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Water and Pressure Levels Monitoring & Automation System Using Internet of Things

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Abstract: ***Water is a vital resource that sustains life. Utilisable water is frequently exploited and overused in daily life. The leading cause of water waste is leaking water containers. Because water tanks are frequently administered manually, the pressure levels used to pump water into the tanks cannot be determined. This leads to wastage of water and damage to the motor pump. So in this project we are proposing an effective solution for controlling, monitoring and measuring the water and pressure levels with the help of Internet of Things.***
Keyword: Internet of Things, Water, Automation System.

I. INTRODUCTION

Water is an essential resource for commerce, agriculture, and all life on Earth, including humans. Many individuals are unaware of the significance of drinking enough water daily. There are numerous unregulated ways to waste more water. Poor water management practises, inefficient water use, and inadequate and disconnected water allocation are inextricably linked to this issue. Thus, water management systems in the home or workplace may be constrained by water efficiency and monitoring. Water is essential for the survival of all organisms on Earth. Over sixty percent of an individual's body is composed of water.

Monitoring the water level in the reservoir prevents overflow and low water levels. The implementation of a water control system may have repercussions for residential applications. The current automatic level detection method that can be used to power on and off devices is described. In addition, the most prevalent method for controlling the level of a household appliance is to initiate the feed pump at a low level and allow it to run until the water level in the water tank rises. This does not support the regulating system adequately. In addition, liquid level control systems are frequently used to monitor liquid levels in reservoirs, silos, and other structures. To maintain the water resource within a standard defined for residential use and to be able to take the necessary steps to restore the health of a damaged water body by monitoring water quality using information detected by submerged sensors.

The absence of ICT (Information and communications technology) standards results in ineffective interoperability and increased maintenance costs. There are numerous small, regional manufacturers of specialised goods operating in today's feeble and fragmented market. Control and monitoring of water distribution networks are jeopardised by the near-total lack of acceptance of complex and interoperable systems, which impedes their evolution and essential improvements, such as the adoption of the Internet of Things (IoT) paradigm.

II. EXISTING SYSTEM

The water tanks are operated manually by a man when the water level reached to the maximum level a pipe will be fixed at that place and the with help of that pipe he will predict the water level.

The advent of IoT solved the problem to some extent. The arduino toolkit is connected with the ultrasonic sensor which produces the sound with the trigger and receives the reflected sound with the help of the echo and when water level is reached at max level produces a type of sound by the help of the buzzer and for min level produces another type of buzzer.

The anther type of Existing systems is same as the above but the alert sounds and water levels are monitored on a mobile

A. Disadvantages

1) There is no measure of pressure levels of water in the water tank at the time of filling.
2) It doesn’t give pressure alerts to the users.
3) Sensors life time reduces when they are in contact with water.
4) It does not display the time of recent and previous updates.
5) The existing systems are not economical to the user.

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III. PROPOSED SYSTEM

The Internet of Things (IoT) is one of the primary avenues leading to a smart world with pervasive computation. As a consequence of pervasive computing, computing will be embedded in everything and will operate without human intervention. It aims to simplify a variety of tasks for consumers.

With the incorporation of IoT in "Water Tanks" we can save the water and electricity, in this project we are mainly focusing on calculating the pressure of water in water tank and we can automatically switching off the motor in case of low pumping of water and also, If tank is empty, motor will turn on and if the tank gets full it turns off automatically. We can estimate time taken to fill the tank, we can also see pressure graph and tank filled level on online dashboard.

With the help of proposed system, It helps in saving of both water and electricity. In this we are mainly focusing on the calculation of pressure levels of water in the tank. We can automatically switching off the motor in case of low pumping of water. If the water level is low it automatically turned on and when it gets full it gets turned off. We can monitor the water level locally by using Bluetooth.

Pressure levels	Motor status
Low pumping(<1ltr/min)	Off
High puming(>1ltr/min)	On

Water level	Motor status
Low(<=25)	On
Mid(25<50<75)	Still On
High(>90)	Off

Table 1: Pressure and Water Levels for Automation

With the help of our proposed work,we can do

1) We can switch on/off the tank automatically based on water levels.
2) We can calculate the pressure levels in the water tank and pressure automation technique can be done.
3) We can monitor the status of the water on a mobile.

