**WATER LEVEL DETECTOR**

## A MINI PROJECTREPORT

**18CSE309T – DESIGN PRINCIPLES OF SMART SPACE MANAGEMENT**

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**ABSTRACT**

In this IoT project, we will create a water level monitoring web server using an HC-SR04 Ultrasonic sensor and ESP32. It will be a contactless water level measurement system. First, we will learn to interface HC-SR04 with ESP32. After that, we will see program our ESP32 board with the ultrasonic sensor to build our water monitor web server. The web server will show the current water level measured as the distance in cm by HC-SR04. So let’s begin.Now, first let’s discuss various components of IoT base contactless water level monitoring system such as ultrasonic sensor, connection diagram with ESP32, and Arduino sketch. In the end, we will see a video demo. To interface the HC-SR04 ultrasonic sensor with ESP32, we should know the functionality of each pin of the ultrasonic sensor. By knowing the functionality of input and output pins, we will be able to identify which GPIO pins of ESP32 should be used to interface with HC-SR04.

**PROBLEM STATEMENT**

Need of this project is to avoid wastage of water. Because sometimes people forget to off the motor when tank is full,because of that water get wasted.To avoid this problem this project came into picture.By using this water level indicator system we can monitor water level and consumption of water.IoT-based water level monitoring provides automatic detection of liquid levels from differently sized tanks or storage containers. It is a state-of-the-art system specially designed to inform the users about the real status of the liquid levels. Water level controllers that automatically adjust the water level save energy. They do it by automatically turning off the motor when the tank is full and when there is no water flow to the tank. This means that less water and energy are utilized to control a water supply.

**OBJECTIVES**

The main aim of this system is to monitor the water level at rural areas so that they help in detecting the wastage of water and measures can be taken to avoid unnecessary overflowing of water in the areas where monitoring is a difficult task.

1. Bluetooth based Water Level Monitoring: Here Bluetooth plays a major role in alerting the anomalies.

2. Remote Water Level Monitoring: In this, the system is controlled remotely.

3. Automatic Water Level Monitoring: The system is programmed to automatically perform some defined actions.

4. Portability: Using the same software in different environments.

5. Maintainability: Measures the ease and speed with which a system can be restored to operational status after a failure occurs.

6. Performance: To analyze if the system meets its goals.

**DESCRIPTION**

The water level sensor is a device that measures the liquid level in a fixed container that is too high or too low. According to the method of measuring the liquid level, it can be divided into two types: contact type and non-contact type. The input type water level transmitter we call is a contact measurement, which converts the height of the liquid level into an electrical signal for output. It is currently a widely used [water level transmitter](https://www.renkeer.com/product/electronic-water-level-gauge/)**.**

The working principle of the water level sensor is that when it is put into a certain depth in the liquid to be measured, the pressure on the sensor’s front surface is converted into the liquid level height. The calculation formula is Ρ=ρ.g.H+Po, in the formula P is the pressure on the liquid surface of the sensor, ρ is the density of the liquid to be measured, g is the local acceleration of gravity, Po is the atmospheric pressure on the liquid surface, and H is the depth at which the sensor drops into the liquid.

The level sensor is a device designed to monitor and measure liquid (and sometimes solid) levels. When the liquid level is detected, the sensor converts the sensed data into an electrical signal. Level sensors are mainly used for monitoring reservoirs, oil tanks or rivers

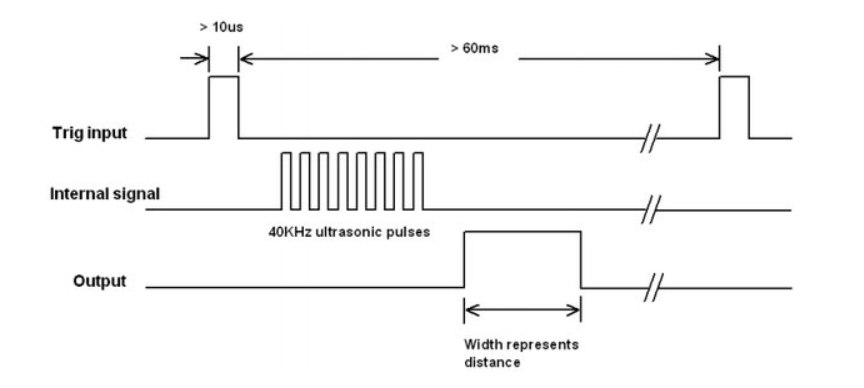
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Fig.1 CIRCUIT DIAGRAM

