all these activities on the field, GSM sim900 was implemented on the field. This GSM was a dual band module with features of message oriented (mo.) and message terminated (mt). Depending on the crops to be cultivated, the water requirement of different crops can be determined by a standard chart and accordingly a minimum threshold value of water requirement and similarly maximum water holding capacity of the particular patch can be programmed on the already installed automatic irrigation system. If the value goes below that threshold level, then its respective water pipe will get ON and the water level in that patch of field will increase. Once the water level reaches the maximum water holding level, then the system will automatically stop. Similarly, the chemical sprinkler for different crops on patch can be programmed and its timer can also be set as per needed, so not to lose the sustainability of farm. By using GSM+ARDUINO combination we can get all the on-going information of the farm on our mobile device by just texting the pre-programmed format of message to the sim card used in GSM module. Thus, the field information will be on the device even if the farmer is not in the farm. In case the GSM+ARDUINO module fails to exchange data with the farmer, there is another substitute for this drawback.

IoT (Internet of Things) in agriculture involves sensors, drones and robots connected through internet which function automatically and semi automatically performing operations and gathering data aimed at increasing efficiency and predictability. With increasing demands and shortage of labor across the globe, agriculture automation and robots or commonly known as Agribionts are starting to gain attention among farmers. The world is in the early stages of an ag robotics revolution with most of the products still in trial phases and R&D mode.

Semi-automatic robots with arms can detect weeds and spray pesticides in the affected plants, saving up the plants as well as overall pesticide costs. These robots can also be used in harvesting and lifting. Heavy farming vehicles can also be navigated from the comfort of homes through phone screens to perform tasks and GPS can track their positions at every time. Drones equipped with sensors and cameras are used for imaging, mapping and surveying the farms. They can be remotely controlled or they can fly automatically through software-controlled flight plans in their embedded systems, working in coordination with sensors and GPS. From the drone data, insights can be drawn regarding crop health, irrigation, spraying, planting, soil and field, plant counting and yield prediction and much more.

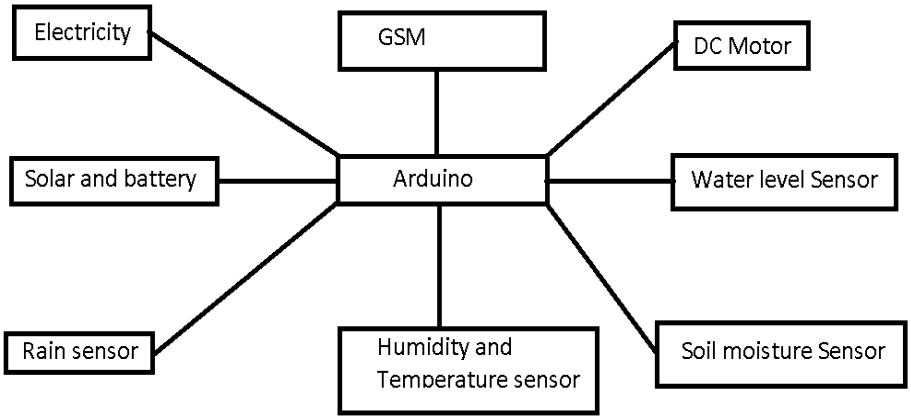
IoT based remote sensing utilizes sensors placed along the farms like weather stations for gathering data which is transmitted to analytical tool for analysis. They monitor the crops for changes in light, humidity, temperature, shape and size. The data collected by sensors in terms of humidity, temperature, moisture precipitation and dew detection help in determining the weather pattern in farms so that cultivation is done for suitable crops. The analysis of quality of soil helps in determining the nutrient value and drier areas of farms, soil drainage capacity or acidity, which allows to adjust the amount of water needed for irrigation and the opt most beneficial type of cultivation. Computer imaging involves the use of sensor cameras installed at different corners of the farm or drones equipped with cameras to produce images which undergo digital image processing. The images are used for quality control, disease detection, sorting and grading yield and irrigation monitoring through Image processing combined with machine learning which uses images from database to compare with images of crops to determine the size, shape, color and growth therefore controlling the quality.

Necessity

The present project proposes as IOT enabled smart soil moisture monitoring system that helps the government authorities to know the information about dry soil areas in the agricultural lands within a village, town or even a state so that the necessary precautionary steps can be taken to make such lands fertile. Besides, the project is also very much useful for the farmers, organizers or individual running plant nurseries to automatically turn the pumping motor ON and OFF on sensing the moisture content of the soil. The advantage of using this method is to reduce human intervention and still ensure proper irrigation.

This project is very low cost and an innovative system to know the moisture level of the soil from a remote place. For this system uses Ethernet Shield + Arduino UNO modem is used for sending data to the cloud and the user. The system makes us Arduino UNO, moisture sensor. It is programmed to receive the input signal of varying moisture condition of the soil. The system is powered by a dc 5V.

Block Diagram



Hardware Components

1.) Arduino UNO Microcontroller –

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

The 14-digital input/output pins can be used as input or output pins by using Pin Mode (), digital Read () and digital Write () functions in Arduino programming. Each pin operates at 5V and can provide or receive a maximum of 40mA current, and has an internal pull-up resistor of 20-50 K Ohms which are disconnected by default. Out of these 14 pins, some pins have specific functions as listed below:

Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip.
External Interrupt Pins 2 and 3: These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
PWM Pins 3, 5, 6, 9 and 11: These pins provide an 8-bit PWM output by using analog Write () function.
SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK): These pins are used for SPI communication.
In-built LED Pin 13: This pin is connected with a built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off.
Along with 14 Digital pins, there are 6 analog input pins, each of which provide 10 bits of resolution, i.e., 1024 different values. They measure from 0 to 5 volts but this limit can be increased by using AREF pin with analog Reference () function.

Analog pin 4 (SDA) and pin 5 (SCA) also used for TWI communication using Wire library.
Arduino Uno has a couple of other pins as explained below:

AREF: Used to provide reference voltage for analog inputs with analog Reference () function.
Reset Pin: Making this pin LOW, resets the microcontroller.

Arduino can be used to communicate with a computer, another Arduino board or other microcontrollers. The ATmega328P microcontroller provides UART TTL (5V) serial communication which can be done using digital pin 0 (Rx) and digital pin 1 (Tx). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The ATmega16U2 firmware uses the standard

USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. There are two RX and TX LEDs on the Arduino board which will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATmega328P also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus.

2.) Soil Moisture Sensor -

Soil moisture sensors measure the volumetric water content in soil. The moisture of the soil plays an essential role in the irrigation field as well as in gardens for plants. As nutrients in the soil provide the food to the plants for their growth. Supplying water to the plants is also essential to change the temperature of the plants. The temperature of the plant can be changed with water using the method like transpiration. And plant root systems are also developed better when rising within moist soil. Extreme soil moisture levels can guide to anaerobic situations that can encourage the plant's growth as well as soil pathogens. This article discusses an overview of the soil moisture sensor, working and its applications. The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil. As the straight gravimetric dimension of soil moisture needs eliminating, drying, as well as sample weighting. These sensors measure the volumetric water content not directly with the help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content.

3.) Rain Sensor -

A rain sensor or rain switch is a switching device activated by rainfall. A rain sensor is one kind of switching device which is used to detect the rainfall. It works like a switch and the working principle of this sensor is, whenever there is rain, the switch will be normally closed. Nowadays, conserving water as well as its proper usage is essential in everyone's life. Here is a sensor namely rain sensor which is used to detect the rain and generate an alarm. So, we can conserve water to use it later for different purposes. There are several methods available for conserving water like harvesting, etc. Using this method, we can increase the level of underground water. These sensors are mainly used in the field like automation, irrigation, automobiles, communication, etc. This article discusses a simple as well as reliable sensor module which can be available at low cost in the market.

4.) Water level Sensor -

Level sensors are used to detect the level of substances that can flow. Such substances include liquids, slurries, granular material and powders. Level measurements can be done inside containers or it can be the level of a

river or lake. Such measurements can be used to determine the number of materials within a closed container or the flow of water in open channels. RS Hydro have a wide range of pressure, ultrasonic, open channel, radar and capacitance level sensors and transmitters for sale and hire.

5.) Temperature and Humidity Sensor -

It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin. Humidity is the measure of water vapour present in the air. The level of humidity in air affects various physical, chemical and biological processes. In industrial applications, humidity can affect the business cost of the products, health and safety of the employees. So, in semiconductor industries and control system industries measurement of humidity is very important. Humidity measurement determines the amount of moisture present in the gas that can be a mixture of water vapour, nitrogen, argon or pure gas etc.… Humidity sensors are of two types based on their measurement units. They are a relative humidity sensor and Absolute humidity sensor. DHT11 is a digital temperature and humidity sensor. DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc.… to measure humidity and temperature instantaneously. This sensor is used in various applications such as measuring humidity and temperature values in heating, ventilation and air conditioning systems. Weather stations also use these sensors to predict weather conditions. The humidity sensor is used as a preventive measure in homes where people are affected by humidity. Offices, cars, museums, greenhouses and industries use this sensor for measuring humidity values and as a safety measure. DHT11 sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature.

The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form. For measuring temperature this sensor uses a Negative Temperature coefficient thermistor, which causes a decrease in its resistance value with increase in temperature. To get larger resistance value even for the smallest change in temperature, this sensor is usually made up of semiconductor ceramics or polymers.

6.) DC Motor -

A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.

A magnetic field arises in the air gap when the field coil of the DC motor is energized. The created magnetic field is in the direction of the radii of the armature. The magnetic field

enters the armature from the North pole side of the field coil and "exits" the armature from the field coil's South pole side. Almost every mechanical development that we see around us is accomplished by an electric motor. Electric machines are a method of converting energy. Motors take electrical energy and produce mechanical energy. Electric motors are utilized to power hundreds of devices we use in everyday life. Electric motors are broadly classified into two different categories: Direct Current (DC) motor and Alternating Current (AC) motor. In this article, we are going to discuss the DC motor and its working. And also, how a gear DC motors work.

A DC motor is an electric motor that runs on direct current power. In an electric motor, the operation is dependent upon simple electromagnetism. A current-carrying conductor generates a magnetic field, when this is then placed in an external magnetic field, it will encounter a force proportional to the current in the conductor and to the strength of the external magnetic field. It is a device that converts electrical energy to mechanical energy. It works on the fact that a current-carrying conductor placed in a magnetic field experiences a force that causes it to rotate with respect to its original position. Practical DC Motor consists of field windings to provide the magnetic flux and armature which acts as the conductor.

The input of a brushless DC motor is current/voltage and its output is torque. Understanding the operation of the DC motor is very simple from a basic diagram is shown below. DC motor basically consists of two main parts. The rotating part is called the rotor and the stationary part is also called the stator. The rotor rotates with respect to the stator. The rotor consists of windings, the windings being electrically associated with the commutator. The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnets are misaligned and the rotor will turn until it is very nearly straightened with the stator's field magnets.

As the rotor reaches alignment, the brushes move to the next commutator contacts and energize the next winding. The rotation reverses the direction of current through the rotor winding, prompting a flip of the rotor's magnetic field, driving it to keep rotating.

7.) GSM (Global System for Mobile communication) -

GSM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response, and over-the-air encryption.

GSM (Global System for Mobile communication) is a digital mobile network that is widely used by mobile phone users in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies: TDMA, GSM and code-division multiple access (CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 megahertz (MHz) or 1,800 MHz frequency band. GSM, together with other technologies, is part of the evolution of wireless mobile telecommunications that includes High-Speed Circuit-Switched

Data (HSCSD), General Packet Radio Service (GPRS), Enhanced Data GSM Environment (EDGE) and Universal Mobile Telecommunications Service (UMTS).

The GSM network has four separate parts that work together to function as a whole: the mobile device itself, the base station subsystem (BSS), the network switching subsystem (NSS) and the operation and support subsystem (OSS). These components perform different functions, such as routing calls and Short Message Service (SMS) and authenticating and storing caller account information via SIM cards.

Because many GSM network operators have roaming agreements with foreign operators, users can often continue to use their phones when they travel to other countries. SIM cards that hold home network access configurations may be switched to those with metered local access, significantly reducing roaming costs, while experiencing no reductions in service.

