SAVE WATER

SMART WATER MANAGEMENT SYSTEM

USING IOT

BY GROUP-2

ACKNOWLWDGEMENT

We wish to express our deep sense of gratitude to our beloved Chairman Shri Narayan Das Agarwal and all trust members of GLA UNIVERSITY for providing all the necessary facilities to conduct our project work. We express our sincere thanks to the head of DCS ----- for his support and providing this internship. We express our gratitude to the trainers of DCS Mr. DK Tiwari, Department of Electronics and Communication Engineering, for the support and guidance he has extended to carry out the project work successfully and for their valuable suggestions and help throughout our project work.

CONTENT

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE DCS INTERN (G2)

AND

THE G.L.A SOCIETY

IN THE FIELD OF SMART WATER MANAGEMENT USING IIOT

This Memorandum of Understanding (MOU) outline the basic terms and agreement is made and entered into by and between THE DCS INTERN (G2) and THE GLA SOCIETY. The purpose of this MOU is to establish the strong co-operative relationship between both the parties.

OBJECTIVE:

The objective is to design and develop the real time water monitoring and control system with all the advance methodologies. By using the advance technologies we can able to preserve drinking water, prevent the wastage of water and make the system cost effective by the help of IIOT.

TERMS:

This MOU is effective upon the day [date] and date last signed and executed by the duly authorised representative of both the parties.

OPERATIONAL FEATURES:

- Measuring water level within the water tank of every building in the society.

- Sharing the temperature of the water inside the tank (especially during summer).
- Making water pump respond automatically whenever needed.
- Water quality measuring system monitor which provides the quality of water in real time.
- Reading water consumption on daily basis and alarm the residence, if water consumption exceeds.
- Leak detection solution which monitor underground pipeline and detects the leak within the pipeline.
- Designing proper interconnectivity of the sensors to respond quickly.
- Provide one control room inside the society for visualisation and control of the complete system from one place.
- An app will be provided to all the residence for viewing their activity and alarming them for more water consumption.
- One technical staff will there for one month for monitoring the system and teaching society staff the controlling and operation of the whole system.

Either party may request change to this MOU. Any change, modification, revision or amendment to this MOU which are mutually agreed upon by and between both the parties to this MOU shall be incorporated by written instrument, and effective when executed and signed by both the parties to this MOU.

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D.K TIWARI
G.L.A Society Secretary

DCS
Power To Design The Desired

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Adarsh kumar
DCS INTERN Group-2 (G2)

CHAPTER-1

Abstract--- This project helps to regulate the proper maintenance of water tank information to monitoring section with proper updation of records. Problem affects various processes in water management, such as water consumption, distribution, Water dust formed in the water tank. These problem can overcome by implementing proper monitoring system and information update system. Set of sensor like Turbidity, Salt sensor, pH sensor and Water flow sensors were used. This sensor informs about the water level tank and communicate to the monitor section. To maintain the tank without bacteria and microbes the Chlorine powder is sprayed if there is any changes in the ph value is found. If the water level reaches minimum position the motor automatically starts and when it reaches the maximum the motor stops automatically. A wireless sensor network is formed by connecting two and more water tanks using RF radio channel transceiver with monitoring section.

INTRODUCTION

In the 21st century, there were lots of inventions, but at the same time were pollutions, global warming and so on are being formed, because of this there is no safe drinking water for the world's pollution. Nowadays, water quality monitoring in real time faces challenges because of global warming limited water resources, growing population, etc. Hence there is need of developing better methodologies to monitor the water quality parameters in real time. The monitoring of water quality is extremely important for maintaining the safety of water resources used for various purposes.

Water is one of the most important basic needs for all living beings, but unfortunately, a huge amount of water is being wasted because of uncontrolled use and exploitation of water resource. Kerala averages rainfall of 3,000 mm a year. The general impression was that among all the states in India, Kerala had ample drinking water, but it's not the case. There are 1,164 problem villages without the adequate supply of drinking water. Even though Kerala has 44 rivers spanning its lush green landscape. Together, they contribute an annual discharge of 72, 00 million cubic meters of water which is unused to the Arabian Sea. One of the main reasons for the shortage is poor management of water.