**LIST OF COMPONENTS**

1. **Arduino UNO: -** The Arduino Uno is a microcontroller board with 32 KB of flash memory, running on 5V and accepting input voltage of 7-12V. It has 14 digital I/O pins, 6 of which provide PWM output, and 6 analog input pins. Each I/O pin can supply up to 40 mA of DC current, while the 3.3V pin can supply up to 50 mA. With its versatility and features, the Arduino Uno is widely used in hobbyist projects, educational activities, and professional prototyping.

A picture containing text, electronics, circuit

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Fig.2ARDUINO UNO

1. **JUMPER WIRES : -** Jumper wires are used for making connections between items on your breadboard and your Arduino's header pins. Use them to wire up all your circuits.

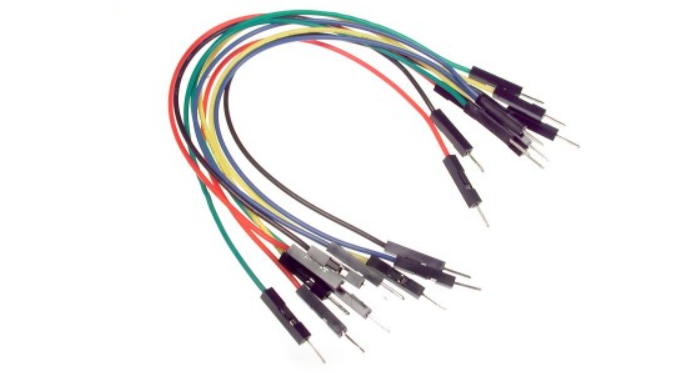
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Fig.3 JUMPER WIRE

1. **HC –SR04**: - Vcc and Ground are used to power sensor. We should supply 5 volts to the Vcc pin and connect the GND pin with the ground terminal of the power supply.

Trigger: It is an input pin. Trigger pin is used to initiate the ultrasonic sensor to start distance measurement or distance ranging. When users want to get distance measurements from the sensor, we apply a 10µs pulse to this pin.

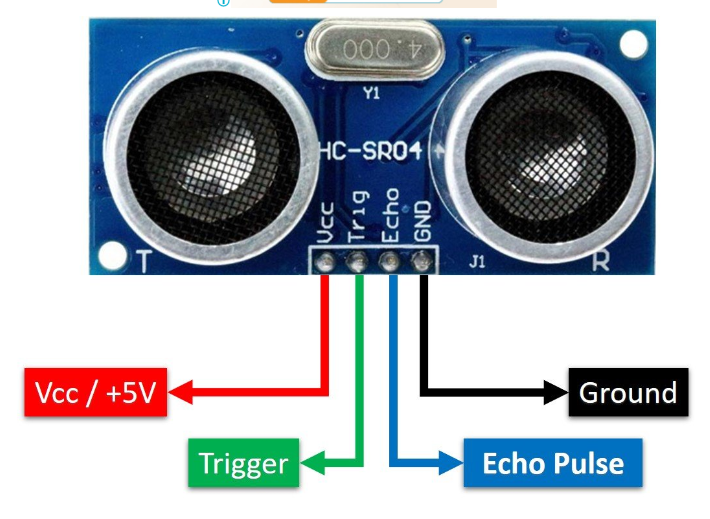


Fig. HC-SR04 Pinout

1. **ESP-32**: - Until now we have seen the working of the ultrasonic sensor and the pin details. Now we know that to interface an HC-SR04 sensor with ESP32, we need four pins out of which two are power supply pins and two are digital input output pins. One GPIO pin of the ESP32 will be used as a digital output pin to provide a trigger signal to the ultrasonic sensor. Similarly, one GPIO pin will be used as a digital input pin to capture echo output signal of output sensor.