8.) Solar cell -

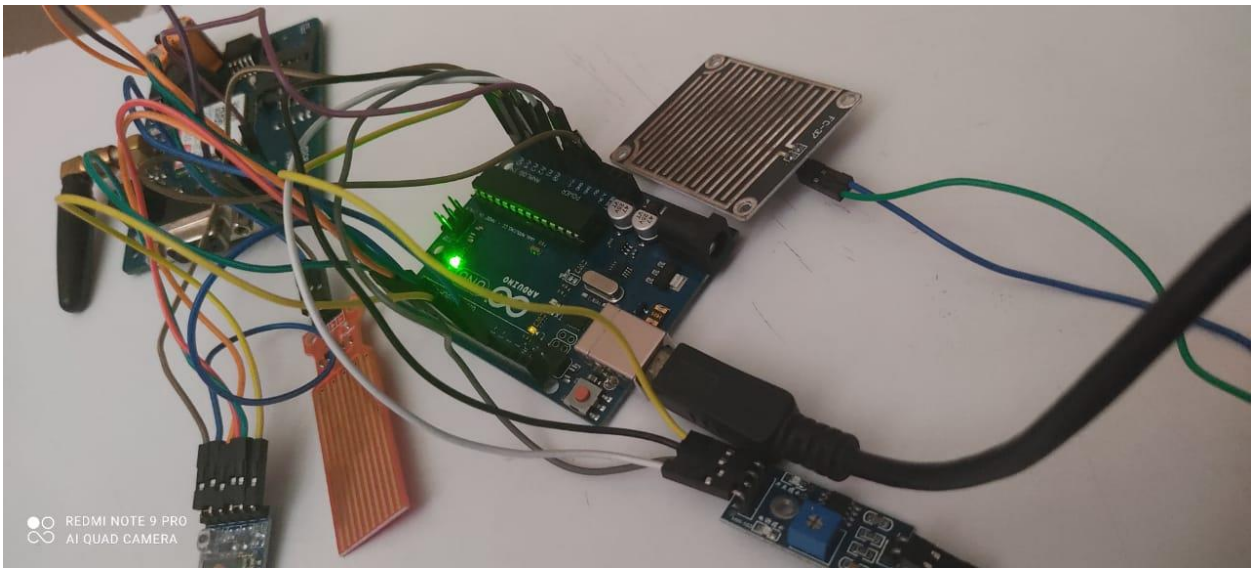
It is a source of electricity, which converts sunlight into electrical energy. A solar cell (also known as a photovoltaic cell or PV cell) is defined as an electrical device that converts light energy into electrical energy through the photovoltaic effect. A solar cell is basically a p-n junction diode. Solar cells are a form of photoelectric cell, defined as a device whose electrical characteristics – such as current, voltage, or resistance – vary when exposed to light. Individual solar cells can be combined to form modules commonly known as solar panels. The common single junction silicon solar cell can produce a maximum open-circuit voltage of approximately 0.5 to 0.6 volts. By itself this isn't much – but remember these solar cells are tiny. When combined into a large solar panel, considerable amounts of renewable energy can be generated.

Solar cell, also called photovoltaic cell, any device that directly converts the energy of light into electrical energy through the photovoltaic effect. The overwhelming majority of solar cells are fabricated from silicon—with increasing efficiency and lowering cost as the materials range from amorphous to polycrystalline to crystalline (single crystal) silicon forms. Unlike batteries or fuel cells, solar cells do not utilize chemical reactions or require fuel to produce electric power, and, unlike electric generators, they do not have any moving parts.

Solar cells can be arranged into large groupings called arrays. These arrays, composed of many thousands of individual cells, can function as central electric power stations, converting sunlight into electrical energy for distribution to industrial, commercial, and residential users. Solar cells in much smaller configurations, commonly referred to as solar cell panels or simply solar panels, have been installed by homeowners on their rooftops to replace or augment their conventional electric supply. Solar cell panels also are used to provide electric power in many remote terrestrial locations where conventional electric power sources are either unavailable or prohibitively expensive to install. Because they have no moving parts that could need maintenance or fuels that would require replenishment, solar cells provide power for most space installations, from communications and weather satellites to space stations. (Solar power is

insufficient for space probes sent to the outer planets of the solar system or into interstellar space, however, because of the diffusion of radiant energy with distance from the Sun.) Solar cells have also been used in consumer products, such as electronic toys, handheld calculators, and portable radios. Solar cells used in devices of this kind may utilize artificial light (e.g., from incandescent and fluorescent lamps) as well as sunlight.

PROTOTYPE



Cost Estimation

SR. NO.	COMPONENTS	PRICE
1	Arduino UNO	499
2	Soil Moisture Sensor	598
3	Rain Sensor	140
4	Water level Sensor	4500
5	Temperature and Humidity Sensor	1499
6	DC Motor	1699
7	GSM	990
8	Solar cell	2570
9	**TOTAL**	**12,495**

CONCLUSION -

There is an urgent need for a system that makes the agricultural process easier and burden free from the farmer's side. With the recent advancement of technology, it has become necessary to increase the annual crop production output of country India, an entirely agro centric economy. The ability to conserve the natural resources as well as giving a splendid boost to the production

of the crops is one of the main aims of incorporating such technology into the agricultural domain of the country. To save farmers effort, water and time has been important consideration.

As per plans we had to make the project a viable one. We were able to successively transmit, receive and record the data on our phones. The data was available for transmission due to the GSM which was sent after we would send a particular encrypted message. The data sent consisted the readings of the moisture, the patch on which the water was ON/OFF, the readings of the water level indicator. Thorough comparison of the two soils: Red and Brown helped us to realize the water holding capacity of brown soil is more compared to red soil.

Thus, the smart farming will revolutionize the world of farming and it will increase the productivity as well as improve the quality and can save lives of farmers.

13.1.6 Electrical Designs 3: - Smart Dustbin Segregation and Level Monitoring System

ABSTRACT

Nowadays certain actions are taken to improve the level of cleanliness in the country. People are getting more active in doing all the things possible to clean their surroundings. Various movements are also started by the government to increase cleanliness. Solid waste management is a crucial issue towards global sustainability crises. Governments across the world are taking initiatives to transform cities into smart cities. For this purpose, we design a garbage disposal system that uses multiple dustbins with a voice-based system that speaks to the user each time he or she stands before the dustbin. The system makes use of an IR sensor to detect the presence of any person in front of the dustbin. If a person is detected, the system issues voice instructions to the user about throwing right garbage in the right bin. When the dustbin gets full, stakeholders can see the level of dustbin on the online portal and thus hygiene will be maintained.

INTRODUCTION

The Smart garbage segregation & dustbin level indicator and monitoring system has been designed to ease the problems that the people or organizations face while managing their waste. The system allows the user to keep watch on the garbage bins with the help of IOT service. The system has an IR sensor which detects when a user arrives and guides him to throw garbage in the particular bin. To develop this system, we make use of a raspberry Pi controller. The controller is interfaced with an IR sensor and a voice speaker for detection and communication. The controller gets dustbin level input using ultrasonic level sensors. The level sensors are used to constantly feed the raspberry pi with bin levels. The Raspberry Pi is also interfaced with a WIFI module to transmit the level data over the internet. The level sensor panels are made to be easily mounted over any dustbin this allows the system to be easily screwed over any dustbin for instant installation. The data is transmitted over IOT to Adafruit platform which displays the bin level data over the internet. This indication can be used to alert the authorities that the garbage bins need to be emptied.

Hardware Components

1.) Raspberry PI 3 B+ -

The Raspberry Pi 3 Model B+ is the latest product in the Raspberry Pi 3 range, boasting a 64-bit quad core processor running at 1.4GHz, dual-band 2.4GHz and 5GHz wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and PoE capability via a separate PoE HAT The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market.

2.) Ultrasonic Sensor –

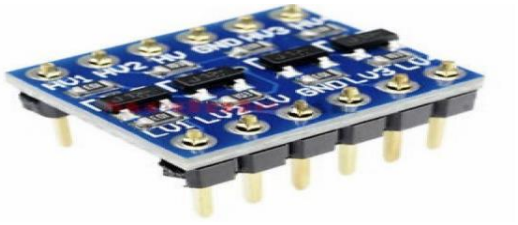
This is the HC-SR04 ultrasonic distance sensor. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit.

There are only four pins on the HC-SR04: VCC is the power supply for HC-SR04 Ultrasonic distance sensor which connects the 5V pin on the Arduino. Trig (Trigger) pin is used to trigger the ultrasonic sound pulses. Echo pin produces a pulse when the reflected signal is received. The length of the pulse is proportional to the time it took for the transmitted signal to be detected. GND should be connected to the ground.

3.) IR Sensor –

IR sensor is an electronic device that emits light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensors can detect these radiations.

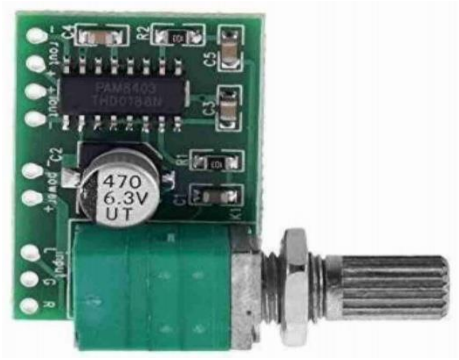
4.) Logic Level Controller –



The logic level converter circuit convert signals as low as 1.8 V to as high as 5 V and vice versa, and its four channels are enough to support most common bidirectional and unidirectional digital interfaces, including IC, SPI, and asynchronous TTL serial. A bi-

directional Level Converter- 4 Channel is a small device that safely steps down 5V signals to 3.3V AND steps up 3.3V to 5V at the same time. This level converter also works with 2.8V and 1.8V devices.

5.) Audio Amplifier –



PAM8403 Mini 5V Digital Amplifier Board with Switch Potentiometer. PAM8403 is a small digital amplifier chip, high-definition sound quality highlights the advantages of digital chips, the circuit using the most reasonable peripheral configuration, power supply filtering is upgraded to 470uf. The 1.6mm glass sheet, the real amplifier board did the most detailed, high-fidelity sound output 3W + 3W, is a rare good product enthusiasts' amplifier, potentiometer using the original anti-meter body, potentiometer with the switch can cut off the power supply directly counterclockwise.

6.) Speaker –

There is magnet, suspension, voice coil and diaphragm. It is 2.5-inch 4ohm speaker. As the current (audio signal) flows, the coil takes on magnetic properties repels the magnet and causes vibrations. Piezoelectricity is an effect where certain crystals will change shape when you apply electricity to them. By applying an electric signal at the right frequency, the crystal can make sound.

PROTOTYPE

Cost Estimation

SR. NO.	COMPONENTS	QUANTITY	PRICE
1	Raspberry PI 3 B+	1	3175
2	Ultrasonic Sensor	2	55
3	IR Sensor	1	30
4	Logic Level Controller	1	44
5	Audio Amplifier	1	59
6	Speaker	1	49
7	5 V DC Adapter	1	150
8	USB cable	1	50
9	GPB	1	90
10	Jumpers	5	100
11	**TOTAL**		**3857**

CONCLUSION

From the above implementation we came to the following conclusion:

● GARBAGE CAN BE CLEANED EFFECTIVELY: By using raspberry pi we ensure that the garbage will be cleaned and no waste will be there in the garbage bins.
● EASY TO USE FOR THE CIVILIANS: Using IR sensors we can detect humans in front of the garbage bins so it can guide the person with the help of audio from the speaker.
● REGULARITY: As there will be no human in this system so the dust bins can be cleaned regularly as displayed on the online portal.
● LESS COMPLEX CIRCUIT AND LESS POWER CONSUMPTION: Since a raspberry pi requires less power to operate and the power consumption of IR sensor and ultrasonic sensors will be less. This leads to a substantial increase in environmental cleanliness and we all should keep our environment clean.
● By using our system, the garbage can be dumped at regular intervals.
● Our environment will be clean as much as possible by this technology. We don't need man power in our machine so human errors are as low as possible.
● The dustbins will be cleaner than ever before done by any human. There will no longer be any irregularities in cleaning the dustbins as there were before.
●By using ultrasonic sensors, the waste level can be calculated and indicated on the online portal. By using IR sensors, the human detection is possible and can be guided with the help of audio from the speaker.
● Thus, by using the latest technology we ensure the best performance of our system. Low cost, highly reliable. Very low power consumption. System is less complex so installation is easy. It can easily be transferable due to compact size.

13.2 Reason for Students Recommendation of the Design:

- From the collect data and observation, the information of new proposal as follows – Maternity Home can be provided as there is no facility of medical treatment in the village. Pregnant women to go out of the village for their medical treatment.