Overflowing water tanks in residence, schools, colleges, Municipal overhead tanks, Hospitals etc. can contribute to the massive amount of water wastage. If we can control this we can save large amounts of water.

Conventional water tanks can neither monitor nor control the water level in the tank. As of now, the water level has to be manually checked and refilled according to the requirements.

So in this paper, we solve all the above mention problems with automatic water level detection and refilling of water storage system with the help of Internet of Things (IoT).

SENSORS

Microcontroller-The Atmega328 is a one of the very popular microcontroller chip produced by Atmel It is an 8 - bit microcontroller that has32Kof flash memory, 1K of EEPROM, and2K of SRAM. The Atmega328 is one of the microcontroller chips that are used with the popular Arduino boards. This microcontroller has an analog pin and digital pin for easy interface of the Microcontroller Operating Voltage: – 1.8-5.5V 23 Programmable I/O Lines Two 8-bit Timer/Counters Real Time Counter with Separate Oscillator Six PWM Channels 6 channel 10-Bits.

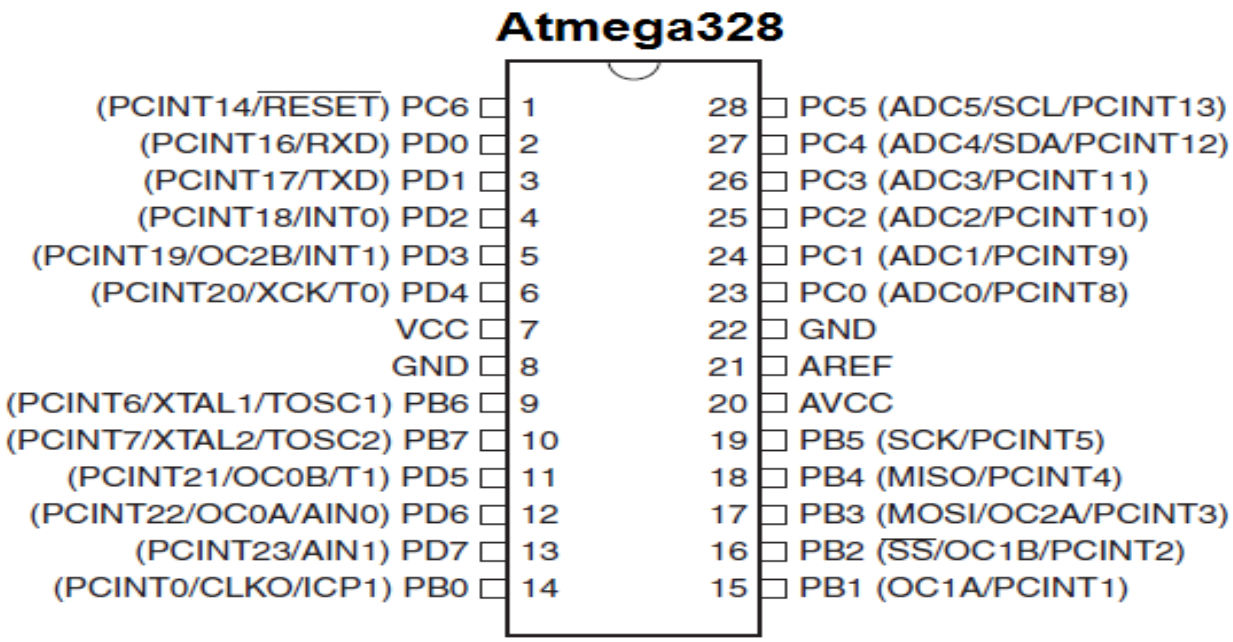


Fig 1.1

ESP8266 Wi-Fi Module - The **ESP8266 Wi-Fi Module** is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your **Wi-Fi** network.

