iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** XII **Month of publication:** December 2022

DOI: https://doi.org/10.22214/ijraset.2022.47856

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue XII Dec 2022- Available at www.ijraset.com

Water Level Controller Using Ultrasonic Sensor

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Abstract: ***The general public in public areas who face the problem with water like water overflowing or lack of water or because of extra water which goes inside of tank will leads more water into the tank. It is very hard for customers to get to know that how much water is remaining in the water tank and some other details related to water tank or water level in water tank etc. its difficult for them to understand like what's the issue with the tank or what's going on with water tank. By using our project water level controller using ultrasonic sensor user or customer will get to know that what Is the condition of water tank, for how much time the water tank should be in switch on state and for how much time the motor should be in off state we will get to know easily if we use this project. This device helps us in not to waste water and utilize water very efficiently. This device tells the user or customer that how much quantity of water is present in their own home's roof head water tank. Also we can control how much quantity of water that we want to keep inside the tank for now all adjustments we can make on our own according to user preferences. Arduino will indicates us if the wastage of water is taking place at any point of time something like that. This project can be used by using wi-fi also. In our project the fluid like any fluid can be measured which is inside any kind of closed thing for example tank, water tank etc.***

Keywords: Water level controller, Arduino, Ultrasonic sensor, Water Overflow, Level Indicator

I. INTRODUCTION

Water is a common solvent which plays an essential role in ordinary existence. The overall quantity of water available in the world has been envisioned at 1. Four billion cubic kilometers, enough to cowl the planet with a layer of about 3km. Water is very common source of consumable thing for all living things in the whole world. The total water is available in the whole world is four billion cubic kilometers. And also almost ninety-five percent of water which is available in the world is water but which cannot be consumable to any living thing in the world. And remaining five percent of water is in the form of ice. So, now a day's water is so precious for us. And there is only one percent of water is fresh water and all of this fresh water is available in or located in rivers and lakes. So this clearly says us that we should do water management by preserving water storing fresh water and by not wasting water or not supporting ideas which supports water wastage or includes water wastage. That's why we should not waste any more water in our overhead water tanks in our homes or in any of the hotels restaurants or anywhere say no to water wastage.

Even though pumps equipped with variable speed Motor will be greener than on and rancid mechanism, the previous are expensive to procure and maintain particularly for small and medium enterprises. In addition, more commercially available water degree sensor is steeply-priced been imported into the USA and as such can't be deployed in each household.

Control systems are categorized as open loop and closed loop. In open loop systems a command is given to a gadget and it is assuming the machine plays well. A closed loop system alternatively, compares the result for output of the device to a preferred output and take suitable corrective actions. The monitoring of a water degree is a reservoir is vital within the application associated with agriculture, flood preventionand industries, and so forth. Automated water level controller is a chain of feature to govern the automated water pump controller circuit in a reservoir or water storage. The water stage sensor is made with a metallic plate mounted on the reservoir for water tanks with the sensor in the short to create the top level and a detection sensor for detecting long again made for the decrease stage and the floor traces connected to the bottom of reservoirs.

The water in the tank will be calculated by the sensors which are used to make this device. At first the tank is considered to be empty by us or by the ultrasonic sensor. When the water level in the tank is low the motor will automatically get on and if its full I mean if the water level is full then the motor will be stopped and then there is no water wastage there at that particular point we achieved our purpose of the project.

II. LITERATURE SURVEY

The prototype changed into advanced the usage of Arduino microcontroller, water level sensor, mobile telephone. The extent of water sensed through the water stage sensor become sent to the controller wherein it, in turn updates the records to server.The facts stored in the server was sent to the mobile smartphone. The consumer in flip makes the selection to turn on or flip off the motor via running the buttons in the cell.

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The sensor is of contact-kind. Dimension range is constrained and has short lifespan while uncovered to moist environment. Human intervention is important.

A. Paper 1: Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue

This paper has implementation of water level like degree management device also consists in it like Arduino for doing a task to automate the work or do the same work repeatedly like pumping the water into tank till the level is reached of the tank and the switch will switch on or off of the pump automatically because they used Arduino here. And the result can be seen on the LCD screen. Here machine also does one more work like levelling the water of the supply tank also. If there is any problem in the sensors a beep sound will be generated.

