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Automatic Water Level Indicator and Controller

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Abstract: ***This Project mainly aims at optimizing the use of water. Since water wastage has become a major and global issue now, hence water conservation has now become more important. One of the common sources of wastage we encounter is the overflow of water. This project aims to help judge the water level inside the water tank and display it accordingly on the screen while also preventing any overflow of water which is achieved through the Arduino Uno. The ultrasonic sensors used helps determine the water level in tank which is then send to the Arduino Uno, the LCD then attached to it displays the level to us. According to the level of water inside the tank, the Arduino helps turn ON or OFF the servo motor hence closing the source of water. In this way, through the automation of water control, we intent to save the energy and our natural resource.***
Keywords: Arduino-UNO, DC motor, LCD display, Servo, Ultrasonic sensor

I. INTRODUCTION

Water is life and we know for a fact that 70% of our planet is covered with water. That makes it obvious to think that it will always be plentiful. However, only 3% of the total water available is freshwater – which is fit for usage. The remaining amount of water is either present in the form of glaciers or unavailable for our use. This makes freshwater a very valuable resource. People living in urban areas who have unlimited supply of water often fail to realize the severity of water scarcity. Spending a day without water seems impossible to them. Water overflowing and getting wasted is a very common occurrence. On the other hand, there are 1.1 billion people within the world who lack access to water. A total of 2.7 billion people find water scarce for a minimum of one month of the year. Natural sources of freshwater like rivers, lakes, aquifers are either dehydration or becoming too polluted to use. Almost 50% of the world's wetlands have disappeared. Climate change has further led to drought in some areas and floods in others. India constitutes 16% of the total world population and just 4% of the total freshwater reserves in the world. India's urban population is expected to rise to 50% of the total current population by 2050, according to projections by the UN. As such, the demand from domestic sector in India over the next twenty years will increase from 25 billion cubic meter to 52 billion cubic meter. The above mentioned facts alarm our attention towards the urgent need to take precautionary steps to save water. It is a necessity for us to conserve and control the consumption of water for sustainable development of the country. This can be done at individual level by installing systems that ensure that water flow is turned off once container is completely filled.

The system will comprise of ultrasonic sensors which will be fitted right at the brim of the container. As soon as the sensors detect that water level has reached its maximum potential, water flow will automatically be turned off. The aim of our project is to not only ensure that water doesn't overflow but also display the amount of water filled in the container at any given time on a LCD screen. The open source electronics platform Arduino has been used in the construction of this system. If such a system is installed in every household, there will be drastic reduction in the amount of water being wasted. Although the primary aim of this system is to assure that no water is wasted, it can also be used in fuel tanks of vehicles wherein the exact amount of fuel present inside the tank is displayed to the driver. It will be extremely beneficial as the driver will be informed about the quantity of fuel left in the tank at all times. Also, the pump attendants at petrol stations won't be able to fill in lesser amount of fuel as the driver will be certain about the quantity of fuel to expect after refilling. On a wider scale, this system can be used in large scale industries where tons of liters of water and other valuable fluids get wasted due to overflowing.

II. LITERATURE REVIEW

[1] This paper focuses on limiting the amount of water supplied to each household. When this system is installed in a house, it continuously monitors the total water usage of that house. Once the amount of water used reaches a threshold value, the flow of water entering the house is reduced by a fraction of the original, the system send a message to the consumer via email once the water limit reaches 80% and 100%. Also, it periodically updates the user about the volume of water spent, along with information about the exact points in the house where consumption is maximum. [2] This Project mainly focuses on minimizing water and electricity wastage by building an efficient automated water pump. Some sophisticated automation materials have been established in order to set some works automatically such as Arduino microprocessor, which enables to control the electrical circuits logically.