The **ESP8266** is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

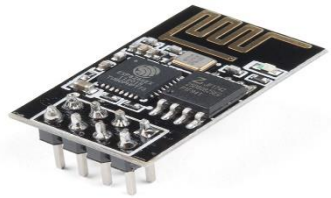


Fig 1.2

NRF24L01- NRF24L01 is basically a wireless transceiver, which is **used** to send and receive data by using radio waves. It is a single chip transceiver module. It **uses** SPI protocol for transmitting data. Its data transmission speed is up to 2Mbps.

A **transceiver** is a combination transmitter/receiver in a single package. The term applies to **wireless** communications devices such as cellular telephones, cordless telephone sets, handheld two-way radios, and mobile two-way radios. ... Some **transceivers** are designed to allow reception of signals during transmission periods.

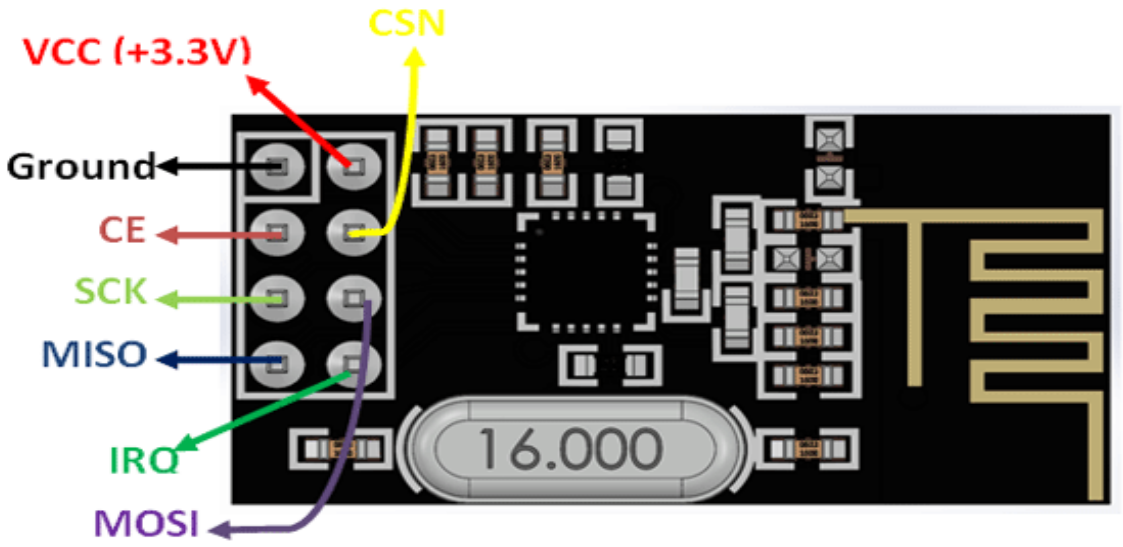


Fig 1.3

Ultrasonic sensor- An **ultrasonic sensor** is an electronic device that measures the distance of a target object by emitting **ultrasonic** sound waves, and converts the reflected sound into an electrical signal. **Ultrasonic** waves travel faster than the speed of audible sound (i.e. the sound that humans can hear).

Fig 1.4

Relay- 220v alternating current (AC) powers the AC devices. Arduino cannot control such high voltage and amperes. For that purpose a relay is used. Arduino controls this relay to control AC devices according to the program. So we are using a relay as a switch to control high power devices (here water pump). Here we use the relay for controlling motor. According to the water level, the receiver section gets a command to turn ON/OFF the water pump. As water pump works on AC, this AC has to be controlled to automatically turn ON/OFF according to our system requirements. So, we use a relay in order to achieve this need.

Fig 1.5

Ph sensor- A **pH sensor** is one of the most essential tools that's typically used for water measurements. This type of **sensor** is able to measure the amount of alkalinity and acidity in water and other solutions. For drinking purpose ph range should be between 6.5 to 8.5 ph.