B. Paper 2: Design and Development of Automatic Water Flow Meter

This paper has advanced the whole system where firstly all the exams and the water availability inside the tank will be assisted with the help of detector and then it will adjust the water pumps count and keep the information with the extent detector and the seven sections layout also shows it and a pump. The main system also includes the degree sensor to sense on water with virtual processor circuit. The main system removes manually the necessities and control the flow of water it can also be used in agricultural fields.

C. Paper 3: Automatic Water Level Controller with Short Messaging Service (SMS) Notification

This Paper took a gadget which gives us a monitor device which monitors the water. It indicates the water requirement like how much more water is needed. This method is very beneficial to understand how to use the modules of wireless connectivity and also they are very easy to use we can take them anywhere we want.

D. Paper 4: Automatic Water Level Control System

This paper took a gadget which will count or measures the degree of the water by using the Ultrasonic sensors. This gadget which we used to indicate the water's degree and control on water and control on Microcontroller. Here Ultrasonic sensor will gives us the reading of the height of the water then it sends a message to microcontroller and it will be executed by itself.

E. Paper 5: Design of an Automatic Water Level Controller Using Mercury Float Switch

This paper given for automatic water controller with SMS Notification. It was delivered to the computerized control system of the water so that we can manage it according to the customer needs for load dropping. Two structures work at a time automatic level control system and SMS Notification system. Controller will be operating by the strength of the battery. Whenever the gadget get no degree or empty degree then the load dropping will happens automatically. And finally the SMS notification will be sent to the customer's number.

III. AIM, OBJECTIVE & METHODOLOGY

A. Aim

To save you water wastage while the water tank is packed with water, water is not alleged to overflow by means of theusage of water stage sensor the use of ultrasonic sensor.

B. Objective

1) To stay in an international that's transferring at this kind of speedy pace that the whole lot is computerized, will help usto keep our lives going.
2) To understand the working of water stage controller while the water in our tank is both full and empty and routinelyturn on and off the pump as and when essential.
3) To calculate the time of the ultrasonic waves journeying to and fro and the water degree in the tank by using the use ofthe primary precept of ultrasonic sensor, i.e., the ECHO method.

C. Methodology:

As discussed earlier the concept of the assignment is to design a sensor which is useful to shut the valve of the water tank automatically while the water is filled and valve opens when the water degree is low. Water degree indicator and Controller paper we're going to degree the water stage with the aid of setting and sensor will be there at maximum point of water point. At the same time audio waves will be transferred to surrounding's, and the signals will come back to the start point.

It moves quickly because waves are impediment. So here Ultrasonic sensor find's the put off and measure it then it transmits back as a signal. Though understanding the latency in time, it will sell off the gap among water measured by the sensor.
In step with the requirement we said the most and the least measured value with the same time do the same operation always and it repeats it continuously.

IV. BLOCK DIAGRAM OF THE SYSTEM AND HARDWARE DESIGN

A. Block Diagram Used to Designing f the Module

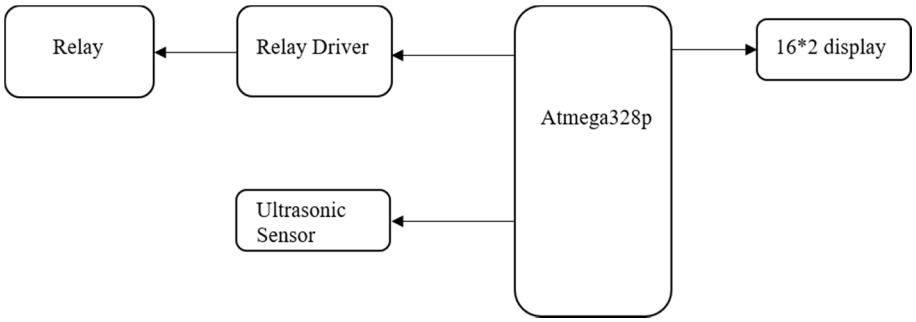


Fig. 4.1: Block Diagram of water level controller

The running of this undertaking is honestly smooth; we used an ultrasonic sensor module to emit sound waves into the water tank and come across the sound waves' reflections, which is referred to as echo. First, we should use Arduino to cause the ultrasonic sensor module to emit a signal, after which we need to wait for the echo to reach. The time between beginning and receiving the echo is measured with the aid of Arduino. We realize that the rate of sound is more or less 340 m/s, for that reason we are able to use the following formula to degree distance:

(Travel time* sound speed)/2 = distance.....eq. 1

We will get the distance among the sensor and the water surface the use of this manner. After that, we need to compute the water stage. Now we should decide the overall period of the water tank. Because we recognize the period of the water tank, we are able to decide the water stage by way of subtracting the ultrasonic distance from the tank's duration. We'll additionally acquire the distance among the water stages.

