

Water Quality Monitoring and Theft Identification

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Abstract: In this project we are mainly concerned with the solving a issues faced regarding a water , which is faced in our day to day life . one such problem which we have observed is water theft in urban areas and also the impurities presence in the water. Our system is mainly concerned with the monitoring of the water supply to the residential area, in addition to this application this project also focuses on the water quality monitoring .This system make use of the IOT technology to transfer a information to the water board and the machine learning algorithm is used in the water quality monitoring process.

Keywords: Temperature sensor, PH sensor, machine learning algorithm, IOT, Arduino UNO server.

I.INTRODUCTION

Water is one of the important source for living. Earth consists of $3/4^{\text{th}}$ of water and $1/4^{\text{th}}$ of land, the percentage of water in earth is more, but using of that 97% of water. water is consumed for all the purposes ,due to this water consumption is increasing in one or the other reason everyday,because of this people facing lots of problem every day .So in this scenario, we are taking an step to save the water. So our main focuss is identified in urban area problems ,which is water theft in urban areas and also for monitoring the impurities present in the water. In this step we can stop the wastage of water due to leakage and also there will be uniform distribution of water to the consumer. In addition to this advantage our system also helps in monitoring a water quantity.

The problem has been identified, but the technology to accomplish this process is the biggest deal , because there are many technologies in which these problems can be carried out ,but updating the system according to the technology revolution is also equally important . So in that effort we have decided to carry out this project in IOT(Internet Of Things) and machine learning.

IOT(Internet of things) is the extension of the internet connectivity to the hardware which can be operated at any time and any where. The definition of internet of things is evolved due to the emergence of various technologies such as

machine learning , automation, embedded systems. Our project is use the IOT technology to pass the information to the water board management ,through this there will be a continuous monitoring at any time and at any where.

Machine learning is a system which can learn from the various different examples by self improvement which is not explicitly coded by the programmer. A typical machine learning is to provide the recommendations. Machine learning in this project is used in the water quality monitoring phase , where by giving the various data to the server the machine will learn the temperature and PH level ,so by this machine will give the information using iot to water board management if the temperature and PH level is increase or decrease than the specified value .

II. LITERATURE SURVEY

In our project we are working on a two application these are water quality monitoring and theft identification. Based on the survey this project is presented in various ideas and implemented in different cities , urban areas and domestic areas. In[1] that paper is focused on the predicting flow of water and automatic supply of water using sensors, zig bee, LCD and IOT. Water samples are analyzed for 28parameters.The project called“Water quality monitoring for rural areas”a sensor cloud based economical project is published in 2015 first International conference on next generation

computing technologies at dehradun, India. In the existing system electrically supplied the water to the consumer by solenoid valve. But in our project we are using an anti-theft control system and new technologies like machine learning, Internet of things. By implementing this proposed system in real time surely it will be able to do water monitoring and theft identification in domestic areas. In[2] this paper it is proposed to develop an embedded based water monitoring and theft identification. DMA flow sensor, GSM, hall effect sensor, solenoid valve and MySQL is used. In the studies from[3] the author proposed that an IOT modem for wireless communication and send the information to all the consumers and officers to take immediate action. In[4] this paper it describes to ensure the safe supply of drinking water and water quality checking by using the new technology Internet of things. In our paper we presents a water quality checking using various sensor and Internet of things and design. In[5] author proposed that continuous monitoring of water supply and amount of water in tanks, flow rate by using raspberry pi, Arduino nano, GSM and sensors. In[6] that paper focused in urban areas to control the water theft and send the water flow rate and quality level and all the information to all the consumers by using the embedded system and arduino uno.

III. MOTIVATION

Water is an important source for all the living things. But, water purity level is very low and another problem in the water supply system is that public is using suction pumps to suck the water directly from the home street pipeline. Even the water is not supplied to all the consumers because of the water theft. The water pollution is the leading cause of diseases worldwide. The quantity of useful water level is decreases. In the 21st century, there are lots of innovations, but at the same time pollution occurred. Nowadays maintaining the pure supply of water is more challenging and supply the same amount of water supply. Because of this problem we are going to implement this project to check the water quality and theft identification.