A. Modules

1) Pressure & Water Levels Sensing Modules

a) The "pressure sensor" has two ends one for water inlet and other for outlet.
b) Whenever the water enters the pressure sensor the fan placed in the sensors starts rotating by this we can predict the "pressure level".
c) The "ultrasonic sensor" consists the "trigger" which produces the ultrasonic sound waves when they contact with the water the waves get reflected are received by the echo.
d) By this we can find the "water levels".

2) User Alerting Module

a) All the processes are done parallel and these are monitored by using the "Bluetooth" or "wireless switch" from the mobile.
b) "Bluetooth" is used for monitoring the system locally.
c) "Wireless switch" is used for monitoring the system globally.

3) Processing Module

a) The code is first dumped into the Arduino UNO board without connecting the Bluetooth.
b) After dumping code the Bluetooth is connected to the board
c) Motor which is connected to the board should be On.
d) The pressure and water levels are monitored through the Bluetooth/E-link applications on mobile.

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IV. HARDWARE IMPLEMENTATION

A. *Arduino UNO Board*

1) It is a microcontroller board required for coding

2) It has inut/output pins for connecting other required accessories

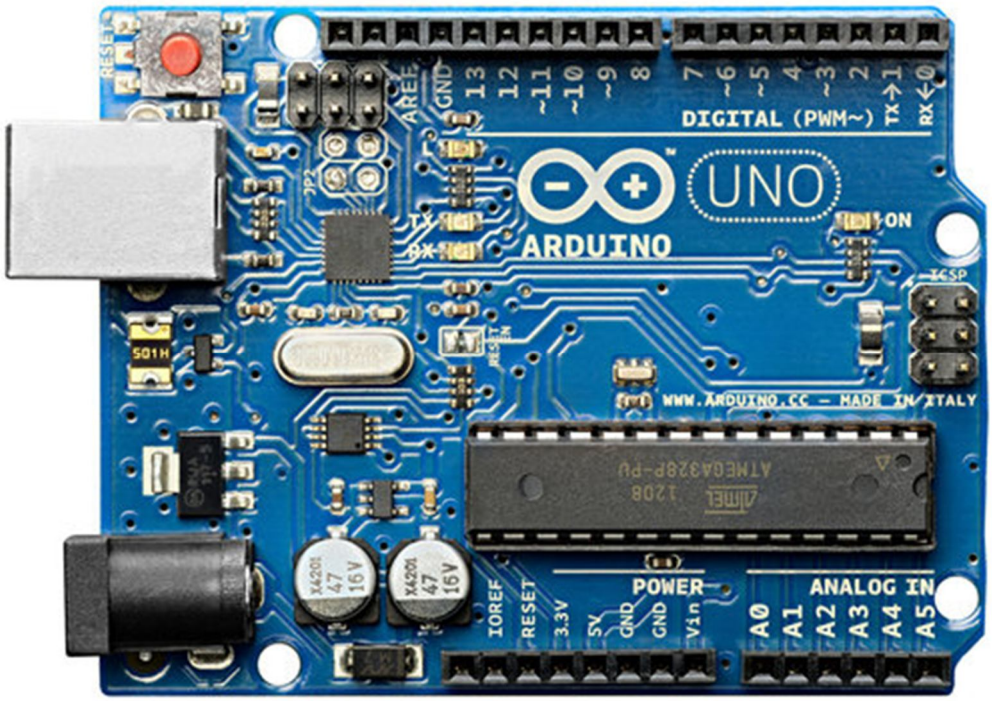


Figure 1: Arduino UNO

B. *Pressure Sensor*

1) This sensor is used to calculate the pressure of the water.

2) Here the pressure is calculated based on the fan rotation due to the water flow

Figure 2: Pressure Sensor

C. *Ultrasonic Sensor*

1) This a sound based sensor for measuring the water level in a tank.

2) The ultrasonic sensor consists of 4 pins, they are v_{cc}, trigger, echo and ground.

3) V_{cc} is used for power supply.

4) Trigger is used for input sound.

5) Echo is used for receiving sound.