- **Public Toilet Design:** In the village Zanu there don't have any public toilet in main center of the village and the panchayat building then we proposed to Public Toilet Design.
- The sanitation facility of the village must be improved for the sake of the cleanliness and health of the people of the village because there are no provisions for the toilet.
- **Vertical Shaft (for Ground Water Filling):** In the villages all are totally depends on the ground water and river of the village but mostly depends on ground water so we can design vertical shaft to re-filling the ground water in rainy seasons.
- **Biogas:** The Main Benefits of **Biogas** for **Rural Areas**
- They provide reliable fuel as well as improved public health and sanitation. Also, they save people the labor of collecting large amounts of firewood, freeing them up to do other activities. So, we design the Biogas plant Design for the Zanu Village.

13.3 About Designs Suggestions/Benefit of the villagers:

Physical Design:

In Physical design we decided **Public Toilet** in our village Zanu. In the Zanu Village there have no public Toilet Facility to Nearby of panchayat Building and market. They have only one Public toilet Located at Bus Station but they have only Gents Toilet. So, we can design Public Toilet Both can use Gents & Ladies. This design is more helpful for all villagers of Zanu village.

Socio-Economic Design:

In Socio-Economic design we decided **Ground Water Recharge by Vertical Shaft** - Recharging of groundwater takes place by the rainwater and water present in the water source like river and ponds. The water tends to seep through the soil and fill the empty spaces and cracks below the ground. That's how **groundwater** gets **recharged**. The vertical recharge shaft can be provided with or without injection well at the bottom of the shaft. Ideally suited for deep water levels (up to 15 m bgl). Presence of clay is encountered within 15 m. Effective in the areas of less vertical natural recharge.

Smart Village Design:

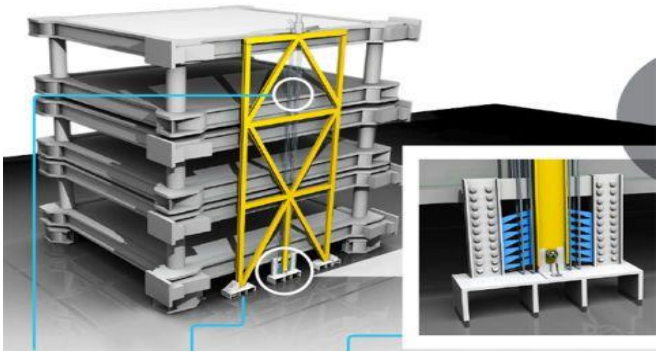
In smart design we decided **Biogas Plant** in our village Zanu. Biogas plant is where biogas is produced by fermenting biomass. The fermentation residue left over from the substrates at the end of the process can be used as fertilizer. The biogas is produced by the micro bacterial decomposition of the substrate in an oxygen-free environment, i.e., under anaerobic conditions. Biogas is a green energy source in form of electricity and heat for the local grid. Considerable environmental advantages - less emission of the greenhouse gasses methane, CO_2 and nitrous oxide. Green house technology is the technique of providing favorable environment conditions to the plant. Offseason production of vegetables and food crops. Water requirement of crops very limited and easy to control.

Chapter – 14: Case Studies: -

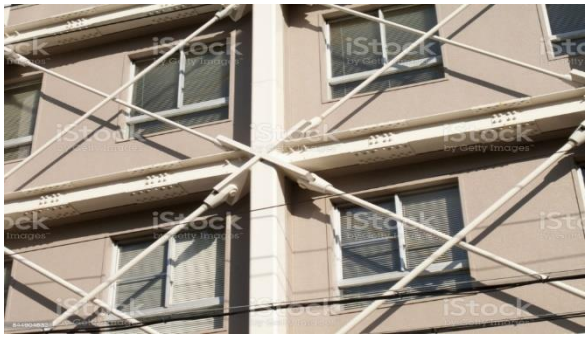
14.1 Civil Engineering:

14.1.1 Advanced Earthquake Resistant

- Earthquake-resistant structures are structures designed to protect buildings from earthquakes. While no structure can be entirely immune to damage from earthquakes, the goal of earthquake-resistant construction is to erect structures that fare better during seismic activity than their conventional counterparts.
- According to building codes, earthquake-resistant structures are intended to withstand the largest earthquake of a certain probability that is likely to occur at their location. Currently, there are several design philosophies in earthquake engineering, making use of experimental results, computer simulations and observations from past earthquakes to offer the required performance for the seismic threat at the site of interest.
- These range from appropriately sizing the structure to be strong and ductile enough to survive the shaking with an acceptable damage.
- The conventional approach to earthquake resistant design of buildings depends upon providing the building with strength, stiffness and inelastic deformation capacity which are great enough to withstand a given level of earthquake-generated force.



14.1.2 Seismic Retrofitting of Buildings



- Seismic Retrofitting Techniques are required for concrete constructions which are vulnerable to damage and failures by seismic forces.
- In the past thirty years, moderate to severe earthquakes occurs around the world every year. Such events lead to damage to the concrete structures as well as failures.
- Thus, the aim is to focus on a few specific procedures which may improve the practice for the evaluation of seismic vulnerability of existing reinforced concrete buildings of more importance and for their seismic retrofitting by means of various innovative techniques such as base isolation and mass reduction.
- So Seismic Retrofitting is a collection of mitigation technique for Earthquake engineering. It is of utmost importance for historic monuments, areas prone to severe

earthquakes and tall or expensive structures. Keywords: Retrofitting, Base Isolation, Retrofitting Techniques, Jacketing, Earthquake Resistance

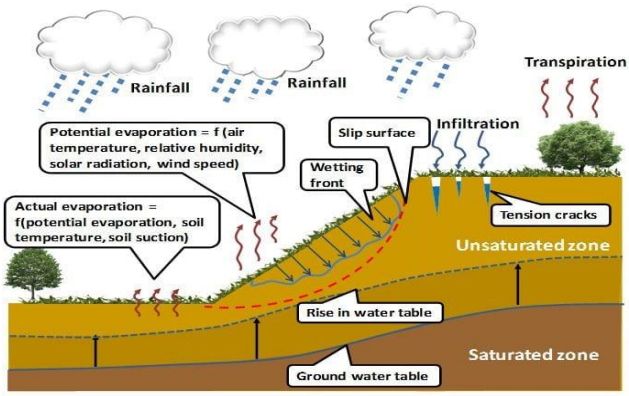
- Earthquake creates great devastation in terms of life, money and failures of structures.
- Upgrading of certain building systems (existing structures) to make them more resistant to seismic activity (earthquake resistance) is really of more importance.
- Structures can be (a) Earthquake damaged, (b) Earthquake vulnerable
- Retrofitting proves to be a better economic consideration and immediate shelter to problems rather than replacement of building.

14.1.3 Advance Practices in Construction field in Modern Material, Techniques and Equipment's

- The Indian advanced construction techniques industry is experiencing a period of fast growth.
- Aiming to overcome the housing problem, it also has to face the dual challenge of fulfilling the needs of the client and maintain the quality standards.
- At the same time, the up-gradation of technology through the adoption of new techniques has become necessary to survive in a tough competitive environment.
- The equipment with proven utility in building construction may be as listed below
  1. Chain and pulley block.
  2. Grouting pumps.
  3. Sprayers for painting work.
  4. Tile cutters.
  5. Portable hand drilling machines.
  6. Horizontal trolleys, wheelbarrows.
  7. Pumps.
  8. Vibrators for compaction of concrete, surface vibrators.
  9. Auto ramming concrete block machine.
  10. Sand washing machine.
  11. Vertical lifts, hoists, winches.
  12. M.S. tubular scaffolding, and formwork.
  13. Concrete mixers.
  14. Cranes.
  15. Earth excavators.
  16. Earthmovers.

14.1.4 Engineering Aspects of Soil mechanics - Environmental Impact Assessment

- The study involved environmental impact assessment of upgrading of existing flow station dealing with different civil engineering works such as road network, housing, water supply, to name a few.

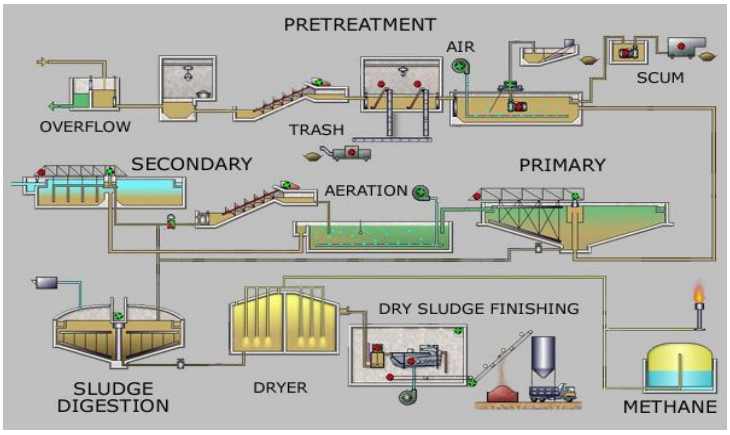


- Data was collected from Federal Environmental Protection Agency (FEPA), Department of Petroleum Resources (DPR) Port Harcourt, Nigerian Meteorological Department (NMD), Lagos, Rivers State Ministry of Environment and Natural Resources (RSMENR), Port Harcourt, Ahoada West Local Government Area (AWLGA), Akinima, Rivers State and the Internet. Data collected was used to get an overview of the existing Environment.
- Relevant test of existing water, soil, noise and air samples were carried out. Comparisons were made with results of the test carried out and data of the area collected. Formal and informal interviews were also carried out with some of the inhabitants of the area.
- All these were done with the aim of assessing the impact the infrastructure had on the environment, and projection of the likely impact of the upgrading exercise.
- The study revealed that civil engineering infrastructure development projects impacted greatly on the environment especially in areas of noise pollution, water pollution, decrease in size of available land, etcetera.
- Based on the findings, recommendations were made for the elimination of the negative effects in some cases; and for amelioration of the effects in situations where it will be impossible to completely eradicate such effects.

14.1.5 Water Supply-Sewerage System-Waste Water- Sustainable development techniques

- In earlier times and even today, engineers and politicians nearly always use a simple cost/benefit analysis when choosing a wastewater system.
- This means that, for instance, only the discharge of organic matter (BOD) or phosphorus and the cost is looked upon. However, the quest for sustainability is necessary because we see many problems are coming like global warming, acidification, diminishing ozone layer, micro-organic pollutants and other toxic chemical matters, eutrophication, diminishing important resources like phosphorus, potassium and oil and other threats to mankind, flora and fauna.
- This shows that many indicators must be used when deciding what type of wastewater systems, we should implement. And we should choose the wastewater system that contributes most to an overall sustainable future
- The notion sustainability should include ecology, economy and sociological aspects and the sustainability must also perform on three different stages:
  1. Local, where hygienic and health aspects are of concern in time scales of hours or days.

2. Regional, where classic environmental problems operate in time scales of months or years.
3. Global, where sustainability matters in a time scale of decades or centuries.



To compare two wastewater alternatives the following indicators may be considered as relevant for a sustainability analysis.

- Discharge of pollution to local recipients and major recipients. For instance: phosphorus, nitrogen and organic matter (BOD).
- The amount of micro-organic pollutants and heavy metals in the sludge going to agriculture.
- Amount of phosphorus, potassium and nitrogen recirculated for plant production.
- Discharge of climate gases like methane and CO2.
- Use of electric energy and fossil energy.
- Use of products with hazardous components.
- Use of finite or critical resources.
- Costs as present value of investments, operation and maintenance.
- The use of area, influence on the landscape, aesthetic- and recreational values.
- The service levels like clogging of sewers and flooding of basements.
- Noise, smell, insects and other disturbances in the operation and construction period.
- Safety for children.