IV. PROPOSED SYSTEM

System overview

The system mainly includes two functions i. water quality monitoring ii. Theft identification.

In water quality monitoring there are various parameters but for the commercial purposes we are considering only pH and temperature. The pH value for commercial purpose can be from 6 to 8.5. The temperature will also plays an important role in water quality because if the temperature is below the desired level then there may be the microbial activity so that the dissolved oxygen level may decrease and this is not fit for commercial purposes.

System architecture

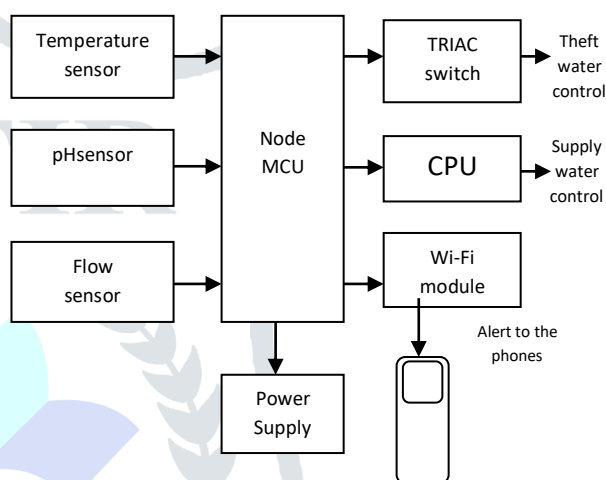


Fig 1 shows the block diagram of the water quality monitoring and theft identification

Node MCU

It is an open-source, interactive, programmable, low cost Wi-Fi enabled controller. This 32-bit Tensilica MCU ESP8266EX which has a feature of extra low power consumption.

pH sensor

In the proposed system pH sensor is used to measure the pH level of water. The pH of a water is the measure of the acidity or alkalinity present in that water. The pH scale is a logarithmic scale whose range is from 0-14 where 7 is a neutral point. The pH values above 7 indicate a basic or alkaline solution of water and values below 7 would indicate an acidic solution of water. This sensor operates on 5V power supply and also it is easy to interface with arduino. The normal range of water pH can be from 6 to 8.5.

Temperature sensor

This DHT11 is used for measuring temperature as well as humidity. The technology used in this sensor ensures the high reliability and excellent stability.

Flow sensor

Flow sensor is the device which is used to measure the flow of water. This sensor consists of a plastic valve body, a rotor and a Hall Effect sensor. The pinwheel rotor rotates when water flows through the valve and the speed of rotor will be directly proportional to the flow rate of water. The Hall Effect sensor present in flow sensor will provide an electrical pulse with every revolution of the pinwheel rotor.

Network architecture

In the system the standard values of the pH and temperature will be stored. If the measured values are not matching with the standard values then the system will provide an alert to a water board to take the necessary action. For this we use machine learning algorithms. Since machine learning is an application of artificial intelligence it gives system the ability to automatically learn and improve from the various examples without being explicitly programmed. Next comes the water theft identification, here for a main water pipelines the flow sensor will be fixed so we will have the database about the water at the source point and also at the destination point. If the flow of water is not to the desired level then the alert is given to the authority. By this we will come to know if there is any illegal usage of water or if there is any leakage or any other issues we can identify easily.

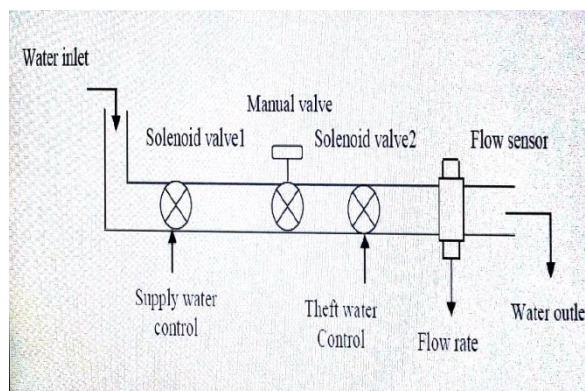


Fig2 shows the flow of water and theft identification.