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The ultrasonic sensors used, will automatically turn on the machine in the water tank and it will be turned off automatically after the water tank is fully filled by the water. As there are many ways to create a water level controller so in case [3] the system consist of similar components but instead of an LCD display it has a buzzer alarming system. Such that when the tank is about to get empty the buzzer makes sound indicating tank the water pump will be started. It helps to prevent dry running of motor which causes financial loss and waste of time. In [4] there is an overview of the Efficient Automatic Water Control Level Management it is also implemented by Arduino and ultrasonic sensor. Although it is a bit expensive system as it involves a Wi-Fi module. Resulting the things can be controlled through an mobile application making it more accessible from anyplace. This system also have a help in saving time .It also use relay module to break or join contact with given circuit based on the input given. [5] This paper is used to make the automatic water level monitoring .the main aim of this project is to sense the level of the water in bucket and the tap turns on and off according to the condition and display it on the screen. [6] This paper have developed a system which firstly check the level of the water in bucket with the help of water level indicator .this system consists of ultrasonic sensor and Arduino Uno. [7] This paper introduced a system in which the automatic water level monitoring takes place with the help of sensor. With the use of sensor we realize the different level of water in bucket and stop the overflow of water. [8] This paper deals with the process of development of a system for automation of fossil fuel pump for filling a container .Basically the author is working on petrol level indicator which has an automated audio alert system. With the help of magnetic sensors the author has come up with a unique application .Water level controllers are not appropriate in this project due to the direct contact of liquid with the electrodes. The concept is very much similar to water level indicator project but defined in different fashion. [9] This paper works with the concept of measurement of water level. The author has used ultrasonic measurements for measuring the level of water and AVR Microcontroller to control the flow of water. Ultrasonic sensors use the concept of ECHO. They have used LCD to display the amount of water present in the motor pump. The concept of echo is related to sound waves with the help of it sensor works. [10] This paper deals with the same concept of checking the water level. The motor turns ON or OFF depending on the amount in the tank. [11] This project checks the water level and uses a pump to switch off the water supply as and when required. It mainly focuses on minimizing the man power and reducing time wastage. [12] This paper gives us a idea of Automatic water level controller for residential application. The system monitors the water level and automatically switches ON motor when tank gets empty and turns it OFF when the tank get full. It also display water on LCD display. To detect and control water level they have used 8051 microcontroller. [13] In this paper we can old concept with adaptive technology. They have used water level sensor which works on the principle of electrical conducting property of water. LED's are used to indicate water level and Relay is used for monitoring of motor. [14] This paper deals with a modern Canal Control System. In this particular paper the author is presenting optimistic indicator for canal control system. One faces lot of problems while selecting an appropriate indicator for canal system, so here is the one with optimized indicator for the canal system. [15] This paper tells us about the Level sensor for automated drug delivery. Unlike microwave methods of level sensing using radars which usually are expensive, bulky and intrusive, the author presents an extremely low cost printed, intrusive microwave sensor to reliably sense the liquid level. So the basic aim of the author is to get larger output within reliable resources.

III.METHODOLOGY

A. Components

The entire document should be in Times New Roman or Times font. Type 3 fonts must not be used. Other font types may be used if needed for special purposes. Arduino-Uno – It is a micro controller having a USB interface, 14 digital input/output pins of which 6 are analog input and 6 can be used as PWM output , and which has Tx and Rx pins to support serial communication is called as Arduino Uno. It is the brain of the system.

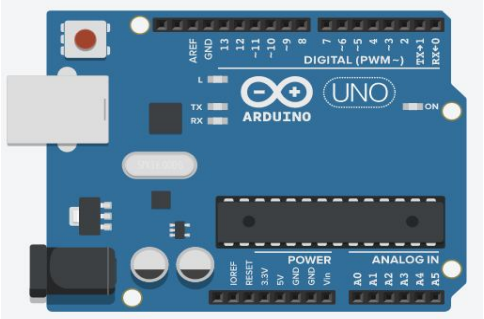


Fig: 1

1) *Ultrasonic Distance Sensor:* It is an electronic device used to measure the distance between two objects or surfaces with help of ultrasonic sound waves. It consists of a transmitter to emit ultrasonic sound waves and a receiver that receives the sound waves which bounces back after hitting the particular object.



Fig: 2

2) *LCD:* It is a 16 x2 liquid crystal display. It can display 2 lines and 16 characters per line. It is an alphanumeric display that is it can display numbers as well as alphabets. Can work on both 8-bit and 4-bit mode. It is used to display the water level.

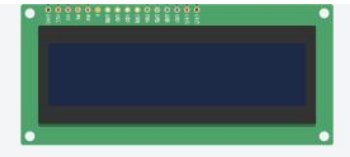


Fig: 3

3) *DC Motor:* An electric motor operated by direct current rather than alternating current is known as a DC motor. It helps in the conversion of DC electrical energy into mechanical energy. It helps in the pumping of water in our project.

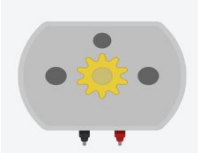


Fig: 4

4) *NPN Transistor:* To drive a dc motor we need a large amount of current than Arduino board can give so for that reason we require NPN transistor



Fig: 5

5) *Resistor:* A resistor is a passive two-terminal electrical component that produces electrical resistance as a circuit element. Resistors are used to reduce current flow, to adjust the signals, to distribute voltages, bias active elements, and also to terminate transmission lines.



