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Intelligent Water Level Monitoring System Using IOT

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ABSTRACT: This article is aimed at designing an intelligent water level monitoring system using Internet of Things. Water level Indicators employ a simple circuit to detect and indicate the water level in a container or a tank. We will be looking further into water level indicators used in overhead water tanks which can be found in many homes today. The idea of this article is to measure the level of water in a tank without any means of manual measurement and we can control it by our smart devices remotely. Thus, the idea came to be useful way to detect the water level of an overhead tank in homes. There are many different types of water level indicators available on the markets which involve much more complex circuitry and complexity and out of flexibility. For instance, automatic water level indicators are an advanced microcontroller-based device which can detect not only the level of water, but can also power on and off of the water pump by using a sensing device. In order to stay with our original motivations for this article, we had to avoid the complex water level indicator circuits. Therefore, we were able to finish before the deadline. Many of water level indicators work in a similar fashion as the one we have built.

KEYWORDS: Ultra-Sonic, Arduino, LCD, SMS, Water Tank, Webpage, Echo.

I.INTRODUCTION

When we decide to make any water level indicator article the first thing that comes to our mind is the electrodes that are we are going immerse in the water. Traditionally several metallic electrodes are immersed in the water at different levels and some voltage is passed. The problem with this method in a long run is that, no matter how the electrodes were refined before installing, it will get corroded due to electrochemical reaction due to passing of electric current through water which reacts with some minerals present in the water and it is a bad idea to consume such contaminated water.

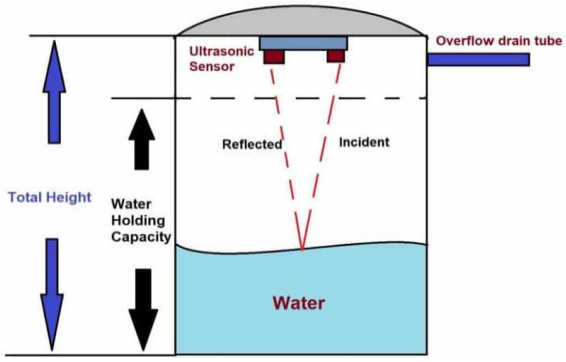

Figure 1: Function of Ultrasonic Sensor

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The ultrasonic based measurement overcomes all the disadvantages that arise due to utilizing traditional electrode method. We are going to construct a water level monitoring system which utilizes webpage network to send the status about the current level of water in a tank from 0 to 100% to owner's phone. This utilizes ultrasonic sensor to detect precise level of water present in the tank. We are using an Arduino board as brain for this article.

This benefit means that water level monitoring is commonly used in some of the following applications:

- Flood monitoring
- River level monitoring
- Wetland studies
- Tidal studies
- Groundwater monitoring
- Surface water monitoring

II.PROPOSED SYSTEM

In this proposed system the water level is monitored by the use of ultrasonic sensor connected with the Arduino board and it executes the operations when the conditions provided by the users to the microcontroller in the Arduino board satisfied. We can use the water level sensor instead of ultrasonic sensor and both are more in accuracy. This part is responsible for measuring and giving feedback to the system and control the motor based on the conditions given to the Arduino. The indication is provided via calls are messages and it will be achieved with the webpage or GSM technology and also, we can control by replying the messages from the remote locations and it is not mandatory that we should available on the spot to control the motor or else and also, we can monitor the water level by Internet of Things (IoT) technology. We can monitor with the help of graphical interfaces which available in the mobile applications like Blynk and some other webpages which shows the level of water in the tank. By using this system, we can control the system both manually and automatically and also from both onsite and remote locations.

