e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
( Peer-Reviewed, Open Access, Fully Refereed International Journal )
Volume:04/Issue:05/May-2022 Impact Factor- 6.752 www.irjmets.com

# WATER LEVEL MONITORING SYSTEM

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## ABSTRACT

To demonstrate this the system makes use of containers, where the ultrasonic sensors placed over the containers to detect the liquid level and compare it with the container's depth. The system makes use of an AVR family microcontroller, Raspberry Pi, LCD screen, Wi-Fi modem for sending data and a buzzer. A 12 V transformer is used for power supply in this system. The LCD screen is used to display the status of the level of liquid in the containers. The liquid level is highlighted as colored to show the level of liquid present in the container with the help of a web page to the user. The buzzer starts ringing when the set limit of the liquid is crossed. Thus this system helps to prevent the wastage of water by informing about the liquid levels of the containers.One of the major problems faced by most of the countries is the issue of water scarcity in the world and wastage during transmission has been identified as a major culprit; this is one of the motivations for this research, to deploy computing techniques in creating a barrier to wastage in order to not only provide more financial gains and help the environment as well as the water cycle which in turn ensures that we save water for our future. The IOT based Water Level Monitoring system is an innovative system which will inform the users about the level of liquid and will prevent it from overflowing.

## I. INTRODUCTION

Water is a universal solvent which plays an important role in everyday life. The total amount of water available on earth has been estimated at 1.4 billion cubic kilometers, enough to cover the planet with a layer of about 3km. About 95% of the Earth's water is unfit for human consumption. About 4% is locked in the polar ice caps, and the rest 1% constitutes all fresh water found in rivers, streams and lakes which is suitable for our consumption. A study estimated that a person in India consumes an average of 135 liters per day. This consumption would rise by 40% by the year 2025. This signifies the need to preserve our freshwater resources. Many houses make use of supplementary water tanks to store water that is collected from rain water or water pumped from wells or underground. At present, water meters are used to calculate the amount of water used at homes. This doesn't provide an efficient method of monitoring the water usage. The water is wasted at each and every outlet knowingly or unknowingly which adds up to huge amounts in the end. Efficient management of the water used at homes is very much necessary as about 50% of water supplied to the cities gets wasted through improper usage. Water management is only possible, if the user is aware of the quantity of water he uses and the quantity available to him. Water is essential in every hour of our lives. Hardly anyone keeps in track of the level of water in the overhead tanks. Consequently, automatic control involves designing a control system to function with minimal or no human interference. The idea can be implicitly used to ascertain and control the level of water in overhead tanks and prevent the wastage. In this Arduino based automatic water level indicator and controller project, the water level is being measured by using ultrasonic sensors.

## II. OBJECTIVES

1. To learn the working of a water indicator.
2. Measure the water level when the circuits indicate when the tank is half and full.
3. To learn how to build simple circuits.
4. To check the level of water in the tank. Depending on the water level, the motor switches ON when the water level goes below a predetermined level or the motor switches OFF when the tank is full.
5. To display the water level and other important data on a 7-Segment Display.

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## III. LITERATURE REVIEW

[1] This paper has an implemented Automatic water level control system consisting of arduino to automate the process of water pumping in a tank and has the ability to detect the level of water in a tank and switches ON or OFF the pump accordingly and displays the status on the LCD screen. The system also monitors the level of water in the sump tank (source tank). If the level inside the sump tank is low, the pump will not be switched ON and this protects the motor from dry running. A beep sound is generated when the level in the sump tank is low or if there is any fault with the sensors.

[2] This paper have developed a system which initially tests the availability of water in the tank with the help of a level detector and then adjusts the state of the water pump according to the information collected through the level detector. This design makes use of a seven segment display and a motor pump. The proposed system consists of a water level sensor and a digital logic processor circuit. The proposed system eliminates manually controlling of water requirements in home and agricultural fields.

[3] This paper introduced a system which proposes a simple water level monitoring system with different levels indicated. It also signifies when the water level is below and above than the requirement. This method helped us to understand the use of Bluetooth modules and how it can be made as a portable device.

