Smart Water Flow Management System

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Abstract- *The project is about measuring the water used in every house and provides real time statistics. House which uses more than average level of water are warned by sending a message. Any registered person in the house can see the last 24 hours statistics of their usage anytime through their android app. Each house has a separate outdoor usage tap that provides 2 litres of water initially. If the user requires more water for some valid reasons, they can request through the app by providing the appropriate reasons. In the management of resources like water, a human negligence can cause wastage of large volume of water or an error in the supply management can deny basic facilities to people. With the current existing system of water supply for domestic purposes, there are quite common cases of untimely supply of water and there is a need to automate the monitoring of supply of water. This project helps to automatically monitor the supply of water from the authorities and to get alert regarding it which helps in the proper utilization of it. This will help the masses to fill up their containers even in case of unusual timing of supply*

I. INTRODUCTION

Water scarcity is both a natural and a human-made phenomenon. There is enough freshwater on the planet for six billion people but it is distributed unevenly and too much of it is wasted, polluted and unsustainably managed. Worldwide, more than 1.2 billion people lack access to clean potable water. The main sources of fresh water available for living purposes and for human use is the surface water available, as a result of rainfall which also recharges the lakes, different water resources like aquifers. But the increase in the population has increased the competition to use the resources. Water scarcity affects every continent.

According to the United Nations Development Programme, the poor management of sufficient available water is found more often to be the cause of countries or regions experiencing water scarcity, as most countries or regions have enough water to meet household, industrial, agricultural, and environmental needs, but lack the means to provide it in an accessible manner.

The term automation refers to the technique, method, or system of operating or controlling a process by highly automatic means, as by electronic devices, reducing human intervention to a minimum. Introducing automation in water management system can notably decrease the human errors and thus help reducing the wastage of water.

Also with limited supply of water, there is need to monitor the usage which may help people to habitat in all geographical conditions. This conservation of the water and to facilitate the proper and fair usage of it with help of automation technology can significantly contribute to the minimization of water scarcity problems.

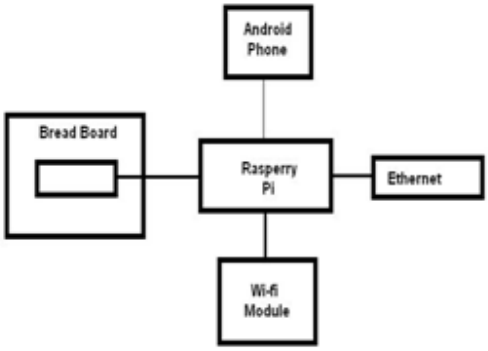

Fig I.1 Architecture Diagram

II.RELATED WORK

A sensible integration system for water distribution is proposed in [6]. This may be prescheduled and pre-intimated to the voters over the net. This method makes use of electronic valves (solenoid valve). The management of the valves are controlled through Mobile App as per schedule and can be notified beforehand to the Voters of specific area through SMS in order that the wastage of water may be prevented. However, undetected leaks, even small ones, will lead to giant quantities of lost water since these leaks may exist for a long time. Ironically, several little leaks are easier to find because they are noisier and easier to hear victimization hydrophones. Smart water management will play a key role within the

transformation of cities of developed and developing countries into good and property cities, if adequate policies, strength governance, and board neutral involvement square measure integrated into its designing and implementation.

In [3], a GSM/GPRS system to develop a highly efficient system capable of validating and detecting leakage is proposed. It is a low power metering system, in which power supplied is required only while reading the meters. Information in the meter is sent to a central server by SMS. The limitation of this system is that, it can be used only where GSM network is available. In ZigBee based Automated Meter Reading (AMR) system, meter measures electricity and water usage for each home and sends recorded data to central station In [1], a solution for the easy and auto-mated management of water in households which helps in preventing wastage of water is proposed. It is also supposed to help people to tackle the untimely supply of water by authorities. The overall project works in different phases. The initial state of valve is on. Whenever water arrives at the pipeline, it is detected and the buzzer is set on for a short duration. The ultrasonic depth sensor is used to measure the level of water in the container and whenever the water level crosses a set limit, valve is closed. The water flow sensor, ultrasonic depth sensor, buzzer and the solenoid valve are controlled by the Arduino from which the data are sent serially to the raspberry pi. Raspberry pi sends this data to Google database. This data can be retrieved from Google database through android App.

In [5], a preliminary assessment of water loss evaluation on a small section of water distribution network at the Institute campus is carried out. The measurement logs pertaining to received water quantities were assessed against individual consumption at the different locations within the geographical area. The water loss on account of various factors such as pipeline joint leakages underground, faulty water-meters, defective faucets and water-taps, overflow water loss due to aged / broken float-valves, dripping losses through garden water hoses, etc. were identified during the assessment survey. The amount of water saved by corrective actions, replacements and revised operations was of the order of about 14% of water receipts. The consumption data on water-metering at a few branch locations in 4"NB mains were shown. The monthly consumption for a small population of water-meters in a small community network were shown. Analyses of these yielded information on water loss, enabled steps to be taken for improving water conservation measures, etc. within the small community.

The present study is being extended to incorporate consumption pattern based algorithms to enable substantial value addition to consumers as well as saving of treated water. Data Analytics at the CRBM would provide information such as consumption patterns for each type of consumers, identify and evaluate changes in these patterns, look for trends in consumer demands, verify consumption data for suspect consumers and conduct audit to identify avoidable leakages, pipeline pilferages and breaks, etc.