Fig 1.6

Turbidity sensors- It measure the amount of light that is scattered by the suspended solids in water. As the amount of total suspended solids (TSS) in water increases, the water's **turbidity** level (and cloudiness or haziness) increases.

Fig 1.7

Water flow sensor- It is use to detect the flow of water inside the pipeline. A water rotor rotates when the water flows through the pipe and measure the water flow. It works on the principle of Hall Effect.

Fig 1.8

CHAPTER-2

AUTOMATION OF MOTOR

Depending on the water levels, as described above, the status of the motor will be automatically controlled. If the water level is in between maximum and minimum level set, then the user can control the status of the motor from the cloud platform. Buttons ON and OFF have been provided for the same.

Sl.No	Conditions of water level	Motor status
1	When the water level is below a minimum level	ON
2	When the water level is above the maximum level	OFF
3	When the water level is in between maximum and minimum level	It can be controlled by a user using Adafruit cloud platform

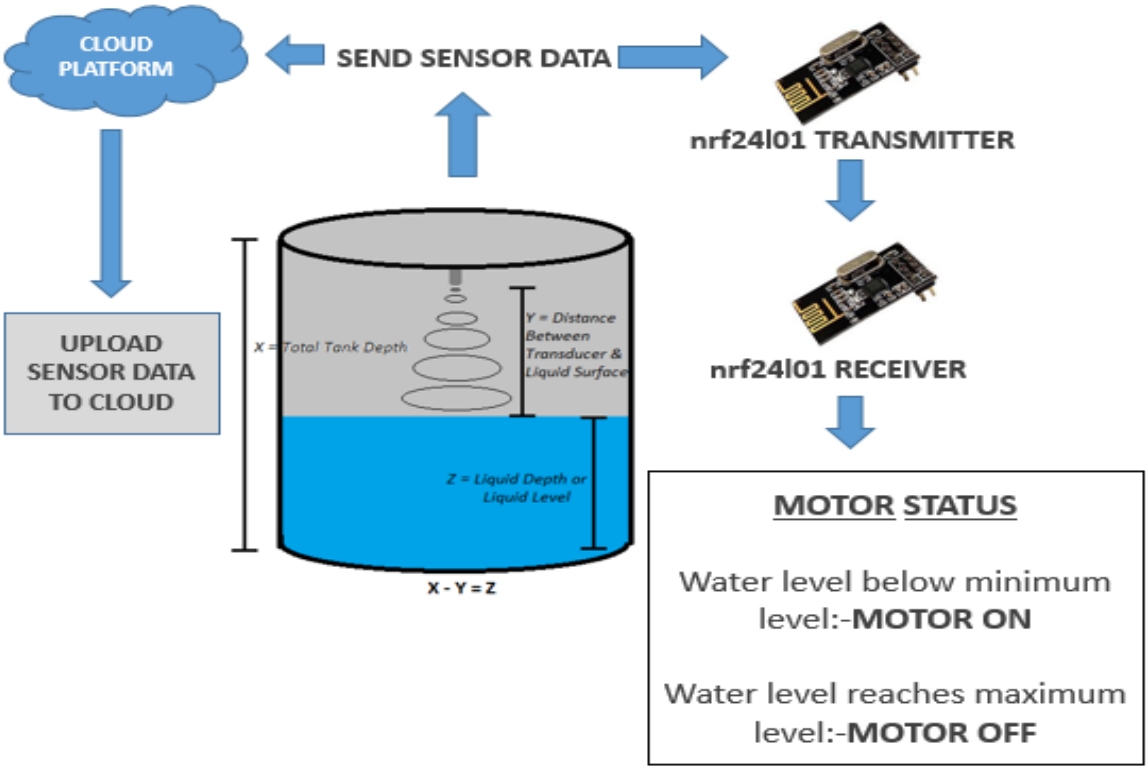


Fig 2.1

The motor will be automatically controlled by using the relays.