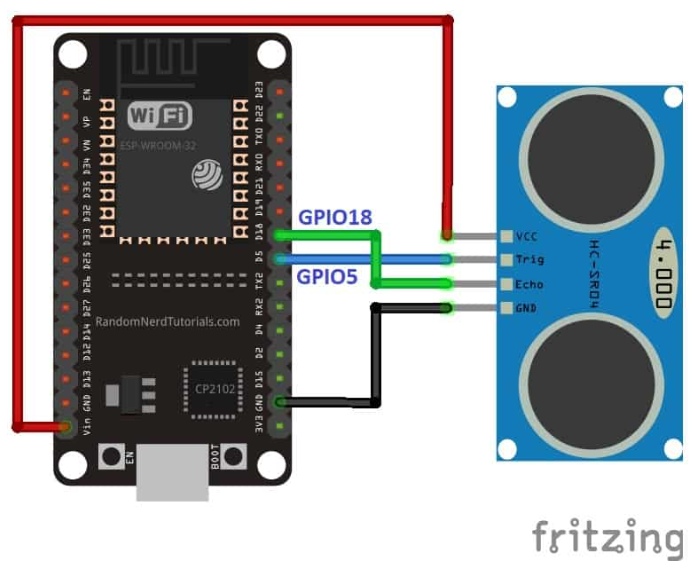


Fig.5ESP-32

1. Micro USB Cable 1 m MG-12 - **MG12** is a 12 AWG MG **Wire**, High Temperature **Wire** rated up to 450C. See full 12 AWG High Temperature **Wire** Nickel-Plated Copper pricing and MG specs..



Fig.6MG-12

1. **BREAD BOARD**: - A breadboard (sometimes called a plugblock) is used for building temporary circuits. It is useful to designers because it allows components to be removed and replaced easily. It is useful to the person who wants to build a circuit to demonstrate its action, then to reuse the components in another circuit.

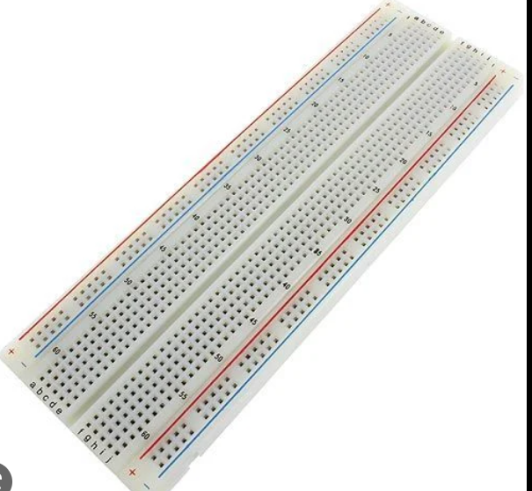
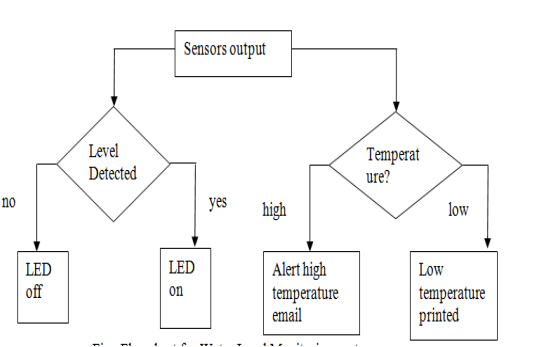


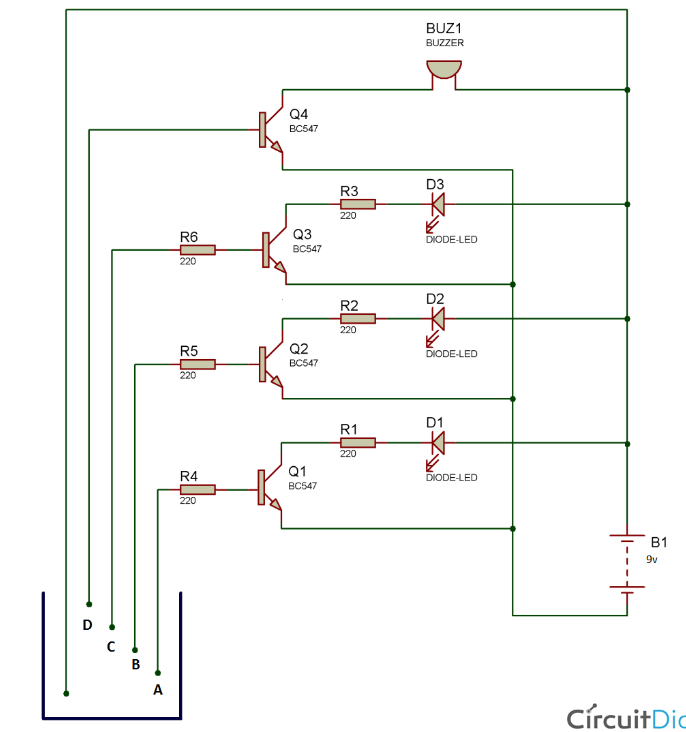
Fig.7 BREAD BOARD

**BLOCK AND CIRCUIT DIAGRAM**

**Block Diagram:**

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**Circuit Diagram:**

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**CODE**

#include <WiFi.h>

#include <WiFiClient.h>

#include <WebServer.h>

#include "ThingSpeak.h"

