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A Review on Arduino Based Automatic Water Pump Level Adjustment and Monitoring System

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Abstract: ***Water is the most important thing for humans. Wells, tanks, canals are the main source for the supply of water in the farmland. Water scarcity is one of the problems facing major cities of the world. Wasting water during transmission has been identified as a major culprit. In the traditional way of climbing down the well and shifting the pump, it is a very tedious and time-consuming job. With the help of hardware and software components, we are designing a device that will help the farmers to automate this regular work by adjusting the water pump according to water level. This is the main motivation for this study to deploy computing techniques in creating a safety mechanism that will automatically shift the pump according to the level of water in the well and also will turn on/off the pump as the use of water for watering the crops and filling the water tank is done. Thus, the automatic shifting of the pump, automatic turn on/off of the pump, and monitoring of the water supply will help save the life of the farmer by electric shock, also help save water as it is very limited somewhere and also save electricity.***

I. INTRODUCTION

Water is a universal solvent that plays an important role in our everyday life. It is used in everyday activities. Rainwater is the most readily available source of water. Water in most places, although in the past century, piped water was the norm. This water is germ-free but includes some mineral salts; it is widely recognized and utilized as a source of drinking water in most nations. The world is experiencing a water shortage, which implies that water sources should be managed to minimize wastage. In farms, we will find out that the boreholes and wells have tanks for water storage before pumping it into the field. People often turn on their water pump when they wish to water their crops and when the water level in the tank is low, then turn it off when the tanks begin to overflow and the crop irrigation is over. This produces a lot of trash, and there isn't always enough water in an emergency. At the Farms, farmers switch on the water pumps and sometimes set off to do certain work or even fall asleep, forgetting to switch off the main switch when the tank is full and watering is done. This results in wastage and often an unnecessary supply of water. The volume of liquid or water pumped by the ordinary pumping equipment is uncontrollable. If the water is kept running for an extended period without being turned off, it can constitute a form of hazard by flooding the farm and destroying the crops. Therefore, an experimental setup will be constructed to control the water level in a tank and supply to the crops using Proteus software as well as an Arduino UNO microcontroller board. In this project, we are using an ultrasonic sensor to sense the water level along with software in a windows-based PC. An automatic water pump controller is a series of functions to control the Automatic Water Pump Controller Circuit in a well. The water level sensor is made with a metal plate mounted on the good wall, with a sensor at the bottom of the setup to create the top level and a detection sensor for detecting long again made for the lower level and ground lines connected to the bottom of the well. Some physical elements must be managed in everyday life for them to fulfill their expected behaviors. A control system, therefore, is a device, or a group of devices, that controls, directs, or regulates the actions of some other device (s) and system (s).

As a result, automated control entails creating a control system that operates with little or no human intervention. Intelligent systems are being used in medical sciences, financial sciences, Education, law, and other professions are only a few examples. Several of these are included in the design of everyday gadgets. The purpose of this paper was to demonstrate our work on integrating a control system into an autonomous water pump level adjustment and monitoring system. One of the motivations and goals of this study was to find a solution to the problem of water scarcity.

Eliminating the main culprits of water waste and human suffering in various locations during pumping and dispensing into overhead tanks. We believe that making a barrier to wastage won't solely offer a lot of monetary gains and energy-saving but also will facilitate the setting and water cycle that successively ensures that we tend to save water for our future. Technology these days has become AN integrated part of people's lives. It has, and continues to influence several aspects of everyday life and has allowed higher social interaction, easy transportation, the flexibility to indulge in diversion and media, and has helped within the development of medicinal drugs.

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The creation of the many devices corresponding to mobile phones and computers has caused many individuals to place confidence in technology to speak with their friends, store data such as pictures, movies, documents, and music. individuals with the assistance of smartphones will currently connect with the web while not needing a computer, whereas still giving equivalent practicality however through totally different means. With the introduction of advanced software packages and hardware devices, smartphones are now powerful devices and became a very important part of people's daily lives. One of the most important features is the Smartphone's ability to connect and communicate with other devices. A field that is recently gaining popularity is Water pump Level adjustment and Smartphones can potentially be used as information or functionality hubs in monitoring systems.