14.1.6 Rain Water Harvesting - CIVIL CASE STUDY: -

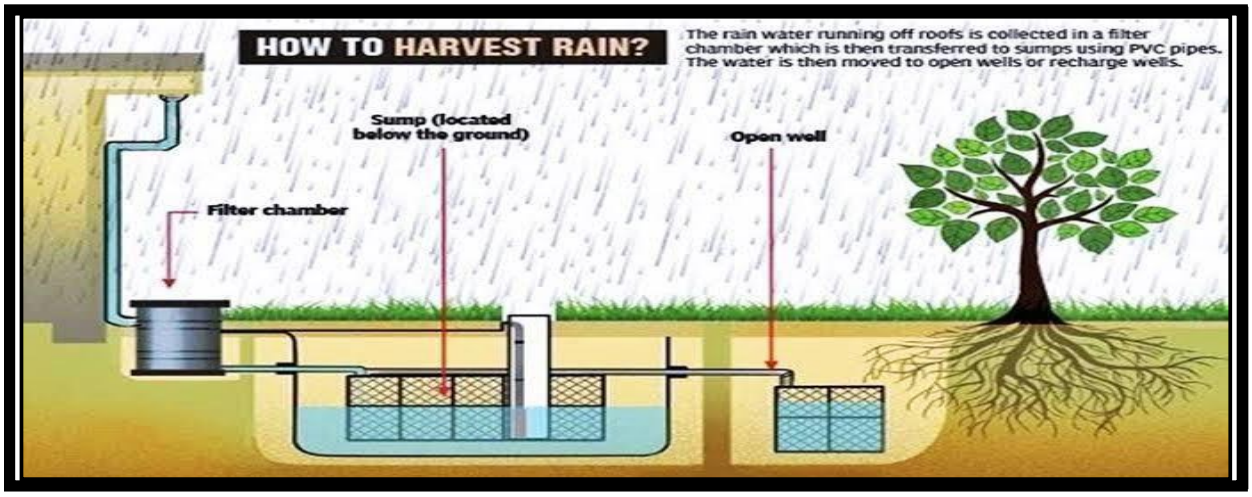
Feasibility: -

- Rainwater Harvesting system is one of considerable choice to reduce flood in Jakarta, moreover it helps to reduce main tap water consumption. In this study, rainwater is used for Flushing toilet and watering garden for domestic use.
- Rainwater harvesting system is examined for 60 m2 and 90 m2 housing area, using rainfall data from Cengkareng station in West Jakarta.
- Two type of rainwater harvesting reservoir is designed, those are ground reservoir and underground reservoir.

Construction: -

- From the analysis, it finds that 60 m2 house feasible for 1 m3 ground reservoir and 9 m3 underground reservoir.

- Meanwhile for 90 m2 house 2 m3 tanks ground reservoir and 14 m3 tank underground reservoir is feasible.
- Underground reservoir retains more water volume so it provides higher rate of water supply. The cost of underground reservoir is lower 60% - 70% than ground reservoir.
- Even though rainwater harvesting is technically feasible for housing, it is not economically feasible.
- The construction cost is higher than the benefit of reduced tap water consumption.



[Fig.52 Rainwater harvesting]

- Scarcity of pure drinking water during the dry season (November–March) is a major problem in Bangladesh, which needs to be addressed.
- This crisis has been further aggravated due to surging populations. Rainwater can provide some of the cleanest naturally occurring water and can hold a great potential in dealing with the current challenge of acute arsenic poisoning as well as physical water scarcity in many parts of Bangladesh.
- In this connection, rainwater harvesting (RWH) system has been constructed in a very remote and rural village in Khulna, Bangladesh, for a 4-membered household

Maintenance and operation: -

- It consists of a concrete catchment of 40 m^2 area, a supporting and collection system made of PVC pipes, and two locally available plastic storage tanks having capacity of 2000 L each.
- The study also investigates the quality aspects of the stored rainwater, which include measurement of pH, alkalinity, hardness, total dissolved solids (TDS), iron, chloride, nitrate, and turbidity, using standard methods.

- The results showed that not only the quality of harvested rainwater is good but also the amount of water is enough for a 4-membered household to meet its domestic use throughout the year.

Cost: -

- Typically, installing a **water harvesting** system in a building would **cost** between Rs 2,000 to 30,000 for buildings of about 300 sq. m.
- The **cost estimate** mentioned above is for an existing building.

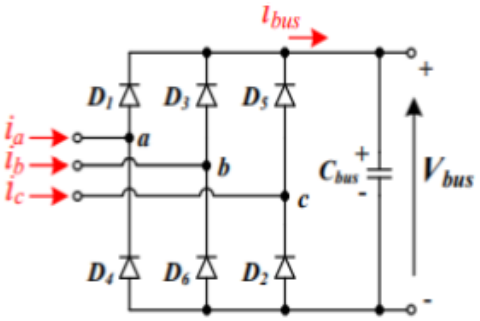
14.2 Electrical Engineering:

14.2.1 Design of Power Electronics converter

Power electronics have already found an important place in modern technology and are now used in a great variety of high-power product, including heat controls, light controls, electric motor control, power supplies, vehicle propulsion system and high voltage direct current (HVDC) systems. Nowadays, power electronic converters play an essential role in the majority of consumer electronic devices and are widely used in industrial applications. Since most of these applications are supplied through the AC grid, the use of rectifiers and DC-DC converters are mandatory to adapt the grid voltage to the application requirements.

1. Uncontrolled turn on and off (Power Diode)
2. Controlled turn on uncontrolled turn off (Thyristors)
3. Controlled turn on and off characteristic (Power Transistor, BJT, MOSFET, GTO, IGBT)
4. Continuous gate signal requirement (BJT, MOSFET, IGBT)
5. Pulse gate requirement (SCR, GTO)
6. Bipolar voltage-withstanding capability (SCR, GTO)
7. Unipolar voltage-withstanding capability (BJT, MOSFET, GTO, IGBT)
8. Bidirectional current capability (TRIAC)
9. Unidirectional current capability (SCR, GTO, BJT, MOSFET, IGBT)

1) AC-DC Rectifiers: -

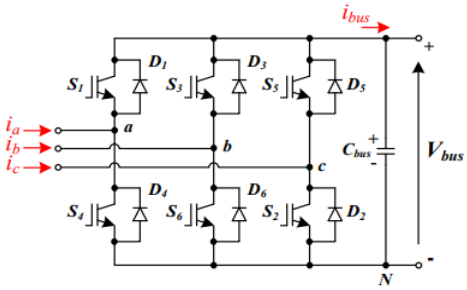


Three-phase diode front end - In this figure it shows a three-phase diode front end (DFE) rectifier composed of a DC bus capacitor (Cbus) and three legs with two diodes in each leg. As it is composed of diodes, the power flow is unidirectional (from AC source to DC bus) and the bus voltage cannot be controlled (it depends on the AC supply and the load). This rectifier is widely used in industry due to its low manufacturing cost and high efficiency and reliability. However, they generate current harmonics in the AC side, which are detrimental for electrical generators. Under the assumption of a highly inductive AC side, the rectifier operates in a

continuous current mode (CCM) and the DC bus current (ibus) can be considered constant. Each diode conducts when it is forward-biased and two diodes are always current conducting in the bridge. Assuming a highly inductive AC side, the current ripple in the DC side can be neglected.

Thus, the current conducted by all the diodes is considered equal to the DC side current ibus. This DC side current varies depending on the transferred power, i.e., the higher the power the higher is the circulating current. Being conservative, the maximum DC bus voltage (vbus) is equal to the line-to-line voltage and hence, the maximum reverse voltage of the diodes is given by the peak line to line voltage (vbus). The conducted current and reverse voltage of all diodes are same and in consequence, it can be assumed that all diodes have same power losses and thermal stress.

Two-level voltage source converter - The two-level voltage source converter (2L-VSC) is composed of a DC bus capacitor (Cbus) and three legs with two transistors and their respective freewheel diodes in each leg. All the semiconductors have to withstand the DC bus voltage during the off state. The low component number makes this converter simple, cost effective and reliable. In consequence, it is one of the most popular converters in conventional wind turbines. Space vector modulation (SVM) and pulse width modulation (PWM) are two of the most used modulation techniques in this converter. In this book, the analytical expressions for power losses estimation are obtained under the assumption that a PWM technique is used. The accuracy of obtained analytical expressions is pretty acceptable. In this figure, typical voltage waveforms of a 2L-VSC operated with PWM are shown. vcr is the triangular carrier and va*, vb* and vc* are the reference phase voltages to be synthesized.



The reference voltages are 120 degrees phase shifted each other. When the reference voltage is higher than the triangular carrier, the upper transistor of that leg is turned-on while the lower transistor is turned-off. Conversely, when the reference voltage is lower than the triangular carrier, the upper transistor of that leg is turned-off and the lower transistor is turned-on. Thus, two different voltage levels can be synthesized in each phase [0, vbus]. Line to line voltage is obtained by subtracting two-phase voltages as shown in figure. This resulting line to line voltage has three voltage levels.

2) DC-DC Converters: -

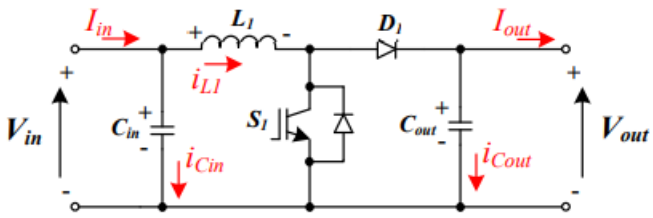
Switch mode DC-DC converters - Generally speaking, switch mode DC-DC converter semiconductors are operated under hard switching conditions. However, soft switching operation conditions can also be achieved if specific converter topologies (e.g., single-active-bridge and dual-active bridge), modulation techniques (e.g., phase-shifting) or additional circuitry (e.g., snubbers) are considered. In this section, converter design and power loss estimation expressions are presented for different converter topologies. On the one hand, it is assumed that main power

losses of the converter come from the power semiconductors. In consequence, power losses in the passive elements are neglected.

Therefore, total average power losses of the converters are calculated by the sum of average conduction power losses and average switching power losses of the semiconductors. Average conduction power losses depend on rms and average currents (Irms, Iave) through the semiconductors and the output characteristic of the semiconductor (rd, Vth). In turn, average switching power losses depend on switched voltages (vsw) and currents (isw) and the switching loss characteristic provided by the manufacturer. Additionally, analytical expressions of the maximum current circulating through the semiconductors (imax) and their maximum reverse blocking voltage (vmax) are calculated. These calculations allow selecting semiconductors with appropriate voltage and current ratings for each converter.

Boost

The boost converter is a well-known unidirectional step-up converter used in applications where no galvanic isolation is required. The converter has few components, which makes its structure to be simple and reliable.



14.2.2 Electronic Soft Starter for 1/3 Phase Induction Motor for Agriculture

An induction motor draws current more than the rated capacity during starting phase which might damage stator windings of three phase induction motor. To avoid the problem of high starting current, voltage is increased gradually from lower to higher level using smooth and soft starters. A smooth and soft starter is employed in a three-phase induction motor to eliminate the surge in current and electromagnetic torque during starting. The surge in current and torque are eliminated temporarily using soft started at the time of starting.

This in turn reduces the stress applied on an electric motor and shaft attached with rotor. The soft starter also eliminates the unwanted effects in electric cables and power distribution network. This paper provides a detailed description of soft and smooth start to an induction motor. At the time of starting, an induction motor draws significant amount of current from the supply and this drawn current is higher than the rated current of three phase induction motor. The motor reaches the full rated speed instantaneously as soon as the voltage is applied. The smooth start of three phase induction motor is based on the delay angle of TRIAC circuit. The firing angle is delayed during starting and delay angle reduces as the motor picks up the speed. The firing delay angle is further reduced to zero when motor reaches full speed. This proposed technique provided reduced voltage at the time of starting and full rated voltage when motor reaches full speed. Due to proposed technique, motor starts at a slow speed and gradually increases to full rated speed.

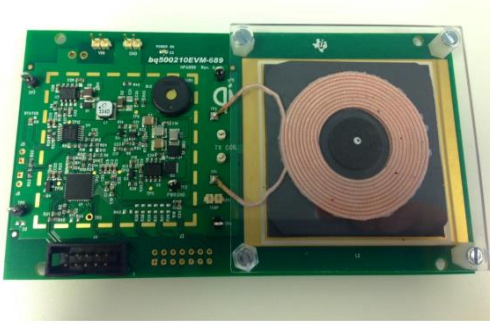
The ac motor starters are increasingly becoming popular due to its controlled soft-starting capability. The ac motor starter provides limited starting current and hence conventional electromagnetic line starters and reduced voltage starters are replaced with ac motor starters.

Thyristor-based soft starters have many desirable properties and provide a viable solution to starting problems in three phase induction motors. These powers semi-conductor-based starters are cheap, simple, and reliable and occupies less volume. The power density of these soft starters is also very high. A three-phase induction motor produces electromagnetic torque on its shaft but initial switching instants of all three phases to the supply produces pulsations on the electromechanical torque when it is controlled by a direct- online starter. These severe pulsations in electromagnetic torque might cause shocks to the shaft and hence to the driven equipment. These pulsations might damage mechanical system components, such as shafts, couplings and gears etc.