In [4], the water level is gettig monitored continuously from anywhere using android application. Motor can be controlled automatically full smart automation is achieved. It is a robust system & small in size This device can be implemented at personal level. It can be implemented in a bungalow or at industrial level. In a bungalow it can be used as similarly described as above and at industry it can be used to check water levels of different tanks consisting of different types of liquids. According to the level of liquids notifications will be sent to the authorized person.

"Water Management" as such implies to maximizing use of water and minimizing the wastage of water. The sensors will sense the flow of water to each pipe which ultimately tells the usage of water at one block ideally. This water usage data would be sent to cloud using the IOT space. This cloud data would be sent to the concern resident's person's mobile app reporting the water used and alerting the user to limit the water use if it gets extended to the limit usage set by municipal government or corporation. If the limit gets extended the user have to pay accordingly. This will be real time operation. The objective of doing so is for limiting and minimizing the usage of water for an average of per person. And secondly, the cloud data will be used as statistic data for use of water at every seasons that is winter, summer and monsoon so that measuring steps for water management can be taken with the appropriate statistics, yielding an avenue for predictive measure.

Earth's 71% is covered by water is a ubiquitous fact [2]. Among which oceans has approximately 96.50% and 3% is considered to be freshwater, again out of which only 0.08% is accessible direct to human use and rest is preserved in tundra regions and in different form on and in the earth surface which is very difficult to abstract for the human purposes. According to scientists and organizations as IPCC (Intergovernmental Panel on Climate Change), state has come, since a long time, where water management as such implies to maximizing use of water and minimizing the wastage of water and thus preventing the domino effect cycle arises as wastage of water. As per Swedish expert Falken Mark, "When water availability is less than 1,000 cubic meter per person per day water stress occurs. Culmination of huge and increasing population and evenly increasing demands for water and uneven accessing to it is the main cause of water scarcity." The work focused in this project is using Arduino, for

measuring the water flow from the pipe which divides the flow of water to every parts of block, will get sense using flow meter YF S201 or using solenoid 5. This data that is flow rate which is nothing but the usage of water rating in hours/liter, will be sent to cloud through IOT (Internet of things) space 6. Then in return getting this data from cloud to mobile application, the application which can be used by the user or the head of corporation for monitoring and controlling the supply of water. In this project, 3 water flow meter is used, one for getting the total water calculation in main tank and other two for the calculation of water usage by two houses through the main tank. The technology used in designing has development board and sensors.is efficient.

III. PROPOSED SYSTEM

The proposed system provides a way of storing water usage statistics. The main idea behind the project is creating awareness among the people by notifying them about the over consumption of water in their house by sending notifications using applications. In this process, the amount of water consumed is calculated with help of water flow sensor and sent to the centralised database. In the database, the statistics of water usage along with the day of usage is stored for each house and can be used for further data analysis such as to calculate the total water consumption in a locality or a city or across the different seasons and also be used to generate bills for each household according to their usage. It does not need any separate system to display the data .It allows the consumers to use the regular smart phones. These data are displayed in mobile app by retrieving the stored data from the cloud. The notifications can also be sent through a short message service (SMS) and through an e-mail, which allows to check the message in the time of absence of mobile. It also indicates about the supply of water to the house by alerting the households through a notification message.

A) Hardware Requirements

- Raspberry Pi
- Wi-Fi module
- Flow meter
- Android phone
- Solenoid valve(Normally Open)

i) Raspberry pi

The Raspberry Pi is a credit-card-sized computer and can function as a proper desktop computer or be used to build smart devices. Caspian is the “official “operating system of the Raspberry Pi. Caspian comes preloaded with Python, the official programming language of the Raspberry Pi and IDLE 3, a Python Integrated Development Environment. It is a complete Linux computer and can provide all the expected abilities that implies, at a low-power consumption level.

Fig: II.1 Raspberry Pi

ii) Flow Meter

A flow meter is a device used to measure the flow rate or quantity of a gas or liquid moving through a pipe.

- Model: YF-S201
- Sensor Type: Hall effect
- Working Voltage: 5 to 18V DC (min tested working voltage 4.5V)
- Working Flow Rate: 1 to 30 Liters/Minute
- Working Temperature range: -25 to +80℃
- Maximum water pressure: 2.0 Map

The sensor comes with three wires: red (5-24VDC power), black (ground) and yellow (Hall Effect pulse output).

Fig: II.2 Flow Meter

iii) Raspberry Pi GPIO Cable 12in

Model: RPICAB6-40
Length: 6in
This cable helps to connect to the new Raspberry Pi B+ GPIO (general purpose input/output) 40 pin header.

Fig II.3 Raspberry Pi GPIO Cable 12in

B) Software Requirements

- VNC viewer
- Mobile application

iv) Mobile Application

The mobile application owned by the user is made use for notification purpose .Its helps to send the notification wirelessly. Notification is sent to the user at the time of water supply and when the consumption of water exceeds the limit. Using the application, general awareness can be created.

IV.CONCLUSION AND FUTURE WORK

By using waterflow management system, a general awareness can be created among the people and it helps to reduce the water utility leading to a solution for the water scarcity problem. Further it provides information about water flow leading to water storage ,which can be used in the future whenever it is needed. The discrepancy in the water supply in the different streets can be found through a comparison, thus providing a several benefits. The data collected can be used for further analytical purposes.

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