II. LITERATURE SURVEY

The primary purpose of this paper review is to find a solution provided by a diverse author and take into account the flaws in the systems they supply, resulting in the optimum solution.

1) The literature review contains the transient discussion of some recent works of water automation for pump controller systems through golem application. A model is conferred in which might collect water expenses from a client and sight the leak within the water distribution system. The advantage of this model is that it will scale back the periodic tours of suppliers to every physical location to scan every meter. Another advantage is that the bill of water usage will offer supported the close to the period of time expense from the previous expense. Detecting leaks helps to save water and energy while also lowering the cost.

2) The operation of water pumping in a tank is automated in this article using an Arduino-based automatic water level control system. It can detect how much water is in the tank and turn on or off the pump accordingly, as well as show the status on the LCD panel. The system also monitors the level of water in the pump tank (source tank). If the level in the pump tank is low, the pump will not turn on, preventing the engine from dry running. When the level in the pump tank is low or the sensors are malfunctioning, a beep sound is emitted.

3) This paper has developed a system that initially tests the availability of water with the aid of a level detector in the tank, and then regulates the condition of the water pump based on the information obtained from the level detector. This design makes use of a seven-segment display and a motor pump. A water level sensor and a digital logic processor circuit are included in the suggested system. The suggested technology removes the need for manual water control in the house and in agricultural fields.

4) This paper introduced a system that proposes a simple water level monitoring system with different levels indicated. It also indicates when the water level falls below or exceeds the required level. This method helped us to understand the use of Bluetooth modules and how they can be made as portable devices.

5) This study described a system that uses ultrasonic sensors to detect water levels. The system includes a water level indicator, a water level sensor, a water pump control system, and a microprocessor. When the ultrasonic sensor detects water, it sends a signal to the microcontroller and begins to repeat the pulses.

6) In an over-head tank storage system, a microprocessor is employed to automate water pumping. It can detect the amount of water in the tank, turn on or off the pump, and show the status on an LCD screen. By using a calibrated circuit to display the water level and using DC instead of AC power, this research has effectively improved on conventional water level controllers, reducing the risk of electrocution.

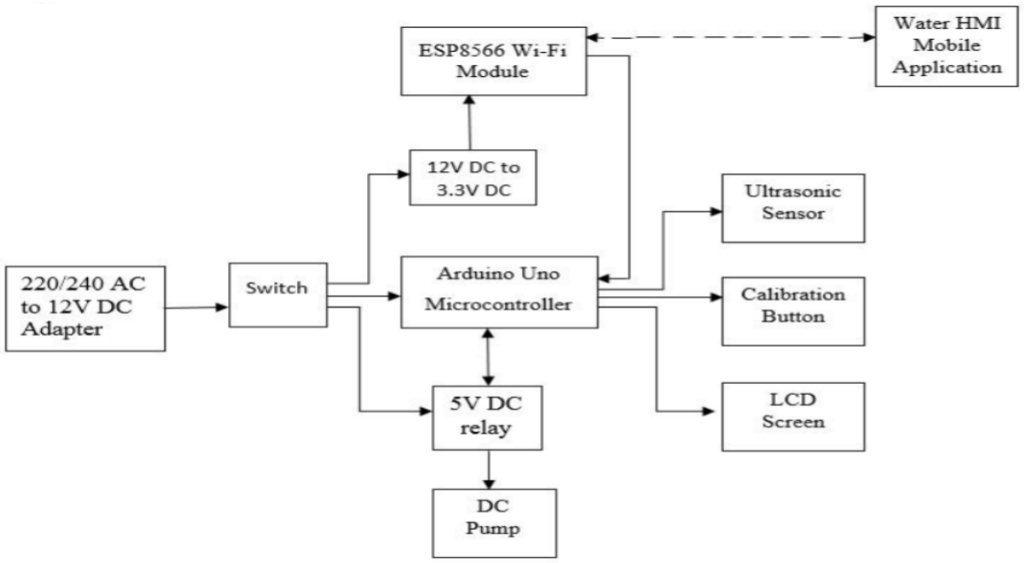
7) This paper proposed an automatic water level controller with Short Messaging Service (SMS) Notification. SMS Notification was added to the automatic control system so that water can be managed by the user during load shedding. The automated level controller system and the SMS system function in tandem. The program was developed in the Arduino program developing environment and uploaded to the Microcontroller. The water level in the system is controlled automatically. The microcontroller is powered by a battery. Whenever the system encounters an empty level and the status of load shedding, the SMS notification is sent to the user.