The soft starters used in three phase induction motor eliminates high inrush current and high mechanical torque on startup. It reduces cable and switch-gear rating in power supply network. It prevents any dip in line voltage. The soft starter has desirable features of soft, step-less acceleration & deceleration. It also avoids current and torque peaks and provides less electrical stress on the power supply network and mechanical stress on entire drive. It reduces stress on couplings and other transmission devices such as gear boxes, shafts, belts etc. The soft starters also suffer from certain drawbacks like harmonics, problems of speed regulation, dependency of acceleration and deceleration time on load etc. It produces harmonics less than inverter. The operating speed of an electric motor is fixed throughout the operation. The speed regulation of an electric motor is not possible when soft-starters are employed in three phase induction motor. The speed regulation is possible only at the time of starting and stopping of motor. The acceleration & deceleration time also depend on load.

14.2.3 Advanced Wireless Power Transfer System

It is a device to transfer power wirelessly instead of using conventional copper cables and current carrying wires. This power is made to be transferred within a small range only for example charging rechargeable batteries etc. For demonstration purposes we have used a fan instead of battery that operates by using wireless power. This requires an electronic circuit for conversion of AC 230V 50Hz to AC 12V, high frequency and this is then fed to a primary coil of an air core transformer. The secondary coil of the transformer develops 12V high frequency. Therefore, by this way the power gets transferred through primary coil to secondary coil that are separated by certain distance around 3cm. Here the primary coil acts as transmitter and secondary coil receives the power to run a load. Every electromagnetic source creates both electric (E-fields) and magnetic (H-fields) fields around itself, and they are characterized by the radiative and non-radiative components. Depending on the distance from the source there are near-field, transition and far-



field regions that are defined by the way they interact with the surrounding media. The small transition region has both the characteristic of near-field and far-field.

The input power (12V) is supplied via connector J1. Then undesired frequencies are removed by capacitor-input filter (C11-C14 capacitors and L1 high current common mode choke). Then the ripple components are further removed by L3 inductor and the supply is fed into a U3 low-dropout regulator (LDO) which supplies 5V for the microcontroller (MCU) and other components. C30 10uF decoupling capacitor improves transient and noise performance of the LDO. The resistors divider (R11 and R12) is used by POW-V pin of the MCU for inspecting the operating voltage in order to adjust the primary sensing voltage of the receiver.

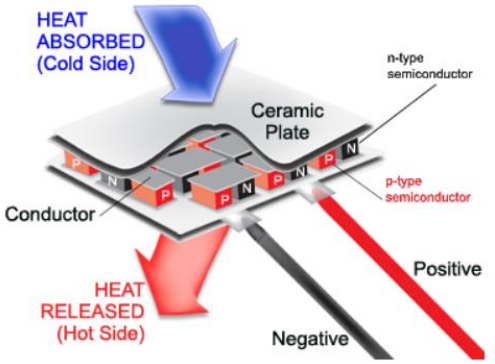
During the positive half-cycle, the current goes from a positive output of the coil through the resonant capacitors C1-C4 then via the D1 TMBS diode then further towards voltage the detection unit and DC-DC (buck) converter. The high voltage potential created by the coil establishes a power loop via resistor R2, a closed gate terminal of the Q2 to negative output of the coil. During the negative half-cycle, the current goes from negative output of the coil through the resonant capacitors C1-C4, then via the D2 TMBS diode then further towards the voltage detection unit and DC-DC converter. The high voltage potential created by the coil creates a power loop via resistor R1, the closed gate terminal of the Q1 to positive output of the coil.

14.2.4 Industrial Temperature Controller

The purpose of a temperature control system is to maintain a device at a constant temperature. Two types of actuators are commonly used to precisely control the temperature of optics, lasers, biological samples, or other temperature sensitive devices. One is a thermoelectric, or Peltier device. The other is a resistive heater. A precision temperature controller uses a current or voltage source to drive power through these actuators based on feedback from a temperature sensor. The temperature sensors are typically thermistors, RTDs, or linear devices such as the LM335 or AD590. With these types of sensors, stabilities of 0.01°C to 0.001°C are commonly achievable. Less precise sensors – thermocouples – can also be used for stabilities of about 1°C. The design of the system dictates the stability. If the sensor, actuator, and device being stabilized are poorly connected, the best controller in the world can't help. Temperature Controllers vary widely in feature set and performance. It meant to familiarize the users with terminology and basic elements, not an exhaustive evaluation of what is available on the market.

The controller, actual temperature must be measured and converted to a voltage input. A common sensor is a Thermistor. This is a resistor that changes resistance with temperature. Most thermistors are Negative Temperature Coefficient (NTC). This means resistance decreases as temperature increases. Resistance Temperature Detectors (RTDs) are Positive Temperature Coefficient (PTC) devices. Resistance increases as temperature increases. Their response is more linear than thermistors, but they are not as sensitive, leading to lower stability. In either case, a

precision current source from the temperature controller drives current through the sensor, providing a voltage feedback for the control system.



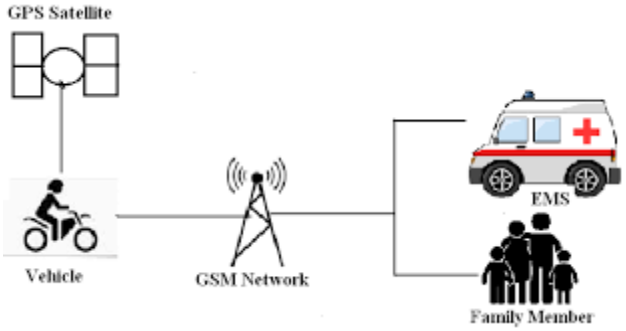
This section of the temperature controller protects the thermoelectric or resistive heater and the device under temperature control. Thermoelectric are approximately 10% efficient. The electrical power delivered to the thermoelectric is converted to heat that must be removed from the load. The "hot" side of the thermoelectric is mounted to a heatsink with enough capacity to remove the heat from the device under temperature control AND the excess lost in the thermoelectric. If the heatsink is inadequate, the sensor reports an increase in temperature to the controller which then drives more current through the thermoelectric, adding more heat to the inadequate heatsink. This cycle is called thermal runaway. The user sets the limit current based on the operating parameters of the thermoelectric and the maximum capacity of the heatsink.

This is a device characterized by two ceramic plates that bound metal junctions made of two dissimilar metals. If current flows through the junction of dissimilar metals, heat is generated at one side while it is absorbed at the other side. By flowing current through a thermoelectric, heat is transferred from one ceramic plate to the other. The direction of current dictates which plate becomes "hot" and which becomes "cold" relative to each other. Reversing the current immediately reverses the effect. A temperature controller works by optimally controlling the magnitude and direction of current through the junction to maintain a device attached to the "cold" side at a fixed temperature. Thermoelectric can be stacked on each other to create wider temperature differentials. These are called multi-stage or cascaded thermoelectric. A thermoelectric can also convert a temperature differential into electricity. This is called the See beck Effect. A thermoelectric is also known as a thermoelectric cooler, a Peltier device, or a solid-state heat pump.

14.2.5 Accident Alerts in Modern Traffic Signal Control System -Camera Surveillance System

Road accidents and traffic congestion are the major problems in urban areas. Currently there is no technology for accident detection. Also due to the delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of the death of victim. There is a need of introducing a system to reduce the loss of life due to accidents and the time taken by the ambulance to reach the hospital. To overcome the drawback of existing system we will implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A main

server unit houses the database of all hospitals in the city. A GPS and GSM module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot. Along with this there would be control of traffic light signals in the path of the ambulance using RF communication. This will minimize the time of ambulance to reach the hospital. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital. This system is fully automated; thus, it finds the accident spot, controls the traffic lights, helping to reach the hospital in time.



The Accident Detection System consist of two main modules. The first module detects whether the vehicle has fallen down. It is mounted on the vehicle itself. This module consists of an accelerometer, MSP430 micro-controller and a Bluetooth module. Once the vehicle fall is detected the information is send to the second module. The second module consists of a Heartbeat sensor MSP430 microcontroller, Buzzer and Bluetooth module. Once the fall is detected the heartbeat of the driver is checked and if any abnormality is detected the decision that a serious accident has occurred is taken. Then the Buzzer in the Accident Detection System is turned ON and it will communicate with the Smart phone to alert the medical center.

Thus, we have presented a system to detect accident automatically and give a clear way to emergency purpose vehicles on road so that they can reach their destination in least time without stopping at traffic intersection. This system can be effectively implemented for an entire city or countries with large population like India for better results.

14.2.6 Electrical Design and Prototype Model: - AUTOMATED MONITORING AND CONTROL OF IRRIGATION SYSTEM

ABSTRACT

This work is primarily about the improvement of current agricultural practices by using modern technologies for betterment of agriculture and modernization the traditional agriculture system. Internet of Things (IoT) plays a crowning role in smart agriculture. The project will help root level farmers to get into smart irrigation in term of agriculture. Which provide greater service in less cost in irrigation and lowest man power. Smart irrigation is an empirical concept because IoT sensors capable of providing information about their agriculture fields and making irrigation automated by Internet of Things. The feature of this paper includes monitoring temperature, humidity, pH and water level in agricultural field through sensors. The data from sensors are sent to Web server database using wireless transmission. Controlling of all these operations will be through any remote smart device or computer connected to internet and rain condition is also applied to the operations. The agriculture sector, the biggest consumer of freshwater, is under constant pressure to use water resources much more efficiently by improving the performance of both irrigated and rain-fed production. Irrigation has become an important part of global

agricultural production, consuming about 70% of global freshwater resources. Watering the plant is the most important cultural practice and one of the labor-intensive tasks in daily greenhouse operation. Watering systems ease the burden of getting water to plants when they need it. Knowing when and how much to water is two important aspects of watering process. To make the gardener works easily, the automatic plant watering system is created. There have a various type using automatic watering system that are by using sprinkler system, tube, nozzles and other. This system uses watering sprinkler system because it can water the plants located in the pots. This project uses Arduino board, which consists of ATmega328 Microcontroller. It is programmed in such a way that it will sense the moisture level of the plants and supply the water when required. This type of system is often used for general plant care, as part of caring for small and large gardens.

INTRODUCTION

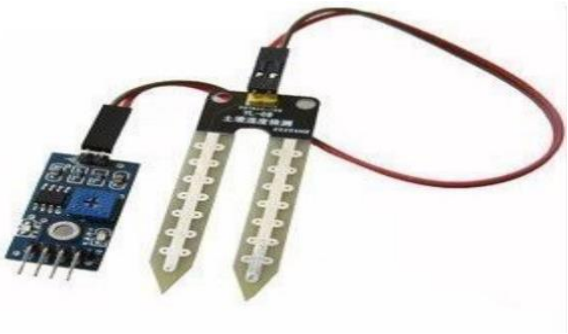
The main aim of this project was to provide water to the plants or gardening automatically using microcontroller (Arduino Uno). We can automatically water the plants when we are going on vacation or don't, we have to bother my neighbors, Sometimes the neighbors do too much of watering and the plants end up dying anyway. the artificial application of water to the land or soil It is used to assist in the growing of agricultural crops, maintenance of landscapes, and re vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. When a zone comes on, the water flows through the lateral lines and ultimately finally ends up at the irrigation electrode (drip) or mechanical device heads. Several sprinklers have pipe thread inlets on the lowest of them that permits a fitting and also the pipe to be connected to them. The sprinklers are usually used in the top of the head flush with the ground surface. As the method of dripping will reduce huge water losses it became a popular method by reducing the labor cost and increasing the yields. When the components are activated, all the components will read and gives the output signal to the controller, and the information will be displayed to the user (farmer). The sensor readings are analog in nature so the ADC pin in the controller will convert the analog signals into digital format. Then the controller will access information and when the motors are turned on/off it will be displayed on the LCD Panel, and serial monitor windows. There are many systems are available to water savings in various crops, from basic ones to more technologically advanced ones. For instance, in one system plant watering status was monitored and irrigation scheduled based on temperature presents in soil content of the plant.

Hardware Components

ARDUINO - In figure it is showing an Arduino board is an open-source platform used for building electronics projects. Arduino is a programmable circuit's board which we can write a program based on your projects. Arduino program will be uploading with IDE (Integrated Development Environment) software that runs on your computer, it is used to write and upload computer code to the Arduino physical board. Arduino language is merely a set of C/C++ functions that can be called from your code. The Arduino Uno R3 is a

microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third, and latest, revision of the Arduino Uno.