WATER QUALITY MANAGEMENT

Water quality management includes the systematic collection of physical, chemical and biological information, and the analysis, interpretation and reporting of those measurements, according to a pre-planned design and structure. ... Sampling programs including type, scale and measurement parameters.

Monitoring **water quality is** an important part of helping us determine whether or not **we are** making progress in cleaning up our waterways. It reveals the health and composition of streams, rivers, and lakes at a snapshot in time, as well as over weeks, months, and years.

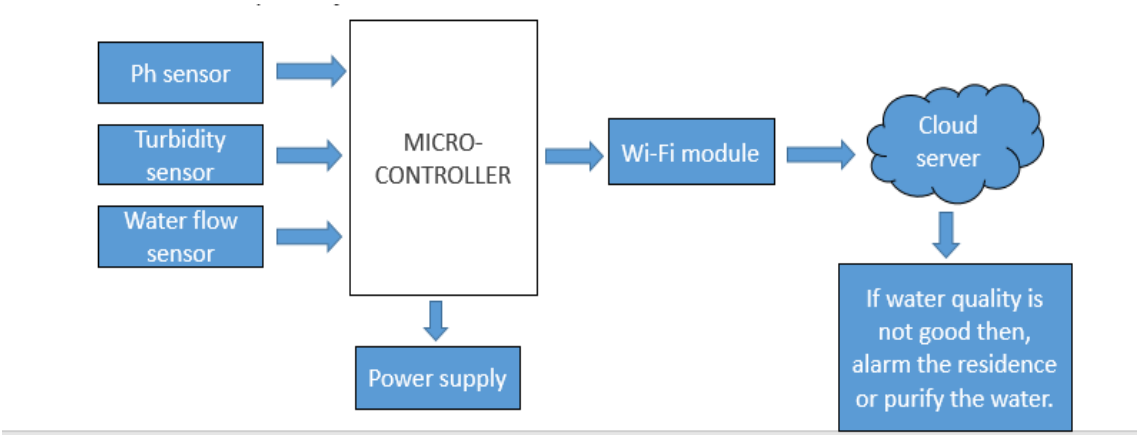
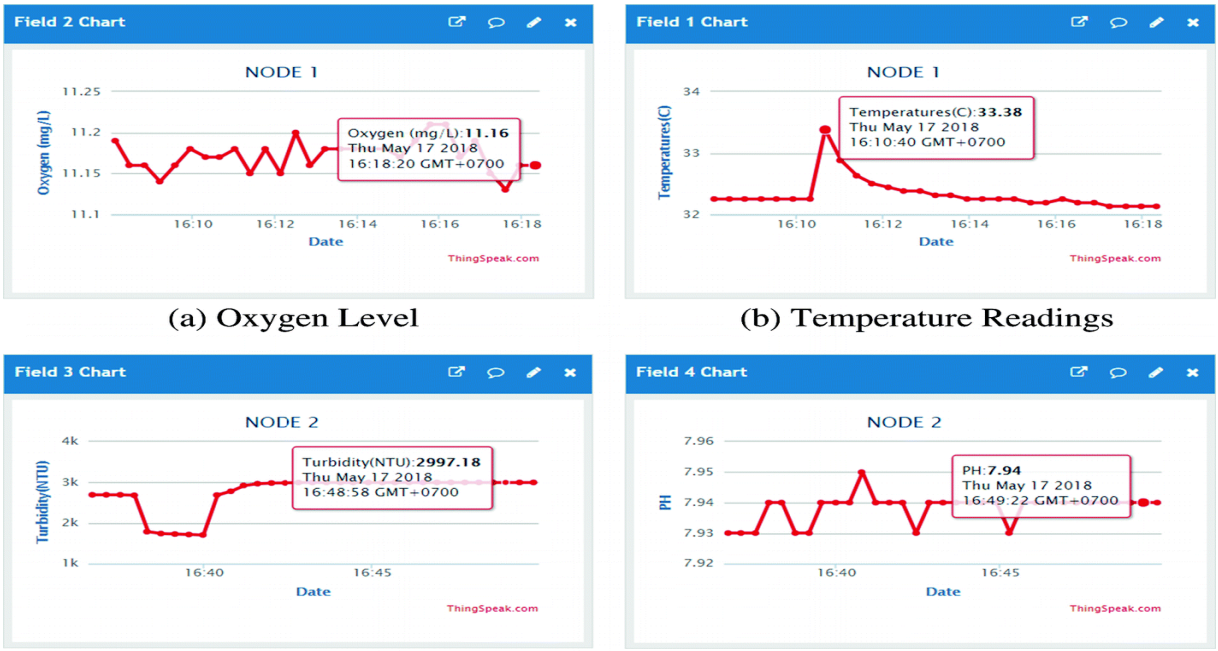