Figure 3: Ultrasonic Sensor

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D. Relay

Relay 5Volts: Relay 5v acts as an electromagnetic switch, it is the voltage that controls the voltage action.

Relay Driver ULN2003: It is used provide a high current which aarduino board cannot provide so it is used to drive the relay.



Figure 4: Relay

E. Bluetooth

1) It has 4 pins they are R_x,T_x, Ground, V_{cc} .

2) V_{cc} is connected to Arduino.

3) R_x,T_x are connected to the T_x , R_x of Arduino board respectively.

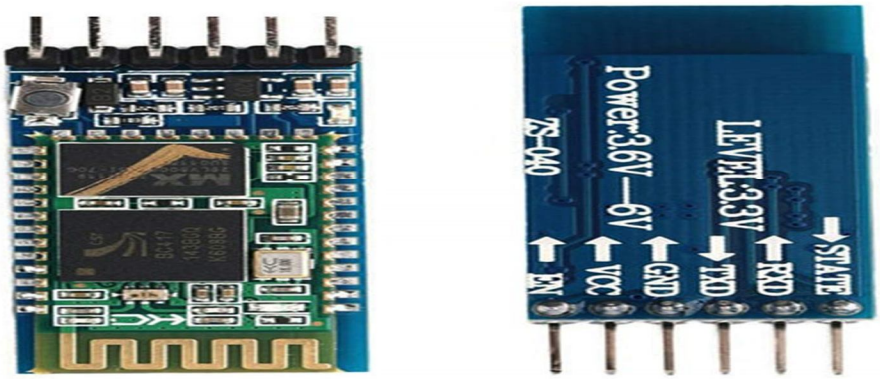


Figure 5: Bluetooth

F. Wireless Switch

It is used to access/monitor the system globally i.e, can be controlled from anywhere.



Figure 6: Wireless Switch

G. Jumper Wires

These are used to make the connections between the Arduino, Bluetooth , relay and sensors.