MOISTURE SENSOR - Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free-soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners. Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential. These sensors are usually referred to as soil water potential sensors and include tension-meters and gypsum blocks.



WATER PUMP - A small pump plus a driver. A driver is to provide enough current for the pump, my application needs a spray distance about one meter, so this pump is enough. But if you need to make a system that needs a large spray range, you may need larger pumps, or even a pressurized device to make the projectile even farther, such as the watering system in a tea garden. If we reside in a city or town, we almost don't think how the water is supplied to our residents every day. Small villages also frequently supply a set-up of pipes to transfer water for every home within the region.

All we require to recognize is how to open the valve at the sink. Because the internal working is not visible, and the water supply is not dependent on the neighbors down the road. Every home has owned well and electromechanical system to draw the water from well and supply to the home. This article discusses an overview of the water pump and its working, types and their applications.

RELAY - In figure, shows are a relay is an electrically operated switch. Several relays use a magnet to automatically operate a switch, however alternative in operation principles are used,

like solid state relays. Relays are used wherever it's necessary to regulate a circuit by a separate low-power signal, or wherever many circuits should be controlled by one signal. The essential relays were handling in long distance communicate circuits as amplifiers, they unbroken the signal coming back in from one circuit and re-transmitted it on another circuit. Relays are the switches which aim at closing and opening the circuits electronically as well as electromechanically. It controls the opening and closing of the circuit contacts of an electronic circuit. When the relay contact is open (NO), the relay isn't energizing with the open contact. However, if it is closed (NC), the relay isn't energize given the closed contact. However, when energy (electricity or charge) is supplied, the states are prone to change.

LCD DISPLAY - Liquid Crystal Display (LCD) screen is an electronic display module. An LCD has a wide range of applications in electronics. The most basic and commonly used LCD in circuits is the 16x2 display. LCDs are commonly preferred in display because they are cheap, easy to programmed and can display a wide range of characters and animations. A 16x2 LCD have two display lines each capable of displaying 16 characters. This LCD has Command and Data registers. The command registers stores command instructions given to the LCD while the Data register stores the data to be displayed by the LCD. A liquid crystal display or LCD draws its definition from its name itself. It is a combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screens that are generally used in laptop computer screens, TVs, cell phones, and portable video games. LCD's technologies allow displays to be much thinner when compared to a cathode ray tube (CRT) technology. Liquid crystal display is composed of several layers which include two polarized panel filters and electrodes. LCD technology is used for displaying the image in a notebook or some other electronic devices like mini computers. Light is projected from a lens on a layer of liquid crystal.

Power Supply Units

The output voltage of 2 set panel (9 x 36 cells) is about 660 V within 0.2 sec.

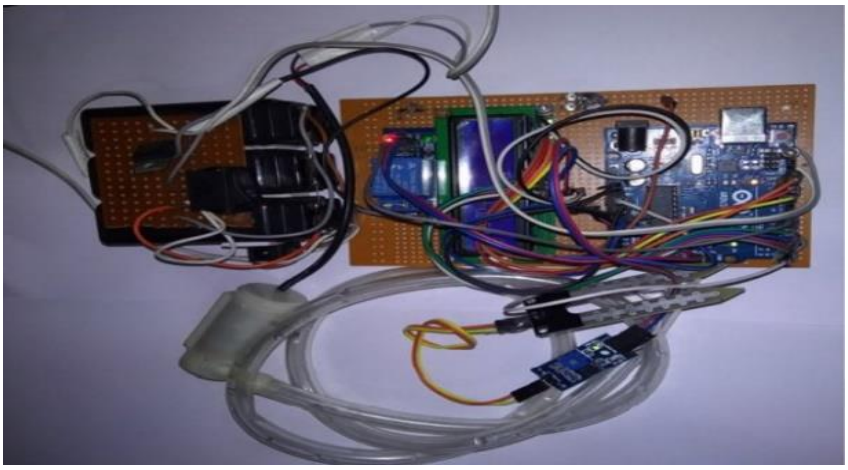
The output power of 2 set panel (9 x 36 cells) should be about 9.5 KW within 0.2 sec. but it will be 8.5 KW within 0.2 sec. hence we can say that about 1 KW of power has been collapsing in losses during generation.

Generally, for 5HP and 3 HP motors supply voltage and current should be 440V and 16A irrespectively. In here 8.5KW solar panel maintain about 400V and 15 A which is the comfortable supply for both motors in irrigation system of rural area

S. No.	Rating	I (stator)	I (rotor)	N (rpm)	T (N-m)	Irrigation output (per day)
1	3 HP	14 A	4 A	1490	9.35	2 acres
2	5 HP	16 A	6 A	1480	12.95	3 acres

Comparison of 3HP and 5 HP motor

PROTOTYPE



All the module & components finally assemble together & microcontroller code for this was developed finally and then we have reach to our goal of this project. Real hardware of our proposed system is shown.

Cost Estimation

Particular	**Description**
Solar pump	5HP
Solar pump type	AC submersible
Pump head	60-120 meter
Solar panel	5 kW
Controller	1 Set
Open circuit voltage	90-140 V DC
Maximum peak voltage	110 V DC
Maximum input current	40 Amps
Output voltage	30-85 V
Input power	3000 w dc
Protections	Over current, high and low voltage, dry run, overflow etc.
Accessories	Structure, wires, nut bolt etc.
Discharge	45000 – 1, 00,000 Liters\day.
Warranty	5 years warranty for complete solar system and 25 years for solar panel.
Delivery	5 to 7 days
Price	**Rs. 3,10,000**

TOTAL COSTING OF SETUP WITH INSTALLATION IS 3,10,000 INR

CONCLUSION

Thus the "AUTOMATED MONITORING AND CONTROL OF IRRIGATION SYSTEM" has been designed and tested successfully. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit.

Another important characteristic is that, as they use the sun as their energy source, the periods of maximum demand for water coincide with the periods of maximum solar radiation Peak demand during the irrigation system seasons is often more than twice the average demand. This means that solar pumps for irrigation are under-utilized for most of the year. The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant. When the desired moisture level is reached, the system halts on its own and the Water Pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully.

Thus, the Arduino Based Automatic Plant Watering System has been designed and tested successfully. The system has been tested to function automatically. Photovoltaic systems are especially designed to supply water and irrigation in areas where there is no mains electricity supply. Their main advantages over hand pumps or internal combustion engine pumps are their practically zero maintenance, their long useful life, that they do not require fuel, that they do not contaminate, and finally that they are straightforward to install.

Chapter – 15: Smart and/or Sustainable features of Chapter 8 & 13 designs, Impact on society. (For Allocated village development, villager's happiness, comfortable and for enhancement of the village) (With the Smart village development Concept as Per Your Idea and Village Visit, modern technology with innovation) with doing small changes, Period, Amount Expenditure and Benefit – a) Immediately b) Within 1 year c) Long term (3-5 years) along with cost estimation.

b) If possible, List the sources of the funding available with the Village gram panchayat: -

For Allocated village development, villager's happiness, comfortable and for enhancement of the village: -

Sanitation facilities:

In this village door to door collection of waste generated by each of the house is not provided, hence improper disposal of waste. Just by applying a collection system there would be a improvement in the places of village where villagers used to throw the waste anywhere.

In this village public toilet is provided but in a very poor condition and only one toilet for men and other toilet for women.

Health facilities:

There is no health facility provided in the village that is there is no hospital and nor even any primary health center in the village. Villagers should go out of the village for their treatment.

In the village no special treatment is given to pregnant women, no facility of maternity home for the timely checkup or for any emergency, they need to go 1.5km away from their village, which could be not good for the health of women.

Samaj-seva Mandal:

There is Panchayat Building in the village but no other place where the villagers could gather and solve their problems through any organizations working for benefits of villagers and village.

Gate:

Once we enter the village, we cannot get that which village we entered, so a gate with the name of village is necessary at the entrance of the village.

Mini market:

Villagers need to go out of the village to buy some of the basic regular used things that is no cluster of shops were present in the village to ease their life.

Sr No.	Design Name	Period	Amount (Expenditure)	Benefit
1	Compost pit	7 to 9 months	52,330	Maintain the hygiene of the village.
2	PHC	9 to 10 months	3,18,355	No problems would be faced by villagers regarding their health.
3	Samaj-seva Mandal	8 to 9 months	4,14,142	People would get help through the seva-mandal
4	Windmill	3 to 5 months	Annual 20,000-30,000	It is very sustainable way to get energy.
5	Gate	1 to 1.5 months	1,43,689	Village would get its own identity.
6	Reading Hall	7 to 9 months	1,80,638	People would get their own space to read, write, learn and would seek knowledge of various new things.
7	Public Toilet	6 to 8 months	55,521	
8	Maternity home	8 to 9 months	2,59,700	Care is taken for the health of the pregnant women.
9	Green House Farming.	2 to 3 months	27,727.7	Economy of farmer would increase and also modern technology of farming is introduced through it.
10	Mini Market	6 to 8 months	1,25,842	It would become easy for the villagers to get basic items for regular use.
11	Temple	1 to 2 months	21,589.5	It would increase their religious aspect and also, they might get inner peace.

- Government primary school
- Milk co-operative society
- Sant ashram
- Water charges
- By donation
- Donation of any NGO
- Land charges
- Fund Collect by panchayat for development of village
- For construction any infrastructure tendering process through work allocated Milk co-operative society.

With the Smart village development Concept as Per Your Idea and Village Visit, modern technology with innovation: -

Smart Infrastructure:

"Smart cities areas places where information technology is combined with infrastructure, architecture, everyday objects, and even our bodies to address social, economic and environmental problems.

"Smart Villages are rural areas and communities which build on their existing strengths and assets as well as on developing new opportunities", where "traditional and new networks and services are enhanced by means of digital, telecommunication technologies, innovations and the better use of knowledge".

- Smart toilet
- Smart building
- Solar electricity
- Smart waste management
- Smart agriculture
- Smart education
- Smart transportation

Smart data center:
Data Center Facilities Solution provides a modern foundation for distributed cloud applications for individuals and corporations.

- ICT, technology, data the internet of everything.
- Connections - "The internet of things"
- Solutions for goals for urban challenges (mobility, safety, the improving live ability and sustainability environment…)
- Connected city
- Smart city zone
- Sensors and camera's
- Safety as an important incentive

Strategic options for fast smart city development:
The strategic components of area-based development in the Smart Cities Mission are city improvement (retrofitting), city renewal (redevelopment) and city extension (Greenfield development) plus a Pan-city initiative in which Smart Solutions are applied covering larger parts of the city. Below are given the Deion's of the three models of Area-based smart city development:

Retrofitting will introduce planning in an existing built-up area to achieve smart city objectives, along with other objectives, to make the existing area more efficient and livable. In retrofitting, an area consisting of more than 500 acres will be identified by the city in consultation with citizens. Depending on the existing level of infrastructure services in the identified area and the vision of the residents, the cities will prepare a strategy to become smart. Since existing structures are largely to remain intact in this model, it is expected that more intensive infrastructure service levels and a large number of smart applications will be packed into the

retrofitted smart city. This strategy may also be completed in a shorter time frame, leading to its replication in another part of the city.

Sewage and Sanitation

- 100% households should have access to toilets
- 100% schools should have separate toilets for girls
- 100% households should be connected to the waste water network
- 100% efficiency in the collection and treatment of waste water
- 100% efficiency in the collection of sewerage network

With doing small changes, Period, Amount Expenditure and Benefit –

a) Immediately b) Within 1 year c) Long term (3-5 years) along with cost estimation: -

b) If possible, List the sources of the funding available with the Village gram panchayat: -

- We had a talk with the Sarpanch of the village, he informed us the major problem of the village which is waste management, there is no facility of door-to-door waste collection system and its disposal.
- Vice Sarpanch of village informed us that they need the health facility in the village as they need to go out of the village for their treatment.
- Sushila ben told us there is no facility for the pregnant women in the village i.e., Maternity home
- Ghanshyam bhai informed us there is no facility for higher education, for higher education students needs to go out of there village.
- Ramila ben, renovate community toilet for local public users and visitors, as the condition of the community toilet is not so good and is unhygienic.
- Dinesh bhai, told there is need of small market which would consist the basic needed things for their day-to-day life, so that they could get basic things in their village only, no need to go out of the village.
- Harshit bhai told a small masonry temple around the idol of their god already present in village.