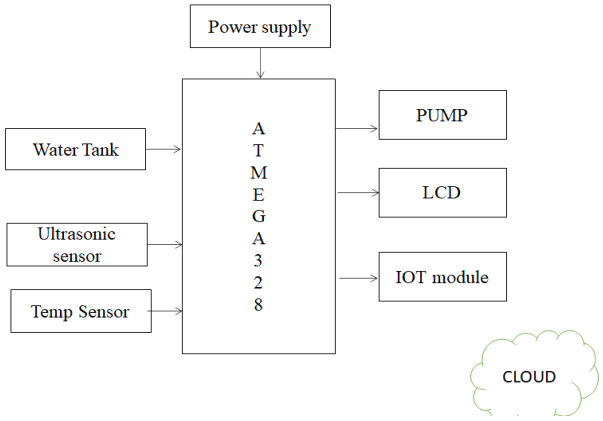

Figure 2: Block Diagram of Proposed Method

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. The recommended power supply range is 7 to 12 volts. The regulated power supply used to power the microcontroller and other components on the board. As in the initial concept, the water level of a tank was needed to retrieve to the web page. An Ultrasonic Distance Sensor is used to get the distance from the top to the water in the tank. In the initial stage, an Arduino Uno board is used to connect the devices. When collecting and searching about the devices, it is effective and easy to use a nodeMCU board to connect the devices, as it does not need a Wi-Fi module to connect with the database. The relay module is used to control the motor.

Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance

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to an object. The basic principle of ultrasonic distance measurement is based on ECHO. When sound waves are transmitted in environment, they return back to the origin as ECHO after striking on any obstacle. Only the distance was retrieved from the sensor.

III.RESULT & DISCUSSION

In the software sector, Proteus turns out to be one of the most acclaimed electronic design programs by engineering students and electronics professionals, capable of offering us an advanced simulation of electronic circuits and microprocessors. It's one of the most complete electronic tool packs on the market as in its version 8.5 (the newest of them all), it allows us to create from our PC all sorts of PCBs or printed circuit boards using almost 800 different microprocessors, and simulate their real-life functioning straight from the circuit's schematics. And as couldn't be otherwise taking into account modern times, it integrates tools with which we can design and simulate within the Arduino environment, one of the most popular boards at present. The main components of Proteus Design Suite. This software includes two main components around which the program's entire functioning revolves: ISIS: the acronym of Intelligent Schematic Input System. The program allows us to carry out the electric design of the circuit, including all sorts of components such as resistors, coils, capacitors, power supplies, and even microprocessors. ARES: the acronym of Advanced Routing and Editing Software. It's the tool aimed at the design of printed circuit boards or PCBs, with routing, location and editing functions for electronic components.

So, to be able to make the most of all their features you'll have to get hold of the full version of Proteus that, despite having to pay for it, comes along with a trial version of the official Lab center Electronics website so that you can try out all its functions before deciding whether to purchase it or not. Apart from these two programs, this software comes along with different modules like VSM that, integrated into ISIS, allows us to simulate different features of integrated circuits in real-time, or Electra, the self-routing module that allows us to trace routes automatically between components, searching for the optimal path to improve the circuit's speed.

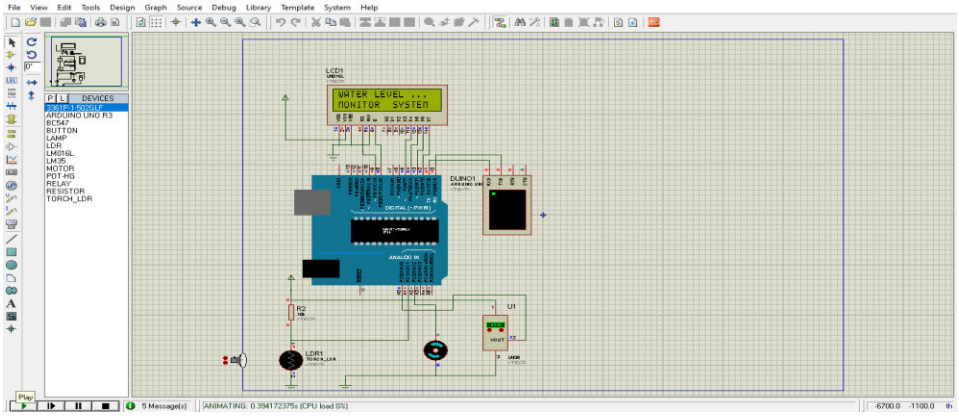

Figure 3: Motor turned on, SMS sent and updated in database

At this time the Sensor detects that the water is below the minimum level, So the motor turned automatically and alert the user via SMS. This will continuously indicate the owner about water tank status on LED display, SMS, and via webpage.