Fig 2.2



(a) Oxygen Level

(b) Temperature Readings

(c) Turbidity Level

(d) pH Level Readings

Fig 2.3

WATER LEAKAGE MANAGEMENT

The **Water Leak Detector** Starter Kit by smart water flow sensor is our **top** pick because it's easy to install and responds almost instantly to the first sign of **water**. If it detects a **leak** or freeze, the sensor triggers an **alarm**, sends text alerts and shuts off the main **water** supply to prevent damage.

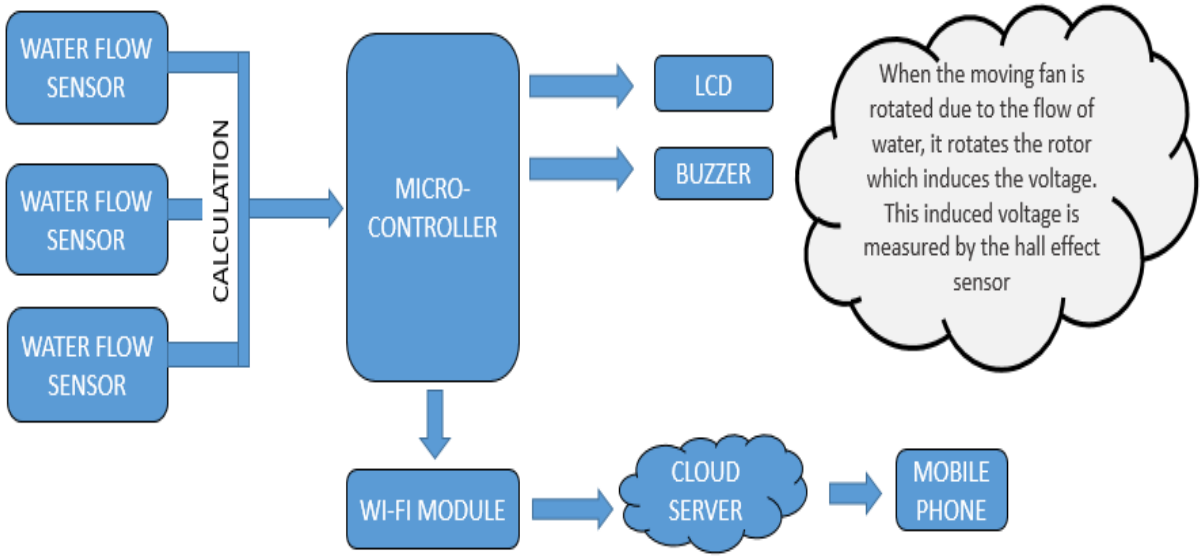


Fig 2.4

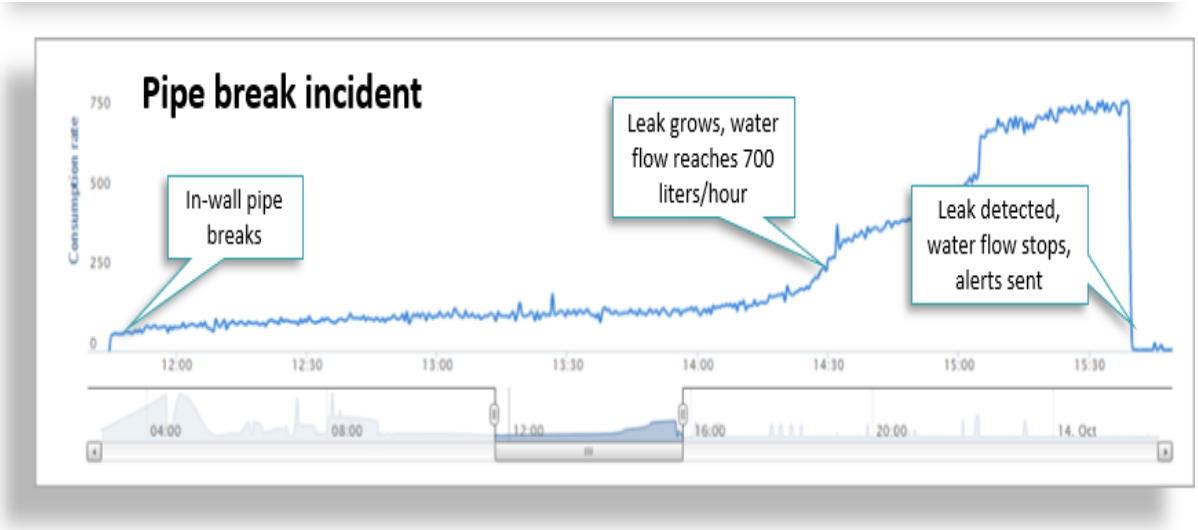


Fig 2.5

This fig helps us to determine the leak in the pipeline. By this type of graph we can easily detect the leak and take the required action as soon as possible.