Sr. No.	Proposed Design Name	Period	Available fund	Amount Expenditure
1	Community Toilet renovation	Within 3 to 5 months	-	55,521 Rs.
2	Compost pit	Within 4 to 6 months	-	52,330 Rs.
3	Mini Market	Within 7 to 9 months	-	1,25,842 Rs.
4	Maternity home	8 to 10 months	-	2,59,700 Rs.

Chapter – 16

Gujarat Technological University, Ahmedabad, Gujarat

Vishwakarma Yojana: Phase VIII
Survey with Interviewing

SURVEY BY INTERVIEWING WITH TALATI AND/OR SARPANCH

Vishwakarma Yojana: Phase VIII

ALLOCATED VILLAGE SURVEY

An approach towards **"Rurbanisation for Village Development"**

CHAPTER- 16

Sr.	Questions	Yes/ No	Remarks
1	What are the sources of income in village?	Y	Farming, Retail Stores
2	What are the chances of employment in village?	N	
3	What are the special technical facilities in village?	Y	Farming, Machinery
4	Is any debt on village dwellers?	Y	
5	Are village people getting agricultural help?	Y	Govt. Subsidy, etc...
6	Is women health awareness Program organized in village?	Y	Govt. Health Department
7	Are women having opportunity to work and income?	Y	MGNREGS (Govt)
8	Child girl education is appreciated in village?	Y	
9	Facility of vaccination to child is available in village?	Y	P.H.C
10	Are village people aware about child vaccination and done to each and every child as per norms?	Y	
11	Women help line number information is provided to village people?	Y	Women Welfare community
12	Is water scarcity in village? How many days per year?	N	
13	Is village under any debt?	N	
14	Is any serious issue due to debt from bank or any person happened in village?	N	
15	Is any suicide like incident observed in village due to government policy, debt or threatening?	N	
16	Is any death of patient occurred due to unavailability of medical facility in village?	N	
17	How many disabled (physically challenged) is observed in village? Provide list with Male/female/girl/boy with age and type of disability and reason of disability.	Y	M-3 F-1
18	Is village improvement is observed in comparative scenario from past to present?	Y	Social development are there
19	Is any unavoidable difficulty village people are facing? Any natural calamity is there?	N	
20	Life Living standard of girls and women is appreciated and uplifted in village?	Y	

Nodal officer and students can add more questions. This is a sample. Having Minimum requirement.

Administration queries/ Difficulties:
GTU VY Section
Contact No – 079-23267588
Email ID: rurban@gtu.edu.in

તલાટી કમ મંત્રી
ઝાણું ગ્રામ પંચાયત
તા.દસક્રોઈ, જી.અમદાવાદ.

Chapter – 17 Irrigation / Agriculture Activates and Argo Industry, Alternate Technics and Solution

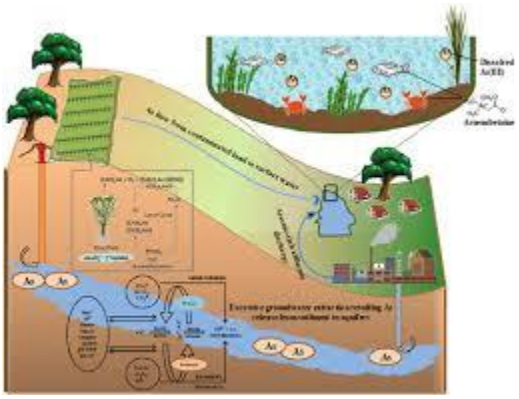
Sustainability and food security are the major challenges faced by third world countries for the past several decades. Most of the third world countries are also facing problems of climate change, increasing population, overexploitation of natural resources and resource degradation associated with rapid economic growth. Among the scientific and policy circles there are controversies in using inorganic chemicals and biotechnology for sustaining the agricultural production.

There is no critical comprehensive review on sustainability of alternative farming systems and their relative advantages over conventional, chemicalized and hi-tech agriculture for decision making at various levels. This review tries to fulfill the knowledge gap in this vital sector. The first part of the review discusses the current status of agroecosystems, with emphasis on their threats in terms of food security, long term sustainability, impacts on ecosystem services and climate change. We also evaluate the ecological, economic, social and cultural sustainability of inorganic agriculture. This analysis points emerging issues such as environmental degradation, loss of ecosystem services, non-sustainability and threats to food security in the context of global population growth and climate change.

Hence there is an urgent need for identifying potential alternative farming strategies to achieve long term sustainability and food security as indicated by several leading workers in the field. The next section traces the background and evolution of alternative farming systems with their scope and importance. Then we classified potential sustainable farming techniques practiced in various parts of the world. For that we review potentials, constraints, strategies and case studies for ten alternatives farming techniques and four innovative endogenous farming techniques from India

Innovative irrigation practices can enhance water efficiency, gaining an economic advantage while also reducing environmental burdens. In some cases, the necessary knowledge has been provided by extension services, helping farmers to adapt and implement viable solutions, thus gaining more benefits from irrigation technology. Often investment in technological improvements has incurred higher water prices, however, without gaining the full potential benefits through water efficiency. Farmers generally lack adequate means and incentives to know crops' water use, actual irrigation applications, crops' yield response to different water management practices, and thus current on-farm water-efficiency levels.

Those general difficulties are illustrated by our two case studies investigating options, stimuli and difficulties to improve water-efficient practices. The two areas have strong stimuli for improvement but lack a knowledge-exchange system to help farmers and resource managers identify scope for improvements. Partly for this reason, farmers' responsibility for efficient water management has been displaced to hypothetical prospects, e.g., extra supplies from reuse of treated wastewater or a long-term low water pricing. In both cases a displaced responsibility complements the default assumption that farmers' irrigation practices already have adequate water-use efficiency. Under current circumstances, agricultural water management will maintain the unknown water-efficiency level and farmers will have weaker incentives to make efforts for more efficient practices. A continuous knowledge-exchange is necessary so that all relevant stakeholders can share greater responsibility across the entire water-supply chain. On this basis, more water-efficient management could combine wider environmental benefits with economic advantage for farmers.



Irrigation systems have been under pressure to produce more with lower supplies of water. Various innovative practices can gain an economic advantage while also reducing environmental burdens such as water abstraction, energy use, pollutants, etc. Farmers can better use technological systems already installed, adopt extra technologies, enhance their skills in soil and water management, tailor cropping patterns to lower water demand and usage, reduce agrochemical inputs, etc. Water-efficient practices potentially enhance the economic viability and environmental sustainability of irrigated agriculture, without necessarily reducing water usage. To inform such practices, experts have developed various models of water efficiency, yet these are little used by farmers.

Chapter -18 Social Activities – Any Activates Planned by Students

Due to Covid-19 sanitizing the village:

- Ahmedabad: On the outskirts of Zanu village in Daskroi taluka, a group of youths stop a bike on Thursday morning.
- The man identifies himself as a health worker and shows his identity card after which his details are noted in a register and he is allowed to go.
- But first, his temperature is recorded with a thermal gun which was procured by the panchayat a fortnight ago.
- Harpalsinh Vaghela, talati-cum-Mantri of the village, says that ever since the lockdown was announced, the village has been implementing it stringently.
- "A group of village youths are stationed right at the entrance of the village with the temperature gun and a register.
- They form our Gram Yoddha or fighters of the village," he says. "They know everybody in the village.
- In village awareness program to "BETI BACHO BETI PADHO" and all Childs educate
- Due to covid-19 pandemic we were unable to visit village and spread campaigns and social activity but in the first phase of VY we had successfully ran campaigns on tree plantation and save water.



Chapter -19 SAGY Questionnaire

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

Village: ZANU Gram Panchayat: ZANU Ward No. –

Block: – District: AHMEDABAD

State: GUJARAT L S Constituency: DASKROI

1. Family Identity and Size

Name of Head of Household	Mukesh Jayantibhai Thakor							Male/ Female	M
SECC Survey ID:		Family Size	4	Over 18	2	6 to 18	2	Under 6	0

2. Category & Entitlement Details (Tick as appropriate)

Social Category[1]	OBC	Life Insurance	1. All Adults 2. Some Adults 3. None	AABY	1. Yes 2. ~~No~~	Kisan Credit Card	Yes / ~~No~~
Poverty Status Year[2]:	1. BPL 2. APL	Health Insurance	1. All Adults 2. Some Adults 3. None	RSBY	1. Yes 2. ~~No~~	MGNREGS Job Card Number	N
PDS (If NFSA is not implemented)			Annapurna	Antyodaya	BPL	APL	Is any woman in the family
PDS (If NFSA is implemented)			Annapurna	Antyodaya	Priority	Other	member of an SHG? Yes / No

2. Adults (above 18 years)

Name	Age	Sex M/F / O	Disability Status Y/N	Marital Status[3]	Education Status[4]	Adhaar Card (Y/ N)	Bank A/C (Y/N)	Social Security Pension[5]
Mukesh Thakor	38	M	N	N	7th	Y	Y	N
Ranjan Thakor	32	F	N	N	7th	Y	Y	N
Vijay Thakor	12	M	N	N	9th	Y	Y	N
Sandeep Thakor	9	M	N	N	4th	Y	Y	N

3. Children from 6 years and up to 18 years

Name	Age	Sex M/F/O	Disability Y/N	Marital Code*	Level of Education: Code#	Going to School /College (Y/N)	Current Class	Computer Literate Y/N
Vijay Thakor	12	M	N	N	9th	Y	9th	Y
Sandeep Thakor	9	M	N	N	4th	Y	4th	Y

4. Children below 6 years

Name	Age	Sex M/F/ O	Disability Yes/No	Going to School (Y/N)	Going to AWC Y/N	De-worming Done	Fully Immu-nised Y/N	Mother's Age at the time of Child's Birth

[1] Scheduled Caste 1, Scheduled Tribe 2, Other Backward Castes 3, Other 4

[2] Enter the BPL Survey round being used in the Gram Panchayat for identification of BPL Families (e.g. 1997/2002/2011)

[3] Marital Status: Not Married – 1, Married – 2, Widowed – 3, Divorced/Separated – 4

[4] Level of Education: Not Literate – 01, Literate – 02, Completed Class 5 - 03, Class 8th – 04, Class 10th-05, Class 12th-06, ITI Diploma-07, Graduate-08, Post Graduate/Professional – 09 (write the highest level applicable)

[5] No Pension – 0, Old Age Pension – 1, Widow Pension – 2, Disability Pension – 3, Other Pension – 4 (mention)

SAANSAD ADARSH GRAM YOJANA (SAGY) Baseline Household Survey Questionnaire

5. Hand washing

	Always		Sometimes		Never
After use of Toilet	Soap ✓	Other	Soap	Other	
Before Eating	Soap ✓	Other	Soap	Other	

6. Use of Mosquito Net
Children: Yes / ~~No~~ Adults: Yes / ~~No~~

7. Do members take Regular Physical Exercise

	Yoga	Games	Other Exercises
Adults	~~Yes~~ / No	~~Yes~~ / No	~~Yes~~ / No
Children	Yes / ~~No~~	Yes / ~~No~~	Yes / ~~No~~

8. Consumption of Tobacco

	Smoking	Chewing
Adults	–	Y
Children	–	–

9. House & Homestead Data

Own House: Yes / ~~No~~	No. of Rooms: 4
Type: ~~Kutcha~~ / ~~Semi Pucca~~ / Pucca	
Toilet: Private / ~~Community~~ / ~~Open Defecation~~	
Drainage linked to House: Covered / ~~Open~~ / ~~None~~	
Waste Collection System	Door Step / ~~Common Point~~ / ~~No Collection System~~
Homestead Land: Yes / ~~No~~	Kitchen Garden : Yes / ~~No~~
Compost Pit: ~~Individual~~/ ~~Group~~/ None	Biogas Plant: ~~Individual~~/ ~~Group~~/ None

10. Source of Water (Distance from source in KMs)

Source of Water		Distance
Piped Water at Home	Yes / ~~No~~	100 m
Community Water Tap	~~Yes~~ / No	–
Hand Pump (Public / Private)	~~Yes~~ / No	–
Open Well(Public / Private)	~~Yes~~ / No	–
Other (mention):		–