Fig: 6

6) *Micro Servo:* A servo motor may be a thought of as a positioner or a motor that permits for a particular control in terms of the position, acceleration, and velocity. Basically it has certain capabilities that a normal motor doesn't have. Consequently it makes use of a normal motor and pairs it with a sensor for position feedback. It helps to control the valve by turning water flow on or off as required.

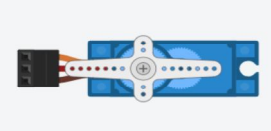


Fig: 7

B. Block Diagram

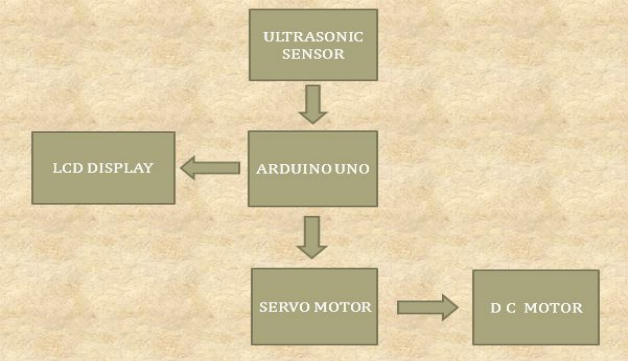


Fig:8

C. Circuit Diagram

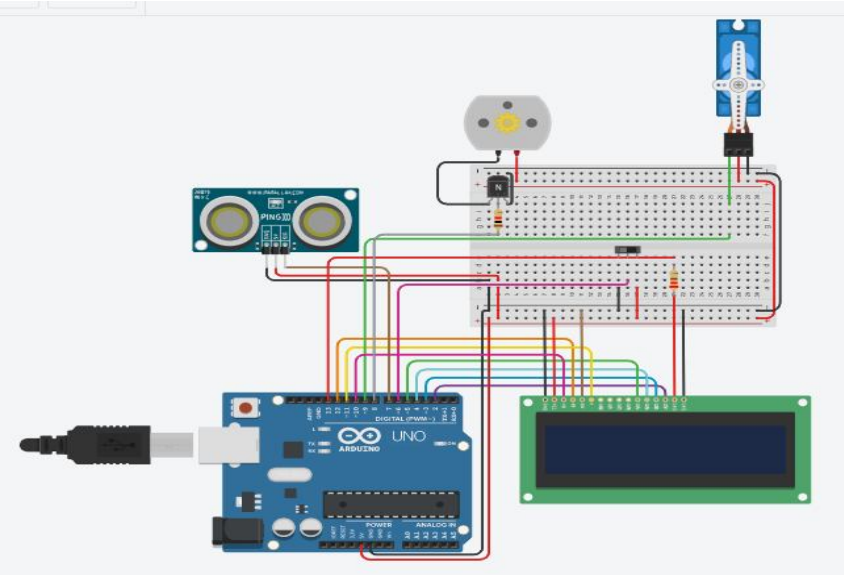


Fig: 9

D. Theory

The automatic water level controller minimizes the need for any manual switching and human interference. The machine helps to detect level of water or any liquid. For this ultrasonic sensor is used. It detects the distance between the top of tank to level of liquid and with help of programmed Arduino Uno it displays the information on the LCD display. And as the water level goes below a certain level it turns the valve on and starts the water flow with help of motor. Similarly as water level reaches the top of the storage tank which is being detected by sonar sensor, then with help of programmed Arduino the valve automatically turns off which shuts the motor and thereby closes the water flow. As the valve is servo motor thus similarly like sonar sensor it is also controlled by Arduino.

IV. RESULTS

As soon as water starts flowing in the container, the LCD screen starts displaying amount of water collected. Once water level reaches the brim of the container, water flow automatically stops. When the container is empty, the water flow starts automatically. At all times, percentage amount of water in the container is displayed on the LCD screen.

V. LIMITATIONS

As it consists servo and dc motor so it requires high power supply. If the water level is not constant then it might not show exact water level in tank.

VI. FUTURE SCOPE

The automatic water level controller has a great future scope. By adding a Wi-Fi module through which it can be controlled through mobile application by doing so it can be used in big building, offices, malls. It also has a bright future in Agricultural sector.