B. Circuit Diagram

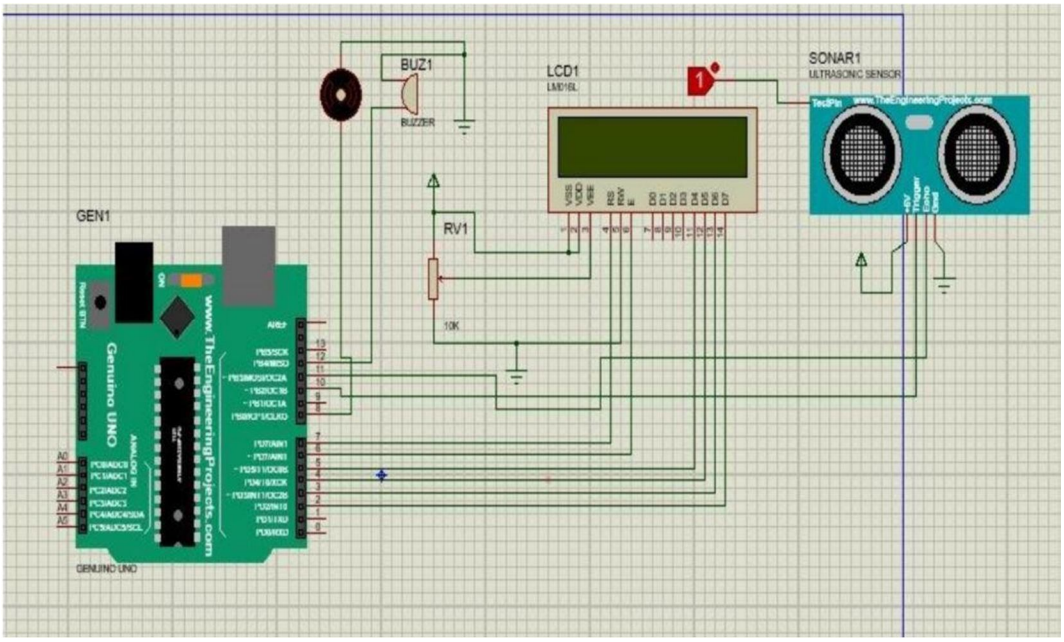


Fig. 4.2: Circuit Diagram of water level controller [7]

The 2 out of 4 pins of the ultrasonic sensor (SONAR1) are connected to pin 6 & 7 of Arduino. Other 2 remaining pins are ground and power connection. The ultrasonic sensor uses SONAR technology to determine the distance of an object.

This buzzer which we used here is a small speaker which can connect to the device which we have used over here. The buzzer will make sound as soon as it gets the feedback from the device. Here, one pin connected to the ground device and the remaining one is connected to the digital display.

V. SPECIFICATION OF HARDWARE

A. Ultrasonic Sensor – HC-SR04(Generic) Power Supply
B. Arduino UNO (ATmega328P-PU micro controller)
C. LCD Display 16*2 (HD44780)
D. Relay Driver
E. Relay Module 1 Channel 5V
F. Micro DC 3-6V (Submersible Pump)
G. Transformer (12-0-12) 500mA 230V

VI. TEST RESULTS

When the water tank is empty there is no path in between the eight common place probes. So there is no biasing voltage when the transistor base emitter(tbe) does not have enough biasing voltage that is why it strays in cut off place while the output throughout is collector will be there at 4.2v.

In this situation the microcontroller is used to energetic the low region (this means it consists 0-2 volts of high and three -five volts will be there for low). At this point the output of transistor that is 4.2v and it will be considered as low through the microcontroller and for this particular reason the default fee given to the microcontroller to the seven-segment show is one which has become the link as empty now

Now because of the water starts filling within the tank a conductive path is already hooked up between the sensing probes and the corresponding transistors get biasing at their base, they start carrying and now the output could be in voltage from 1.2 to 1.8 v. This is the range for the given microcontroller can implicitly switch off the motor and store the water.