WiFiClient client;

int distance\_cm;

int trigger\_pin = 5;

int echo\_pin   = 18;

// Replace with your network credentials

const char\* ssid = "SRMIST 2";

const char\* password = "12345678";

WebServer server(80);

String page = "";

void setup() {

  Serial.begin(115200);

  pinMode(trigger\_pin, OUTPUT);

  pinMode(echo\_pin, INPUT);

  delay(1000);

  ThingSpeak.begin(client);

  WiFi.begin(ssid, password);

  Serial.println("");

  while (WiFi.status() != WL\_CONNECTED) {

    delay(500);

    Serial.print(".");

  }

  Serial.println("");

  Serial.print("IP address: ");

  Serial.println(WiFi.localIP());

  server.on("/", []() {

    page = "<head><meta http-equiv=\"refresh\" content=\"3\"></head><center><h1>Ultasonic Water Level Monitor</h1><h3>Current water level:</h3> <h4>" + String(distance\_cm) + "</h4></center>";

    server.send(200, "text/html", page);

  });

  server.begin();

  Serial.println("Web server started!");

}

void loop() {

  digitalWrite(trigger\_pin, LOW);

  delayMicroseconds(2);

  digitalWrite(trigger\_pin, HIGH);

  delayMicroseconds(10);

  digitalWrite(trigger\_pin, LOW);

  long duration = pulseIn(echo\_pin, HIGH);

  distance\_cm = (duration / 2) / 29.09;

  int x = ThingSpeak.writeField(2137503,1,distance\_cm,"5S00GJ1B0T32P5MU");

  Serial.println(distance\_cm);

  server.handleClient();

  delay(3000);

}

**APPLICATION AND FUTURE SCOPE**

**Application :**

1. A level indicator, whether it be a gage glass, indirect sensing method, or independent remote, is used on a steam boiler to provide a water level reading. A gage glass is the most common form of level indicator found on steam boilers.

2. The water level indicator circuits are used in factories, chemical plants, and electrical substations and in other liquid storage systems. There are many possible uses for this simple system, examples include monitoring a sump pit (to control pump activation), rainfall detection, and leakage detection.

**Future Scope:**

1. If the water level is not constant then it might not show exact water level in tank
2. .The automatic water level controller has a great future scope.
3. 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.20
4. Automatic water level monitoring system has a good scope in future especially for agriculture sector.

**LIST OF IMAGES**

|  |  |
| --- | --- |
| FIGURE NUMBER | FIGURE NAME |
| 1 | Arduino UNO |
| 2 | JUMPER WIRES |
| 3 | HC –SR04 |
| 4 | ESP-32 |
| 5 | MG-12 |
| 6 | BREAD BOARD |

**REFERENCES**

[1] P. Dietz, W. Yerazunis, D. Leigh, Very Low -Cost Sensing and Communication Using Bidirectional LEDs, UbiComp 2011: Proceedings, vol. 2864, pp. 175`-191, 2003.

2] M. Javanmard, K.A. Abbas and F.Arvin,“A MicrocontrollerBased Monitoring System for Batch TeaDryer”, CCSE Journal of Agricultural Science, Vol. 1, No. 2, December 2012

[3] Hicks, F., Tyler, G.; & Edwards, T.W.Pump Application Engineering- McGraw-Hill Book Company, New York.

[4] Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue Proceedings of the World Congress on Engineering and Computer Science, pp 220-225.

[5] S.M. Khaled Reza, Shah Ahsanuzzaman Md. Tariq, and S.M. Mohin Reza, “Microcontroller Based Automated Water Level Sensing and Controlling: Design and Implementation Issue,” Proceedings of the World Congress on Engineering and Computer Science, vol I, 2014.