8) An automated overflow control circuit unit is used in the study to suggest a water monitoring system. The plan is built with the goal of automatically monitoring the flow of water into the tanks and adjusting the flow based on user needs via a mobile application. The system's benefits include water resource-saving, a decrease of manual effort, and time-to-time changes in the state of water storage with the use of sensors.

9) Water pumps can be turned on and off with the help of radio transmitters and a Wi-Fi connection, according to a basic model of the Android application. This technology can prevent the waste of water and power. The android application allows users to check the tank's water level and toggle the pump ON and OFF from afar.

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III. METHODOLOGY



The created wireless automated water level controller is based on a mobile application in which an Arduino Uno microcontroller is programmed to carry out all the control functions and to provide appropriate digital outputs that turn the water pump on and off at the lowest and maximum values defined, HC-SR04 ultrasonic sensors installed at the top of the machine to monitor by transmitting and receiving sound waves to determine the water level, an android mobile application named Water HMI that makes it possible to have a picture of what is happening in the well or the storage tank in real-time and also increases the flexibility of controlling the water pump, The ESP8266 Wi-Fi module is the component that allows the mobile app to interface with a DC-to-DC converter, which converts 12V DC to 3.3V DC. which is needed by the Wi-Fi module in the system, a 5V DC Relay (SRD-05VDC-SL-C) that switches the water pump ON or OFF, and the DC water pumping machine. The above figure depicts the block diagram of the mobile application-based wireless automated water level controller. The block diagram is depicted in the diagram above. The proposed concept of the water pump level monitoring and controlling system. When the module is turned on, the ultrasonic sensor sends out an echo signal, which the Arduino measures. and hence the level of the water within the well is computed using the Echo method. In the Echo method, Arduino reads the time between triggering and receiving ECHO. The speed of sound is around 340 m/s. As a result, the formula is used to compute distance: (travel time/2) * sound speed = distance Where the sound travels at a speed of around 340 meters per second. By using this method, we compute the distance from the sensor to the water surface. Later the same information is computed as a percentage of water available in the well and overhead tank. If the level of the water within the well is at a lower level than the threshold value programmed then the motor will be driven by the controller via motor driver circuit and the pump will be adjusted at a particular height computed by the Arduino, however, if the level of water in the well is greater than the threshold value programmed then the motor will drive again and will set the water pump to a higher height in the well. The amount of water in the tank is constantly monitored and shown on the LCD. The motor/driver will not turn on if the water pump is below the threshold level to protect the motor and machine from getting wet and off-dry running. Before switching ON and OFF the motor and the driver used is being indicated by different tones of the buzzer.