[4] This paper introduced a system which measures water level by using ultrasonic sensors. The system makes use of a water level indicator, water level sensor, water pump controlling system and microcontroller. Ultrasonic sensor gets a water level reading and it will send a signal to the microcontroller and start to echo the pulses.

## IV. MODELING ANALYSIS

### 1. ULTRASONIC SENSOR

It is basically a distance sensor and is used for detecting the distance. It has two ultrasonic transmitters namely the receiver and the control circuit. The transmitter emits a high frequency ultrasonic sound wave which bounces off from any solid object and receiver receives it as an echo. The echo is then processed by the control circuit to calculate the time and the difference between the transmitter and receiver signal. This time can subsequently be used to measure the distance between the sensor and the reflecting object. It has an ultrasonic frequency of 40 KHz and accuracy is nearest to 0.3 cm.

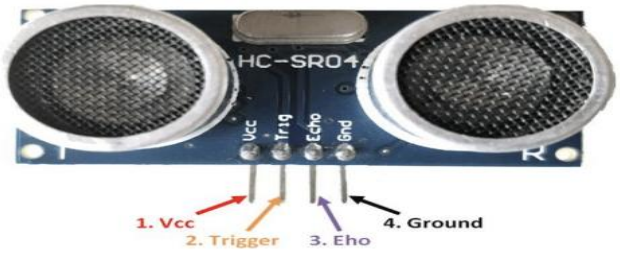


Fig. Pin Configuration of Ultrasonic Sensor

### 2. CONNECTING WIRES

In any electronic circuitry wires are the conductive connections between the elements in contact. Theoretically, they have zero resistance and provide perfect connections. On the breadboard, they look like nice coloured jumper wires.

Fig. Connecting Wires

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**3. RELAY**

In order to isolate two circuits electrically and to connect them magnetically, relays are used. They are very useful in switching from one circuit to another when they are completely separated. The relays comprise of an input and an output section. The input section has a coil which produces a magnetic field when a small voltage from an electrical circuit is applied. This applied voltage is known as the operating voltage.

Fig. Relay

**4. Node MCU:**

NodeMCU is an open-source LUA based firmware developed for the ESP8266 wifi chip. By exploring functionality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266 Development board/kit i.e. NodeMCU Development board.

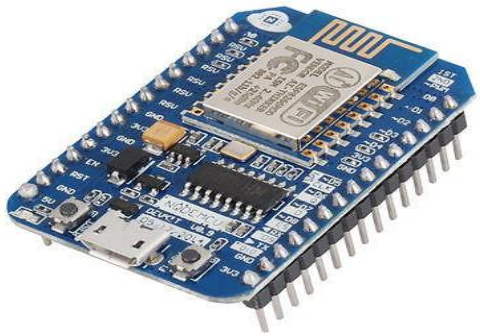

Fig. Node MCU

**Flow Chart:**

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system. DFD can also be used for the visualization of data processing. Automatic water level indicator and controller system uses two sensors at two levels of the tank, i.e. one at the higher level of the tank and the other at the lower level of the tank.

