Microprocessor

(Hardware)

Water tank detector

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1. Aim of the hardware project:

A water tank detector is a device or system designed to monitor and detect the water level in a tank or reservoir. It plays a crucial role in various applications, including residential, commercial, and industrial settings where accurate water level monitoring is essential for efficient water management and resource conservation. The water tank detector utilizes different sensing technologies and communication methods to provide real-time information on the water level, ensuring optimal usage and preventing overflow or depletion of water resources. A water tank detector is a valuable device that provides real-time monitoring and accurate measurement of water levels in tanks and reservoirs. By employing various sensing technologies and communication methods, it helps individuals, businesses, and organizations optimize water usage, prevent wastage, and ensure efficient water management. With continuous advancements in technology, water tank detectors are becoming more sophisticated, user-friendly, and environmentally conscious, contributing to sustainable water resource management.

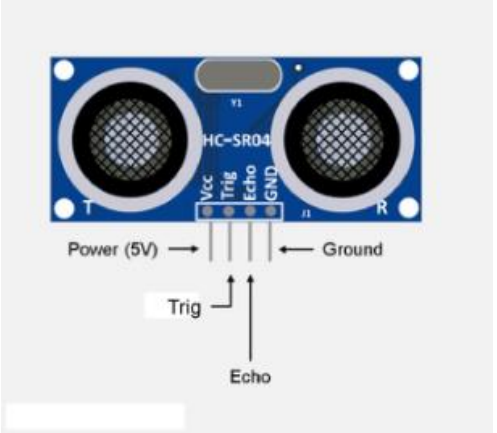
2. list of the used Components:

1. ESP32

ESP32 is a widely used microcontroller module that has gained popularity in the field of embedded systems and IoT (Internet of Things) applications.

2. HC-SR04

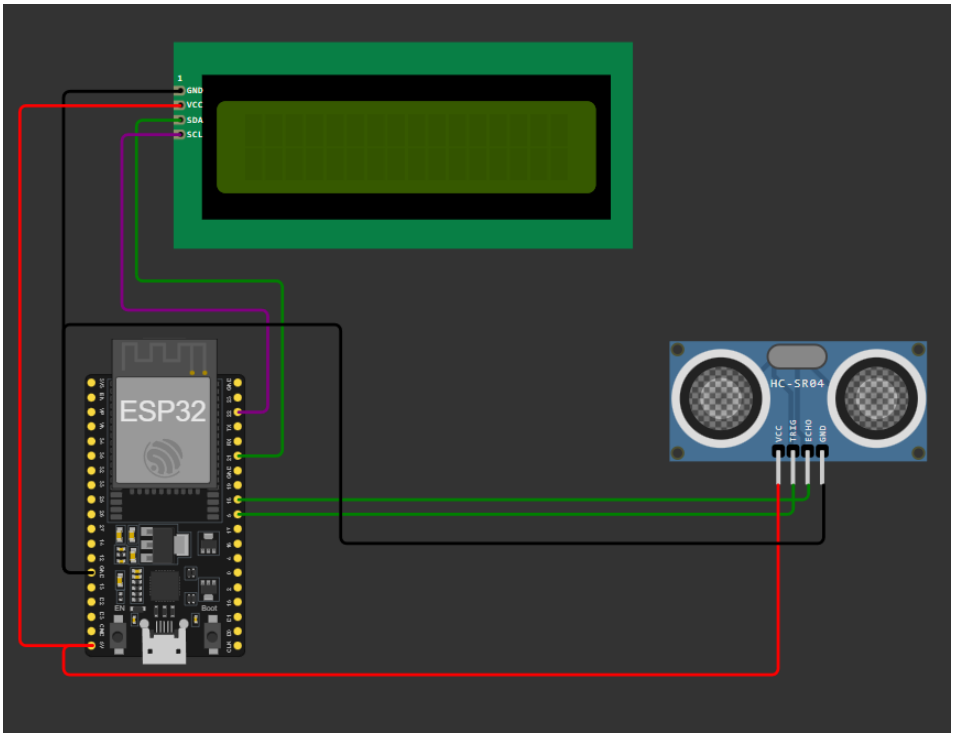
HC-SR04 is an ultrasonic sensor module commonly used for distance measurement in various applications. The HC-SR04 sensor uses ultrasonic waves to determine the distance between the sensor and an object. It emits ultrasonic pulses and measures the time it takes for the sound waves to bounce back after hitting an object.



3. LCD1602

LCD1602, also known as the 16x2 LCD display, is a popular alphanumeric character display module commonly used in embedded systems and microcontroller-based projects.

3. Schematic of the hardware project:



4.Procedure to use this circuit

1-Measure the height of the tank in cm.

2-Program ESP 32 with this height measured to calculate the percentage of the water correctly.

3-Mount the ESP-32 at the top of any side of the tank.

4. Install the ultrasonic sensor on the top of the tank, pointing down towards the water surface. Connect the sensor to the microcontroller.

5. Connect the LCD module to the microcontroller to display the water level percentage.

6. connect the circuit to voltage source

7. read the height and the percentage of the water from LCD module .

5. Budget of the project

component	price
ESP 32	400
Ultrasonic sensor	45
Liquid crystal Lcd	90
I2C module	70
total	605

6. Challenges that the team had and how to overcome them.

1- Monitoring the percentage and the height of the water online on mobile phone, we overcome this using remotexy website to get the readings from ESP 32 and design the screen to monitor this readings.

7. Idea and Implementation:

In this project, we utilized an ESP32 microcontroller, an HC-SR04 ultrasonic sensor, and an LCD1602 display module to create a water tank detector. The objective was to develop a system that could measure the water level in a tank and display the results on the LCD screen. The ESP32 microcontroller served as the core of the system, providing processing power and interfacing capabilities. We connected the HC-SR04 sensor to the ESP32 to measure the distance between the sensor and the water surface inside the tank. By calculating the distance, we could determine the water level. The HC-SR04 sensor emitted ultrasonic waves and measured the time it took for the waves to bounce back after hitting the water surface. Using the known speed of sound, we converted the time measurement into a distance value. The ESP32 microcontroller processed the distance data and displayed it on the LCD1602 module. We utilized the parallel communication interface of the LCD1602 to connect it to the ESP32, enabling us to send the water level information for display. By developing the necessary code and utilizing libraries compatible with the ESP32, we were able to program the microcontroller to control the HC-SR04 sensor, retrieve distance measurements, and update the LCD1602 display accordingly. The final system successfully detected the water level in the tank and displayed it in real-time on the LCD screen. This setup provides a simple and cost-effective solution for monitoring water levels in tanks, which can be

valuable for various applications such as water management, irrigation systems, and storage tank monitoring. Overall, the combination of ESP32, HC-SR04, and LCD1602 proved to be an effective and versatile solution for creating a water tank detector. The project demonstrated the integration of these components and highlighted the potential for expanding the system's features and functionalities to suit specific requirements.

8.Refrances :

1- https://randomnerdtutorials.com/projects-esp32/

2- https://iotdesignpro.com/esp32-projects

9.simulation:

water_tank_detector - Wokwi ESP32, STM32, Arduino Simulator