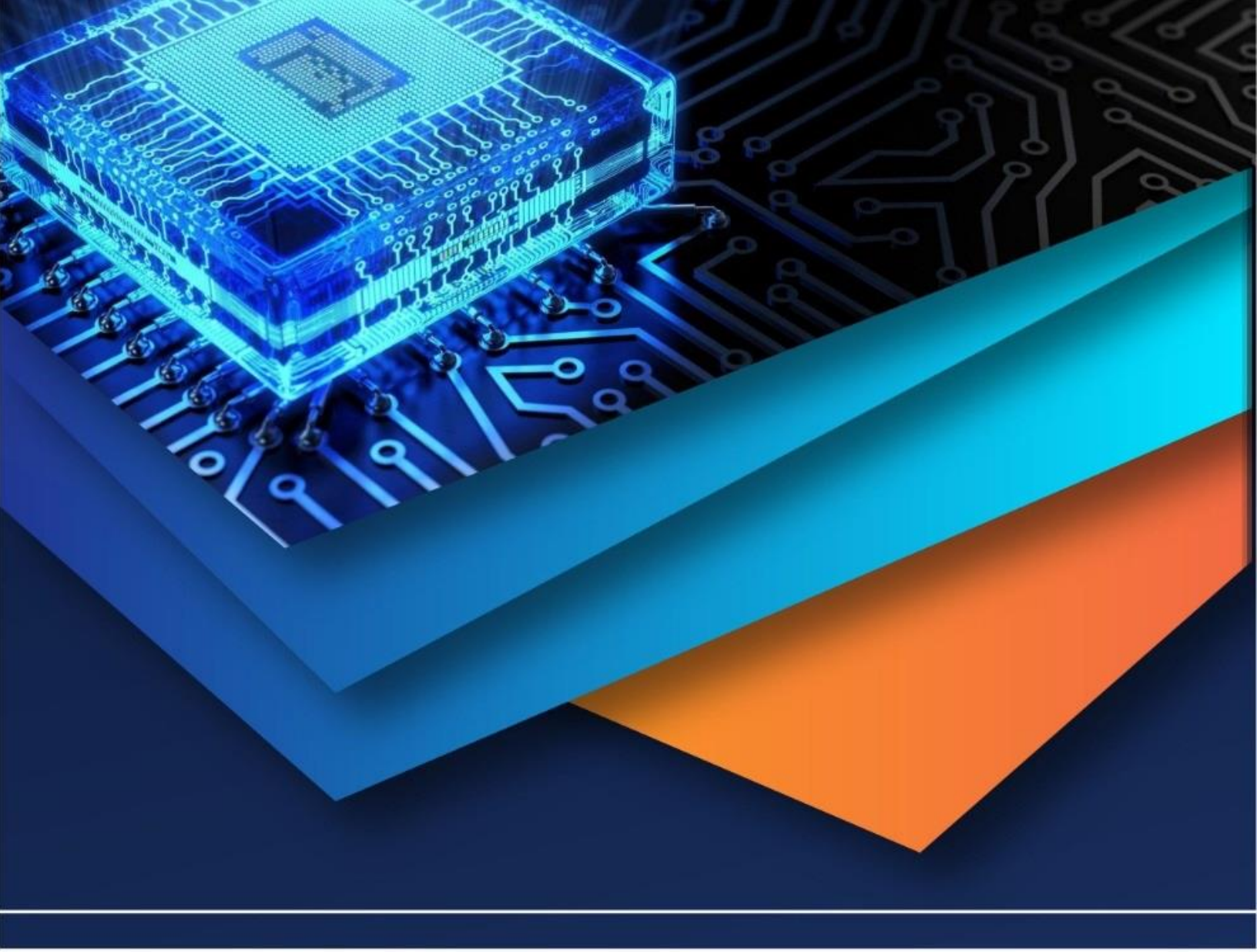
IV. CONCLUSIONS

The experimental system for managing the water level has been successfully devised and built. The two-level system was successfully developed utilizing an Arduino Uno microcontroller. The water pump level (low level and high level) in the well has been controlled by an automated control system. The control system is successfully constructed and tested using LabVIEW software. The Internet has altered the dynamics of virtual engagement in everyday life. The Internet of Things (IoT) has the potential to open up new dimensions by allowing intelligent devices to communicate with one another. This idea provides a straightforward water pump level adjustment and monitoring system with several level indicators. It also indicates when the water level falls below or rises over the necessary level. The design of the system and architecture are explained, resulting from a cost-effective and simple approach for monitoring pump shifting and crop water delivery. Future work might include analyzing levels of water in a specific location to reduce water waste.

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