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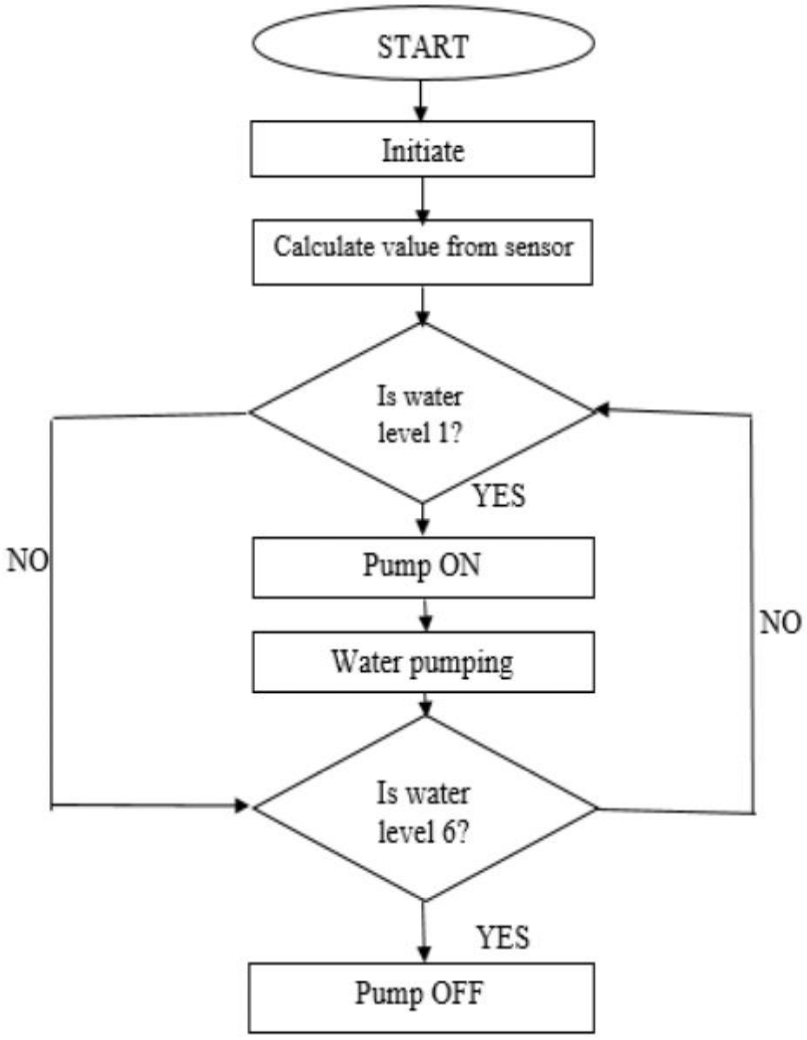


Fig. Flow Chart Of Proposed system

## V. RESULT AND DISCUSSION

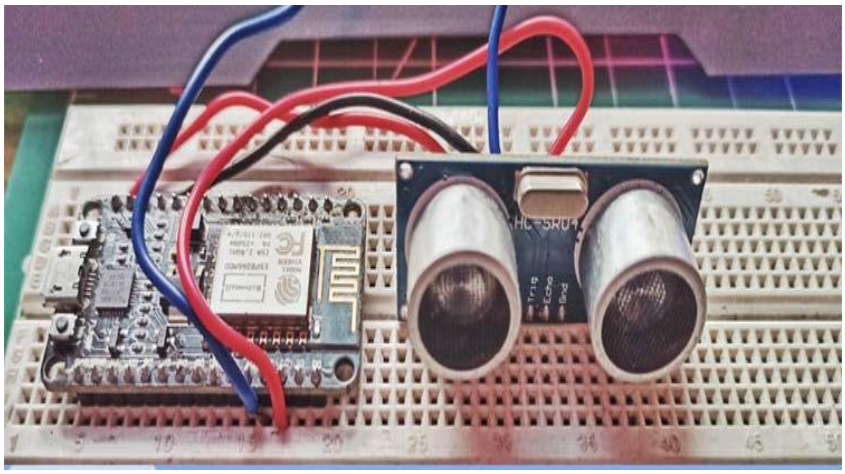

Fig. Water Level Monitoring

The proposed mechanism of water control reduces the water wastage, ensures efficient use of available water resources and generates more precise and accurate results. There is no requirement of human laborer for monitoring the level, just one operator is sufficient for opening and closing the gate according to sensor output.

Due to the number of sensors being more we can open or close the gate whenever necessary knowing the accurate level of water. Also, operation execution time is less. Because of its cost efficiency this system can be installed in various rural areas where the water problems are on a rise.

## VI. CONCLUSION

Automation of the various components around us has been widely increased to reduce human intervention and save time. The water tank overflows as the height of water in the tank cannot be randomly guessed. This leads to extra energy consumption, which is a high concern in the present. People also need to wait and stop doing their other activities until the tank is full. Hence, here is an idea which senses and indicates the water level so that the pump can be switched off on appropriate time and save water, electricity and time as well.

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