V. RESULTS AND DISCUSSION

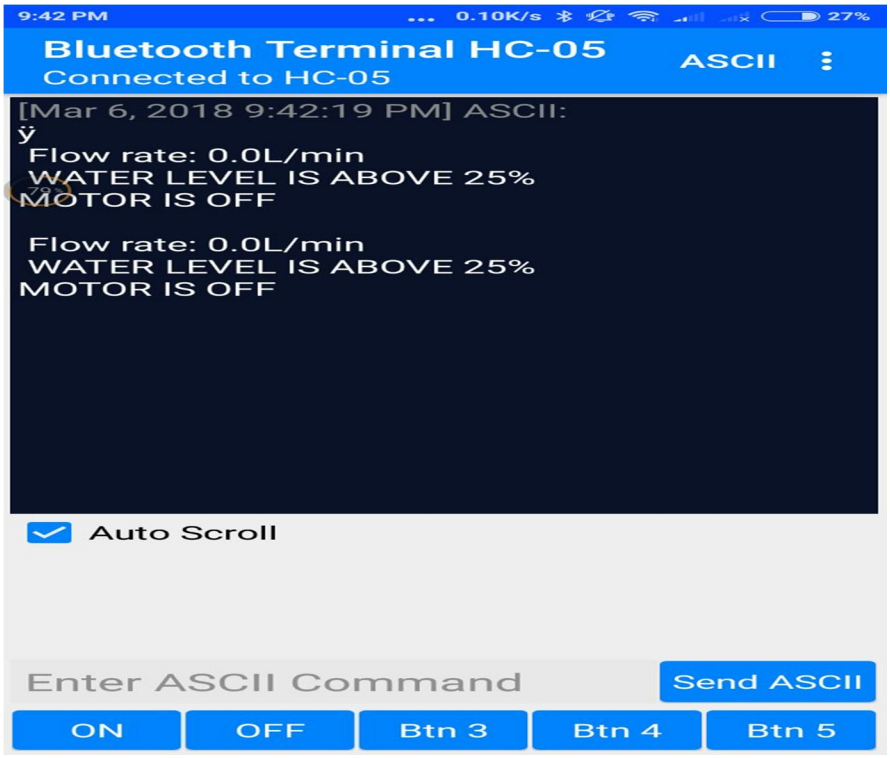


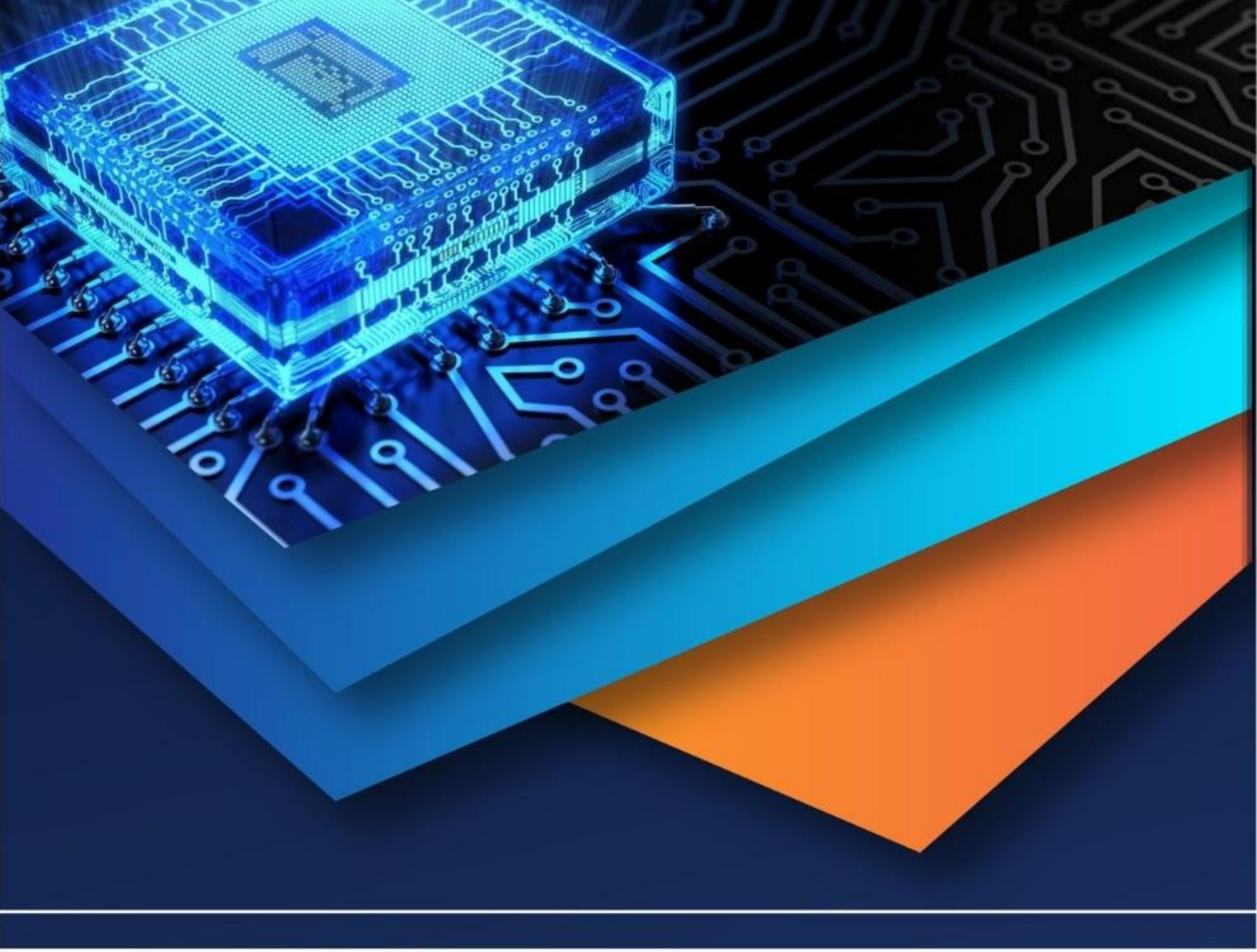
Figure 7: Bluetooth Terminal for Measuring the Flow rate and Water Level

VI. CONCLUSION

With the help of our proposed system we predict the water and pressure levels by using the sensing modules on the mobile using a Bluetooth application. misuse of usable water are the common problem in our daily life. With our approach we can provide an effective solution for controlling, monitoring and measuring the water and pressure levels with the help of Internet of Things.

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