When tank becomes the seven phase show then the first stage or the upper most stage will receives the conductive route via water and the corresponding transistor gets there into the condition where the output is given to the microcontroller with its input parameter and microcontroller can switch off the motor and save water or store water.

Table II Observation Table

Test No.	Actual Value (cm)	Observed Value (cm)
1	180	182
2	160	163
3	140	142
4	120	120
5	100	99
6	80	80
7	60	63
8	40	42
9	20	22
10	12	12

We see that the 2-3 % error occurs due to measurement, tank size and shape, and the environmental changes and thelocation of the ultrasonic sensor placed.

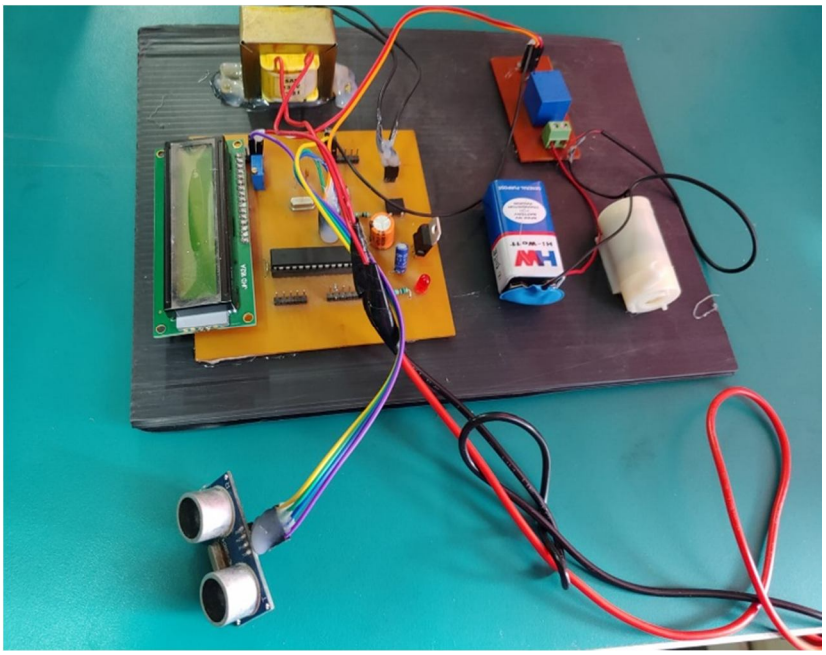


Fig. 6.1: Water level controller using ultrasonic sensor [8]

The principle for this project is closed loop feedback system. The working or description of this project is, the ultrasonic sensor at the top of the tank and this ultrasonic sensor will send some waves towards the bottom of the tank or the level of water, when the waves hit the bottom of the tank it reflects back as an echo till the sensor. Here Arduino calculates the time and converts it into the distance then Arduino will find out at which level the water is present over here. According to that value the motor will automatically turn on and it automatically turns off itself. That's how the project water level controller using ultrasonic sensor works in a understandable description.

VII. CONCLUSION & FUTURE SCOPE

A. Conclusion

Automation of variety of things has been done in our developed environment. Where we can add multiplied to lesson inventions of what we invented and save out time. The water tank's water will be wasted because of its size and water will overflow if it fills. This leads more power intake as very high challenge at the maximum point of water inside of the tank we cannot be randomly guessed we can guess but it is not going to be right. So this results will help us to take more power as input as intake and that's the high challenge in the present. People additionally need to wait the time and make what they do their doing.. Thus we save both energy and power and time at the same time.

From now on the computerized water stage indicator and controller the usage of Arduino and the whole equipment will be done without a doubt be beneficial on a large scale basics due to minimum level of necessary of the energy and additionally the system will be more simpler while making it simpler and to make it a bit more compatible for everyone to use it safely.

B. Future Scope

Here the automated water level indicator will be used at Arduino venture can be setup by us using PH sensors so that it will help us to alter the acidity in water which will be stored in the tank and the alkalinity of the water which will be stored inside the water tank.

