Good morning to all of you, welcome to the presentation of my project Smart Water Management System. I am Suryansh Saxena from Section J 3rd year Btech Cs.

First Slide:

Let me start by giving you some introductory information of my project. All of us are aware that The Internet of Things helps us to make things smart by connecting physical devices to the internet. Water is an essential resource for all life on earth. It is therefore necessary to handle water smartly. Iot is a wide platform that can be use to handle it smartly. So this project was undertaken in response to the need for saving water and to ease the convinience of mananging water movement in societies. So lets move on to next slide to understand how this project is incorporated in infrastructures.

Second Slide :

So, this slide explains the concept of Single Building Framework. So firstly the water from the reservoirs is initially checked before supplying to the society for its quality by using a pH sensor and turbidity sensor and the quality status updates on the Realtime cloud server by using nodeMCU (microcontroller). After the sensors approve the quality of water it will be directed towards the society. Now we have an ultrasonic sensor that checks the water level in the tanks in real-time. If the level of water in tank falls below the minimum setpoint then through the use of relay, motor will get automatically start to fill the tank and then motor will stop automatically after the tank fills the maximum volume setpoint as per algorithm to prevent overflow. The level of tank is updated on a real-time cloud which user can see through the mobile app. Also user can start and stop the motor manually too using the mobile app. Now lets move to the next slide to understand its flow chart.

Slide 3:

So this flow charts starts with two quality check of water. Initially, in the turbidity test if the turbidity is not according to the quality standards, the supply will get

stopped, and an alert will get sent to the user. After the turbidity check gets passed, there is a pH check of the water. After the water passes both the quality test the water can get further supplied. On next step according to real-time updated level of the water in the tank , motor will act. If the motor turns on, the quality check for the water coming from the underground reservoir gets done continuously hand-in-hand. In the back-end, there will be a leakage algorithm running which uses the consumption data which is updated daily on the cloud. So there will be a fix a peak point, if the consumption increases by 10% of the usual fix point, then user will get an alert about it. The user can take the required actions accordingly. To make the leakage algorithm more precise and location specific I came up with a more precised algorithm. To discuss that lets move to next slide.

Slide 4:

Leakage is really unpredictable and a complex problem to solve, so I came up with a very cost-effective approach that is an algorithm. Our main hero of this algorithm is a smart water meter that is applied by the government for real-time payments and consumption check.

Water meters are installed outside the house through which water goes into the house. This algorithm can help to check leakage in a certain area. So basically, this algorithm is divided into three parts:

First Part: In this part, pipes are covered from the reservoir to the tank. Suppose normally a tank fills at 6l/min and in the meantime flats and pipes from the tank to flats consume water at 2l/min. So effectively the tank is filling at 4l/min. And if we found this reading to be lower hence leakage appears and then the relay will stop the valve at the reservoir.

Second Part: In this part, pipes are covered from the tank to meter. These pipes have fixed volume so for that, we have created a formula that if total fixed pipe volume is equal to the Tank full volume subtracted by the sum of Tank remaining and flats consumption then there is no leakage and if it comes out unequal then there is leakage and relay will stop the valve at the tank.

Third Part: In this part, pipes are covered inside the flats. To understand this part first understand the condition that if all taps are closed inside the flat and then also the meter reading is increasing then there will be a leakage and the valve will be closed at the tank.

To implement this, we have 2 scenarios. In the first scenario, the user will be having a button in the app that reads perform a water leakage test and if the user clicks on the button then the app will ask the user to close all the taps and then click continue. After clicking continue software will read the meter readings and if it is increasing then there will be leakage.

In the second scenario, as we are aware of every flat average consumption according to

time like for a particular flat, the flat consumes around 50l/hour at 7 am-10 am and if meter reading exceeds this then we will send a notification to user's mobile to perform water leakage test and then the first scenario will be repeated.

By all these, we can predict very easily in which part there is leakage which was not possible before. Moving further to slide where I would like to explain about the inter-connectivity.

Slide 5:

So, I have connected all the microcontrollers (NodeMCU) in a mesh topology. Mesh topology provides efficient data transfer. Here I have make one nodeMCU as a local server which will act as the master and all others would be slave microcontrollers. The local server would then store all the data over the cloud using the router. The data transfer within the devices, i.e., between the sensors and microcontrollers,

would be based on the MQTT protocol (Message Queuing Telemetry Transfer/Transmission) and for the communication between microcontrollers, ESP8266 would be utilized which is based on the Wi-Fi and UART.

Now I want you to see the whole architecture to sum up the work.

Slide 6:

This slide shows the system architecture that is how everything is connected and implemented.

All the microcontrollers will get power supply from the standard 10 watt power adaptor. Microcontroller in the building will get power supply from the same building. To have a proper internet connectivity for operating Node MCU, there is the connection of one building with the other buildings having a router placed in the middle of the buildings. All of these buildings and reservoir's NodeMCU will be sending their data directly to the cloud which can be easily monitored or accessed through consumers Laptops and Mobile phones at their homes very easily. So this is how whole system is implemented.

Now , I do like to illustrate the smart water mobile app then we will move to costing of the project.

Slide 7:

For a smart system, we have connected all the sensor readings to the secured cloud platform and created a mobile application to show these readings to users. This application offers many features to users. To access these features each user will be provided with a specific user id and password to login to the app. So features are like water quality check, know about water level in tank , perform water leakage test, start/stop motor manually, cut power supply and it gives alert/notification. So it's the time to discuss the perks of this project.

Slide 8:

In the end by summing up the explanations, I want to end this presentation by telling the perks of this project So ,

There are many benefits of this project :

1) Water quality is checked before supply. So you will always be tension free for water quality reliability.

2) An early end to end leakage detection with precise location detection algorithm that make tine consuming task consume less time.

3) It can be easily incorporated into existing infrastructure.

4) It has 24*7 remote access.

5) Everything at your fingertip with complete visualization through a mobile app.

6) Never run out of the water with Automatic tank filling.

7) Saves your water and electricity bills.

8) Data on the cloud for water consumption monitoring.

9) You will get Real-time notification and alerts.

10) Technology that is pocket-friendly. Based on my findings this project cost about 23 thousand rupees which I think is appropriate for the better and smarter technology.

Slide 9:

Thank you for your attention. Now I am happy to answer any questions you might have.