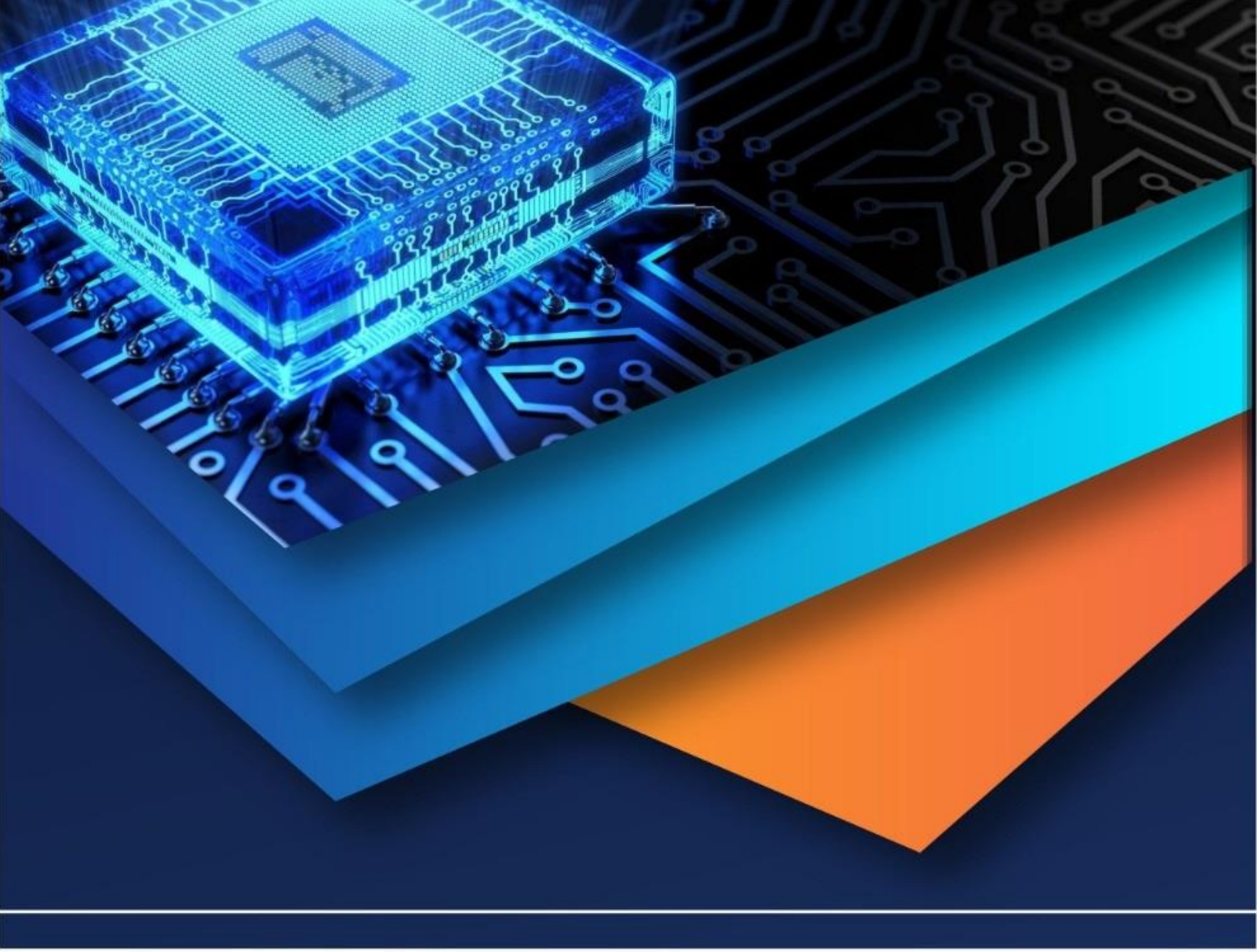
VII. CONCLUSIONS

With the help of this project we aim to save electricity as well as water. It is very important to save the natural resources. When the water in bucket /tank is reaches at a particular level we don't realize that the tank is overflowing. This leads to more water as well as energy consumption. People too get engaged in that and stop doing other work until the tank is full which can cause a lot of unnecessary time consumption. So to overcome this situation this project can sense and indicate the water level in the tank when it reaches at a particular level and then the pump/tap turns on/off which will save water and electricity. Therefore the water level monitoring and controller using Arduino project can prove very helpful in minimizing the use of man power. Its application is not only limited to house hold but can also be used in the industrial and agricultural sector.

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