11. Source of Lighting and Power

Electricity Connection to Household: Yes / ~~No~~
Lighting: Electricity/~~Kerosene~~/~~Solar Power~~
Mention if Any Other: –
Cooking: LPG/~~Biogas~~/~~Kerosene~~/~~Wood~~/~~Electricity~~
Mention if Any Other: –
If cooking in Chullah: Normal/ ~~Smokeless~~

12. Landholding (Acres)

1. Total	1.5	2. Cultivable Area	1.5
3. Irrigated Area	1.5	4. Uncultivable Area	0

13. Principal Occupations in the Household

Livelihood	Tick if applicable
Farming on own Land	✓
Sharecropping /Farming Leased Land	✓
Animal Husbandry	–
Pisciculture	–
Fishing	–
Skilled Wage Worker	–
Unskilled Wage Worker	–
Salaried Employment in Government	–
Salaried Employment - Private Sector	✓
Weaving	–
Other Artisan(mention)	–
Other Trade & Business (mention)	–

14. Migration Status
Does any member of the household migrate for Work: ~~Yes~~ / No. If Yes Entire Year / ~~Seasonal~~
Does anyone below 18 years migrate for work: ~~Y~~/N

15. Agriculture Inputs

Do you use Chemical Fertilisers	Yes/~~No~~
Do you use Chemical Insecticides	Yes/~~No~~
Do you use Chemical Weedicide	~~Yes~~/No
Do you have Soil Health Card	Yes/~~No~~
Irrigation: ~~None~~/ ~~Canal~~/ ~~Tank~~/ Borewell/~~Other~~	
Drip or Sprinkler Irrigation: ~~Drip~~ /~~Sprinkler~~ / None	

16. Agricultural Produce in a normal year (Top 3)

Name	Unit	Quantity
Wheat	HS?1	40
Bajra	HS?1	40

17. Livestock Numbers

Cows: –	Bullocks: –	Calves: –
Female Buffalo: –	Male Buffalo: –	Buffalo Calves: –
Goats/ Sheep: –	Poultry/ Ducks: –	Pigs: –
Any other: Type –		No.
Shelter for Livestock: ~~Pucca~~ / ~~Kutcha~~ / None		
Average Daily Production of Milk(Litres): –		

18. What games do Children Play
Outdoor Games

19. Do children play musical instrument (mention)
NO

Schedule Filled By:
Principal Respondent:
Date of Survey:

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

(Note: Please aggregate information from village level questionnaires wherever relevant)

I. Basic Information

a. Gram Panchayat: ZANU

b. Block: -

c. District: AHMEDABAD

d. State: GUJARAT

e. Lok Sabha Constituency: Sansad Sabha Kheda

f. Number of Wards in the Gram Panchayat: 10

g. Number of Villages in the Gram Panchayat: 1

h. Names of Villages:

ZANU

Demographic Information

Number of Households 930 Total Population 4268 Male 2201 Female 2067

SC HHs 90 ST HHs 1 OBC HHs 670 Other HHs 170

I. Access to Infrastructure / Facilities / Services

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
a.	ANM/ Health Sub Centre	Y	
b.	Nearest Primary Health Centre (PHC)	N	3 Km
c.	Nearest Community Health Centre (CHC)	N	3 Km
d.	Nearest Post Office	N	5 Km
e.	Nearest Bank Branch (Any)	N	2-3 Km
f.	Nearest Bank with CBS Facility	N	3 Km
g.	Nearest ATM	N	5-7 Km
h.	Nearest Primary School	Y	
i.	Nearest Middle School	N	3 Km
j.	Nearest Secondary School	N	3 Km
k.	Nearest Higher Secondary School / +2 College	N	5 Km
l.	Nearest Graduate College	N	5 Km
m	Nearest ITI / Polytechnic Centre	N	15 Km
n	Kisan Seva Kendra	Y	

1

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

(Note: Please aggregate information from village level questionnaires wherever relevant)

	Infrastructure Facilities / Services	Located within the GP Yes (Y)/No (N)	If located elsewhere (N), distance from the GP office
o	Agriculture Credit Cooperative Society	Y	
p	Nearest Agro Service Centre	N	10 km
p	MSP based Government Procurement Centre	N	30 km
q	Milk Cooperative /Collection Centre	Y	
r	Veterinary Care Centre	N	3-5 km
s	Ayurveda Centre	N	15 km
t	E – Seva Kendra	Y	
u	Bus Stop	Y	
v	Railway Station	N	20 km
w	Library	N	5 km
x	Common Service Centre	Y	

IV. Sports Facilities in the Gram Panchayat

a. Number of Play Grounds in the GP: Total 2 Public 2 Private –

b. Mini Stadium : N Yes(Y) /No (N) *(Playground with equipment and sitting arrangement)*

V. Education, ICDS

a. Number of Angan Wadi Centres: 4

b. Number of villages without Angan Wadi Centres –

Names of such villages: –

c. Schools (Number)

Primary Private: – Primary Govt.: 2

Middle Private: – Middle Govt.: –

Secondary Private: – Secondary Govt.: –

Higher Secondary Private: – Higher Secondary Govt: –

VI. Public Distribution System

	Item	Private Contractor	Women's SHG	Gram Panchayat	Cooperative	Other (Mention)	Location in GP (mention Location)	If outside GP, Location & distance from GP HQrs)
a.	Cereal (Rice/ Wheat/ Millets)	–	–	–	–	Govt.	–	–
b.	Kerosene	–	–	–	–	Govt.	–	–
c.	Other (mention)	–	–	–	–	Govt.	–	–

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire
(Note: Please aggregate information from village level questionnaires wherever relevant)

VII. Coverage of Villages under different Facilities & Services

	Parameter	Villages Status[1]	Names of Villages Covered	Names of Villages not Covered
a.	Piped Water Supply Coverage to Villages	Covered: Yes / Not Covered: –	ZANU	
b.	Hand Pump Coverage in Villages:	Covered: NO / Not Covered: –	ZANU	
c.	Coverage under Covered Drains:	Covered: Yes / Not Covered: –	ZANU	
d.	Coverage under Open Drains:	Covered: NO / Not Covered: –	ZANU	
e.	Villages with Household Electricity Connection (Numbers)	Connected: Yes / Not Connected: –	ZANU	

VIII. Land and Irrigation

	Private Land	Area in Acres		Common Land	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	910	d.	Pasture / Grazing Land	–	g.	Check Dam	NO
b.	Irrigated Land	910	e.	Forests/ Plantations	1	h.	Wells/Bore Wells	50 – Private 2 – Govt.
c.	Un-irrigated Land	154	f.	Other Common Land	64	i	Tanks /Ponds	2

[1] Mention the number of Villages Covered and Not Covered

Saansad Adarsh Gram Yojana (SAGY) Panchayat Details Survey Questionnaire

(Note: Please aggregate information from village level questionnaires wherever relevant)

IX. Parameters relating to Households & Institutions

		Number
a)	Number of eligible Households for pension (old age, widow, disability)	150
b)	Number of Households receiving pension (old age, widow, disability)	135
c)	Number of eligible Households who are not receiving pension	0
d)	Number of Households eligible for Ration Card	735
e)	Number of eligible HHs having ration cards	735
f)	Number of households covered under RSBY (Rashtriya Swasthya Bima Yojana)	–
g)	Number of HHs covered under AABY (Aam Aadmi Bima Yojana)	–
h)	Number of active Job Card holders under MGNREGA	250
i)	Number of Job Card holders who completed 100 days of work during 2013-14	–
j)	Number of shops selling alcohol	–
k)	Number of BPL families	472
l)	Number of landless households	170
m)	Number of IAY beneficiaries	80
n)	Number of FRA[2] beneficiaries	–
o)	Number of Community Sanitary Complexes	1
p)	Number of Households headed by single women	15
q)	Number of Households headed by physically handicapped persons	–
r)	Total number of Persons with Disability in the village	10
s)	Number of SHGs	10
t)	Number of active SHGs	3
u)	Number of SHG Federations	–
v)	Number of Youth Clubs	–
w)	Number of Bharat Nirman Volunteers	–

Name and Signature of Surveyor and Respondent'

Dhiraj Vaishnav Surveyor	PRI Respondent (Preferably Gram Panchayat Chairperson)	Official Respondent (Preferably senior most Government official in the Gram Panchayat)	28/05/21 Date of Survey

[2] The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

This questionnaire should be filled for each of the villages in the selected Gram Panchayat[1]

I. Basic Information

a. Village: ZANU
b. Ward Number: –
c. Gram Panchayat: ZANU
d. Block: –
e. District: AHMEDABAD
f. State: GUJARAT
g. Lok Sabha Constituency: DASKROI
h. Number of Habitations / Hamlets in the Gram Panchayat: 1
i. Names of Habitations / Hamlets:
ZANU

Demographic Information

Number of Households 930 Total Population 4268 Male 2201 Female 2067

SC HHs 90 ST HHs 1 OBC HHs 670 Other HHs 170

II. Access to Infrastructure/Amenities etc.

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
a.	Nearest Primary School	Y	
b.	Nearest Middle School	N	3 km
c.	Nearest Secondary School	N	3 km
d.	Kisan Seva Kendra	Y	
e.	Milk Cooperative /Collection Centre	Y	
g.	Health Sub Centre	Y	
h.	Bank	N	3 km
i.	ATM	N	5–7 km
j.	Bus Stop	Y	
k.	Railway Station	N	20 km

[1] While filling this the surveyor must collect the information from the Ward Member/s and relevant government officials

1

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

i.	Access to Infrastructure / Facilities / Services	Located in the Village Yes (Y)/No(N)	If located elsewhere (N), distance in kms from the village
l	Library	N	3 Km
m	Common Service Centre	N	3 Km
n	Veterinary Care Centre	N	3-5 Km

ii. Road Connectivity

a. Habitations connected by All-weather Roads *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations where not available: Some

iii. Drinking Water Facilities

a.Piped Water Supply Coverage to Habitations: All *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

b.Hand Pump Coverage in Habitations: None *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

iv. Coverage of Habitations under Waste Management System

a. Coverage under Covered Drains: None *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

b. Coverage under Open Drains: None *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

c. Coverage under Doorstep Waste Collection: ✓ *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

v. Coverage of Habitations under Electrification

a. Coverage under Household Connections: ✓ *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

b.Coverage under Street Lighting: ✓ All *(1-All 2-None 3-Some)*

If 3 mention the name of the habitations not covered: _____

vi. Sports Facilities in the Village

a.Number of Play Grounds in the Village (minimum size 200 square meters): 2

b.Mini Stadium : N Yes(Y) /No (N)

vii. Education, ICDS

a. Number of Anganwadi Centres: 4

c. Schools (Number)

Primary Private: — Primary Govt.: 2

Middle Private: — Middle Govt.: —

Secondary Private: — Secondary Govt.: —

Higher Secondary Private: — Higher Secondary Govt: —

2

SAANSAD ADARSH GRAM YOJANA (SAGY) Village Details Survey Questionnaire

viii. Land Category		Area in Acres		Land Category	Area in Acres		Irrigation Structure	No.
a.	Cultivable Land	910	d.	Pasture / Grazing Land	–	g.	Check Dam	–
b.	Irrigated Land	910	e.	Forests/ Plnatations	1	h.	Wells/Bore Wells	50 Pvt 2 govt
c.	Un-irrigated Land	154	f.	Other Common Land	64	I	Tanks /Ponds	2

ix. Entitlement Related Parameters		
1	Number of active Job Card holders under MGNREGA	250
2	Number of active Job Card holders who have completed 100 days of work	–
3	Number of shops selling alcohol	No
4	Number of BPL families	472
5	Number of landless households	170
6	Number of IAY beneficiaries	80
7	Number of FRA beneficiaries	–
8	Number of common sanitation complexes	1
9	Number of SHGs	10
10	Number of active SHGs	3
11	Existence of SHG Federation in the Village (Yes / No)	Yes
12	Number of Youth Clubs	–
13	Number of Bharat Nirman Volunteers	–

Name and Signature of Surveyor and Respondent'

Surveyor	PRI Respondent (Preferably a Ward Member, from a Ward that is fully or partially covered under the Village)	Official Respondent (Preferably Secretary/ Government official in the Gram Panchayat)	Date of Survey
Dhiraj Vishnav Nimil Gandhi	B.v. Tank સરપંચ ઝાણું ગ્રામ પંચાયત તા. દસ્ક્રોઈ, જી. અમદાવાદ	તલાટી કમ મંત્રી ઝાણું ગ્રામપંચાયત તા. દસ્ક્રોઈ, જી. અમદાવાદ.	28/05/21