IOT BASED WATER MANAGEMENT SYSTEM USING WIFI MODULE WITH ANDROID APPLICATION

Pragati Jadhav¹, Sonal Nikam², Shital Chakrawar³

¹Computer Science and Engineering
²Electronics and Telecommunication
³Information Technology
(Rajarambapu Institute of Technology, Sangali, Maharashtra, India).

ABSTRACT

The main objective of our project is to check the water level through android application and controlling with IoT. Wastage of water because of overflowing tanks is very serious problem. Conventional water tanks does not control and monitor water level it causes large amount of wastage. Some other technologies had certain disadvantages in another way. So the main focus of our project is to remove all these problems and provide efficient system. This IoT based system can be easily installed and maintained for long time by anyone. The water level sensor is placed in the tank which is continuously checks water level and send water level data towards the cloud storage. Every time information will be updated in the cloud storage and user can analyze the amount of water present in the tank. Android application is a user interface which displays the amount of water in percentage which is present in the tank. Motor on/off button also provided in the android application.

KEYWORDS: PIC Microcontroller, Android Application, ESP8266, Sensors, Internet of Things

I. INTRODUCTION

Water is the most important basic need for all living beings. There is 71 percent of the earth is covered by water, only 2.5 percent of it is fresh. The rest covered by oceans. From 2.5 percent of freshwater only 1 percent is easily accessible, even then huge amount of water being wasted because of uncontrolled use and exploitation of water resources. Due to global environment scenario, water control and conservation is crucial for human survival. Water distribution is unequal on the earth because of unequal rainfall. Water management is defined as the activity of planning, developing, distributing and managing the optimum use of water resources. The water management IoT system now days are a very important parameter to prevent wastage of water. Overflowing water tanks is the most common reason of wastage of water. Water tanks are present in residence, schools, colleges, Municipal overhead tanks, Hospitals etc. It can contribute lot of water wastage. If we use IoT based system then we can save large amount of water. Conventional water tanks does not control and monitor water level that causes amount of wastage. Nowadays person need to check water level manually. This is wastage of time and it is difficult for old age people or handicapped people. So in our project, we tried to solve all the above mention problems with smart water level detection and refilling of water tank with the help of Internet of Things (IoT). Here human work and time are saved.

II. LITERATURE REVIEW

Jemy Joseph, Manju K M, Sajith M R, Sujith Nair, Vishnu P Viay and Sithara Krishnan(2018) performed a study on “Water Management System using IoT”. They developed IoT based water management system to solve water wastage problems. Their main purpose of developing this system is approximating water level present in the tank and prevent overflow or analyze the water usage. [1]

Devireddy Pravallika, Devireddy Prathyusha, Devireddy Srinivasa Kumar (2018) performed “IoT Based Water Level Monitoring System with an Android Application”. They proposed a smart system with Internet of Things. Water level can be checked through android application from anywhere. They give motor access also in the android application. [2]

Gowthamy J, Chinta Rohith Reddy, Pijush Meher, Saransh Shrivastava, Guddu Kumar(2018) In this paper, a prototype water monitoring system using IoT is presented. For this some sensors are used. The collected data from the sensors are used for analysis purpose for better solution of water problems. The data is sends to the cloud server via Wi-Fi module ESP8266. So this application will be the best challenger in real time monitoring & control system and use to solve all the water related problems. [3]
III. PROPOSED SYSTEM ARCHITECTURE

The design for the proposed IoT based water management system is given in Fig. 1. The system consists of different sensors like water level sensor, PIC Microcontroller, Wi-Fi module, motor, etc.

![System Architecture]

**Fig-1: System Architecture**

A. Hardware Components

- PIC Microcontroller 18F452: Microchip Technology made a family of architecture microcontrollers known as PIC. PIC stands for Peripheral Interface Controller. PIC 18F452 is a microcontroller chip used for large operations.
- Wi-Fi module: The module used in this project is ESP8266. It has an integrated TCP/IP protocol stack that gives the PIC microcontroller access to the Wi-Fi network. It also has storage capability.
- Water level sensor: It is corrosion free sensor. It indicates water level. This sensor used for home and industries. Using this sensor we can measure level of any conductive non corrosive liquids. It consists 5 transistor switches. Each transistor is switched on to operate the corresponding LED, when its base is supplied with current through the water through the electrode probes.
- DC Motor: Conversion of electrical power into mechanical power is done by direct current (DC) motor. DC motors operated by a direct current power source. Magnetic field is created when current passes through coils.
- Relay: It is basically a digital switch that is used for switching voltages and currents. The relay performs switching actions based on the input provided by the user.

B. Software Components

- Android Studio: Android Studio is the integrated development environment for development of android applications, built on JetBrains' IntelliJ IDEA software.
- Firebase cloud storage: It is useful for storing and managing various media content. Today mobile app users generates massive amount of data this data stored in cloud storage.
- MP Lab: Microchip Technology developed MP lab. It is integrated development environment. Using this environment you can develop embedded applications on PIC microcontrollers. Latest edition of MP Lab is MPLAB X.

IV. IMPLEMENTATION

Initially the PIC Microcontroller 18F452 is connected to the water level sensor and also the electronic appliances using relay. The microcontroller is also connected to the ESP8266 Wi-Fi module which provides
internet connectivity to the system by making use of its integrated TCP/IP protocol stack. A working model of the system can be seen in Fig. 2.

![Fig-2: Working setup of the system](image)

Water level sensor is placed inside the water tank which is continuously sensing water level of the tank and data collected is stored in firebase cloud as shown in Fig. 3. Through Android Application user can login and check the water level from anywhere around the world. User can check every minute water level status. Water level sensor consist 5 transistor switches. Each transistor is switched on to operate the corresponding LED, when its base is supplied with current through the water through the electrode probes. At the bottom of the tank one electrode probe with 6V AC is placed. Other probes are situated one by one above the bottom probe. When water is upraising the base of each transistor gets electrical connection to 6V AC through water and corresponding probe. Which in turn makes the transistors conduct to glow LED and show the water level. If water level is low then user can switch on the motor through button provided in the android application or switch of the motor.

![Fig-3: Data stored in Firebase](image)

PIC microcontroller is connected to the motor through relay. A relay acts as a switch. Suppose user want to switch off the motor through android application from anywhere, PIC microcontroller then tells the relay to switch off after which relay stops the current and voltage flow to the motor. The coding is done with Arduino software IDE which is easier to write code and upload it to the microcontroller.
V. CONCLUSION

We developed IoT based smart water management system in order to save water, time and human effort. We are tried to make water tank management process convenient and time efficient for people. Checking water level of the tank and refilling it is the main objective of our project. In this system Firebase Real time Database is used as a cloud-hosted database, android application creation using Java language, water level sensor for measuring water level, PIC microcontroller, Wi-Fi module ESP8266 is used. This system is beneficial for all places where water tank is present. We created android application for user to check water level of the tank and refill system by providing motor on/off access. User can check water level from anywhere. Our smart system is helpful for handicapped people too. It will help to reduce human work and save their time too.

VI. REFERENCES