WASTE WATER MANAGEMENT

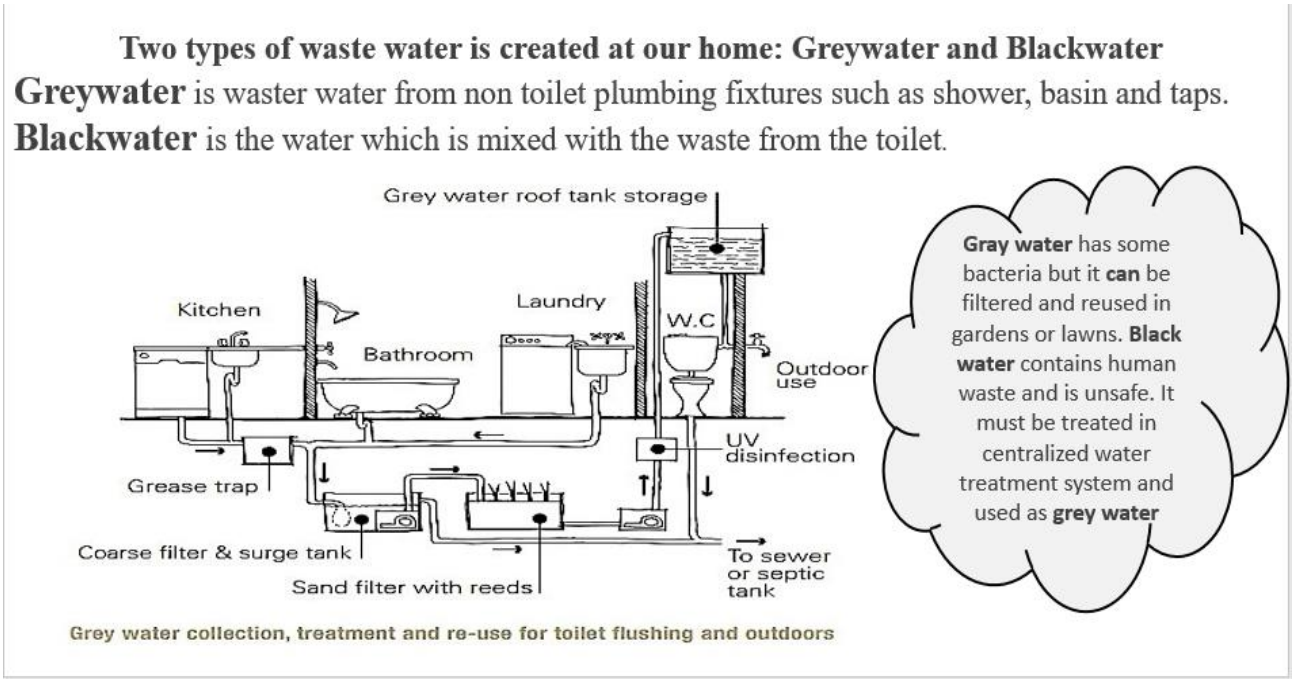


Fig 2.6

We can visualize and control our complete system at one place by making an application (MIT app inventor) for it.

From the control room, one operator will always monitor the whole system.

CHAPTER-3

Chapter 3 is all about the budgeting of our whole water management system into three category.

1-Basic pack

2-Elite pack

3-Premium pack

In the basic pack feature, there will be:-

1. Measuring water level within the water tank of every building in the society, but the alarming system is manual, like buzzer.
2. Making water pump respond automatically whenever needed.
3. Water quality measuring system monitor which provides the quality of water in real time.
4. Leak detection solution which monitor underground pipeline and detects the leak within the pipeline. Designing proper interconnectivity of the sensors to respond quickly.
5. An app will be provided to all the residence for viewing their activity. No controlling of the system is provided with the application.
6. One technical staff will there for 15 days for monitoring the system and teaching society staff the controlling and operation of the whole system.
7. The basic pack of our smart water management system will cost around Rs 30000- Rs 35000.

In the elite pack feature, there will be:-

1. Measuring water level within the water tank of every building in the society.
2. Making water pump respond automatically whenever needed.
3. Water quality measuring system monitor which provides the quality of water in real time.
4. Reading water consumption on daily basis and alarm the residence, if water consumption exceeds.

5. Leak detection solution which monitor underground pipeline and detects the leak within the pipeline.
6. Designing proper interconnectivity of the sensors to respond quickly.
7. An app will be provided to all the residence for viewing their activity and alarming them for more water consumption.
8. One technical staff will there for one month for monitoring the system and teaching society staff the controlling and operation of the whole system.