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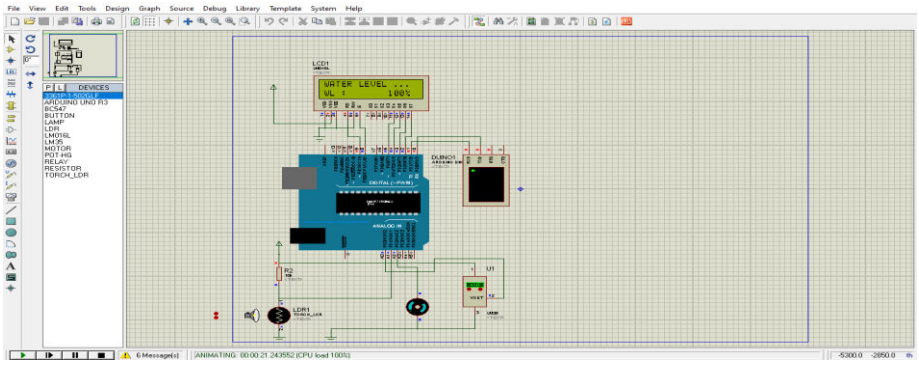

Figure 3(a): Motor turned off, SMS sent and updated in database

After filling the predefined maximum level of the tank, the motor will turn off automatically and indicate the owner on LED display, SMS, webpages. The webpage is designed for this article to update the data from the hardware to the database and it is used to send the message to the user. In the login page we need to enter the username and password for the security purpose.

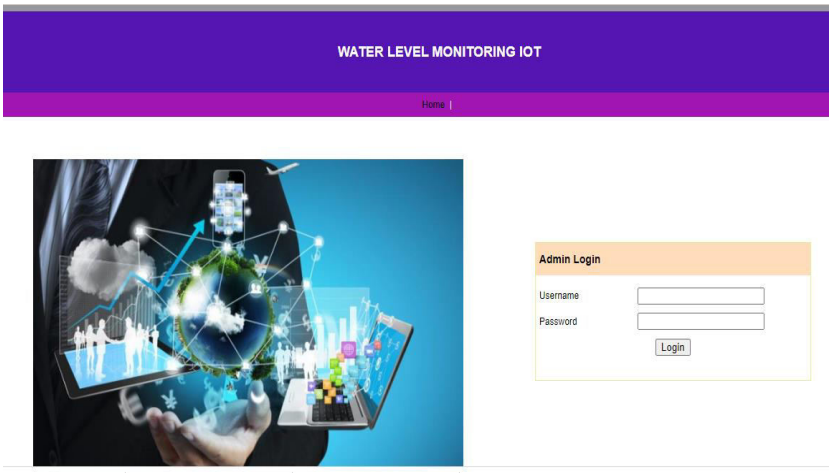

Figure 4: Login page of website

While it is turning on, and reaching every milestone this will be updated in this webpage and send SMS to the owner or in charge.

IV.HARDWARE IMPLEMENTATION

It is a device that can be operated either manually or automatically. The idea of automatic controlling involves designing a control system to function with minimal or no human interference. IoT based Water Level Monitoring system is an innovative system which will inform the users about the level of water and will prevent it from overflowing.

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Figure 5: Water Tank with Ultra Sonic Sensor

Due to this type of special arrangement the device can be operated without any interruption. Malfunctioning of the device can be rectified immediately by any one of the alternate methods. The hardware prototype shows the entire working process of the Water level monitoring and controlling in innovative methods.

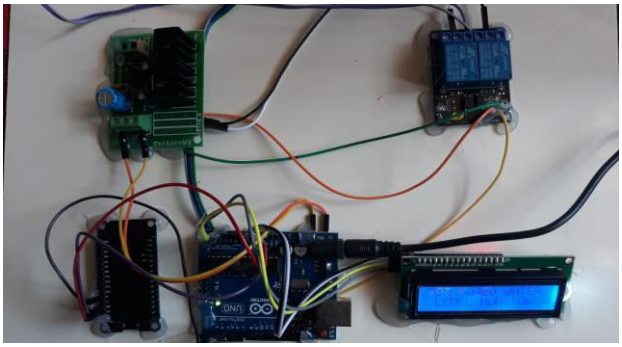

Figure 5(a): Hardware Prototype

V.CONCLUSION

In this paper, IoT based water supply monitoring and controlling system is presented. Arduino UNO is mainly used for controller unit is used for mini-computer and uploading data to the database and webpage. Arduino is easy to control for sensors, relay, pump, etc. In this system the data can be viewing anywhere in the world with internet infrastructure. In the future, the system can be upgraded to monitor and control by the cloud server with other sensors such as PH sensor for the PH level of water, soil moisture sensor and etc.