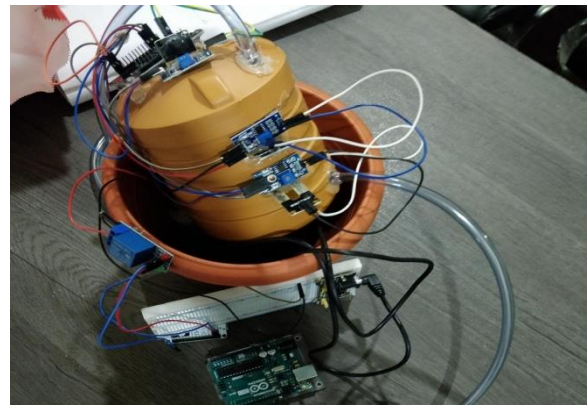


Fig3 shows the system which monitors water quality and identifies the water theft.

Cloud usage in the system

Cloud Computing is a technology which uses the internet and the central remote servers to maintain various type of data and applications. Since cloud will handles data storage remotely and also protects and recovers all crashed or loss data, hence we don't have to worry about crashed or loss of data. Also it gives us high security. Hence we use the cloud in this project. When the measured values not matches will the standard values then the alert message is sent to the cloud. From the cloud the message is sent to the water board whose information is priorly in stored in the cloud. Similarly for theft identification when there is no flow of desired level of water in a particular location then the location information is sent to the cloud, from cloud the location information is sent to the authority whose information is also stored priorly in the cloud.

V. Advantages

- This objective offers new ways of monitoring and optimized exploitation of the water resources .The overall objective of a distribution system is to delivered wholesome water to the consumer at particular area and in sufficient quantity and achieve continuity and maximum coverage at affordable cost and to check the quality of water.
- This system can monitor water quality as well as thefting automatically, and it is low in cost and does not require people on duty.
- So the water quality testing is likely to be more economical, convenient and fast. The system has good flexibility.

- Hence the operation is simple, because whenever the changes are required we can change the program software and corresponding sensors.
- To attain this objective the organization has to evolve operating procedures to ensure that the system can be operated satisfactorily, function efficiently and continuously as far as possible at lowest cost .
- Due to this objective each and every people in the colony get equal amount of water as well as water will free from the chlorides and other toxic constituents of the water
- So the water cannot be theft easily and water will healthy and hygiene for drinking .The another advantage of this project is the texture of the water can also be known.
- If the water is theft the message will be passed to the concern authority and the certain actions can be taken over them.
- The vital role of this project is to save water and it also reduces the man power.

VI. Application

- This type of system can be used in various fields like in agricultural production, air pollution and it is used in industrial sectors also. It has extension value and widespread application .
- Monitoring enables self protection to the environment by keeping the embedded devices in the environment.
- To implement this need to deploy the sensor devices in the environment for collecting the data and analysis.
- By the help of network, we can interact with the other objects in real life.
- Then the collected data and analysis results will be available to the end user through the Wi-Fi.

VII. Conclusion:

There has been tremendous growth in the area of internet of things. In this paper we have proposed a system that monitors both the flow of water for daily usage for the residents and also that checks the quality of the water.

The monitoring of water flow can be updated to the water board so that it helps them in turn to monitor the efficient supply of water for daily usage. Some sensors are used to collect data from all the sensors are used for analysis purpose for better solution of water problems.

VIII. Future scope :

By increasing the number of sensors, more parameters can be monitored. like additional By interfacing relay we control the supply of water. Detecting the more parameters for most secure purpose.

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