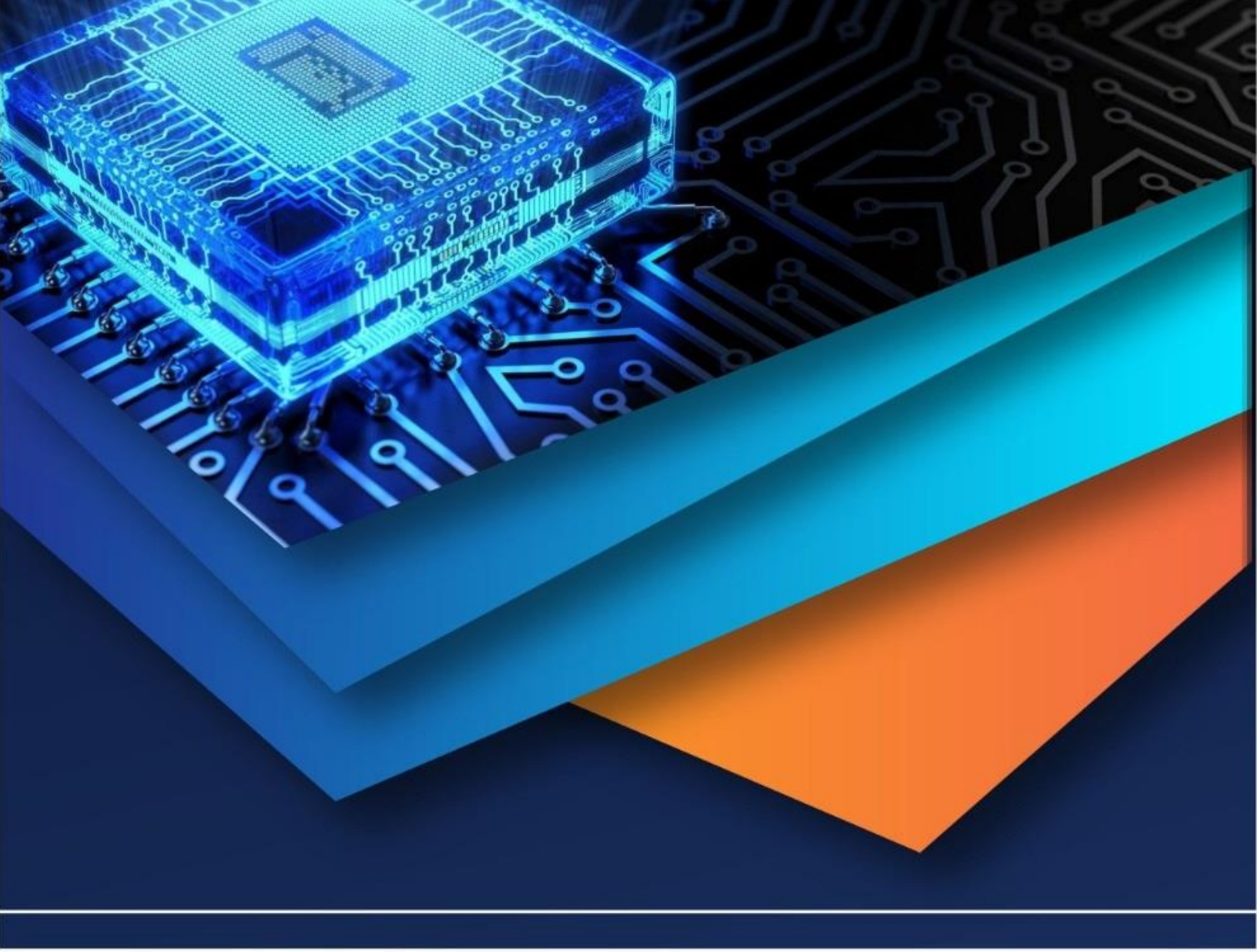
VIII. ACKNOWLEDGMENT

It is our great pleasure in expressing sincere and deep gratitude towards our guide Prof. V. K. Bairagi for his valuable guidance and constant support throughout this work. We take this opportunity to thank Head of the Department Dr. M. P. Sardey andall staff members of department Of Electronics Engineering AISSMS IOIT, Pune, for cooperation provided by them in many ways. The motivation factor for this work was the inspiration given by our Respected Principal Dr. P. B. Mane. Lastly, Iam thankful to those who have directly or indirectly supported for our work.

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