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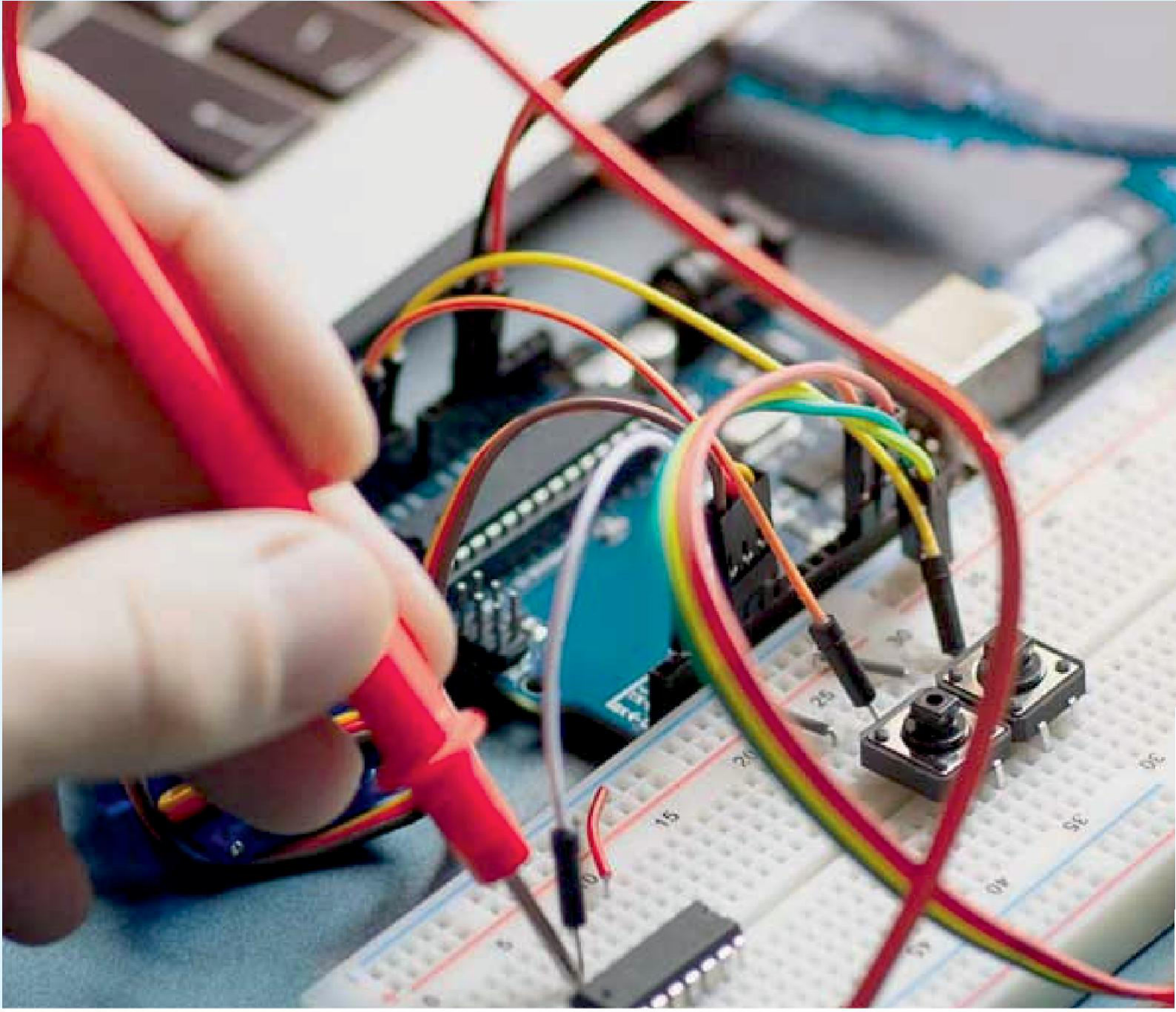

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