9. Free service of the system for 6 months.
10. The elite pack of our smart water management system will cost around Rs 50000- Rs 60000.

In the premium pack feature, there will be:-

1. Measuring water level within the water tank of every building in the society.
2. Sharing the temperature of the water inside the tank (especially during summer).
3. Making water pump respond automatically whenever needed.
4. Water quality measuring system monitor which provides the quality of water in real time.
5. Reading water consumption on daily basis and alarm the residence, if water consumption exceeds. Leak detection solution which monitor underground pipeline and detects the leak within the pipeline as well as inside the each floors.
6. Designing proper interconnectivity of the sensors to respond quickly.
7. Provide one control room inside the society for visualisation and control of the complete system from one place.
8. An app will be provided to all the residence for viewing their activity and alarming them for more water consumption.
9. One technical staff will there for one month for monitoring the system and teaching society staff the controlling and operation of the whole system.
10. Free service of the system for 1 years.
11. The premium pack of our smart water management system will cost around Rs 100000- Rs 120000.

CONCLUSION

Our intention of this research work was to establish a flexible, economical, easily configurable and most importantly, a portable system which can solve our water wastage problem. It is a robust system and small in size.

Our proposed system for water level monitoring comes under the field of Internet of Things (IoT). Our main objective was to design a smart system for approximating the water level in the tank and prevent overflow or analyse the water usage. This analysing feature can also help us in finding whether there is any leakage in the tank or not.

Nowadays liquid level monitoring is vital in many industries too like oil, automotive etc. Using our smart system we can analyse the usage and also detect the leakage in the tanks of these industries.