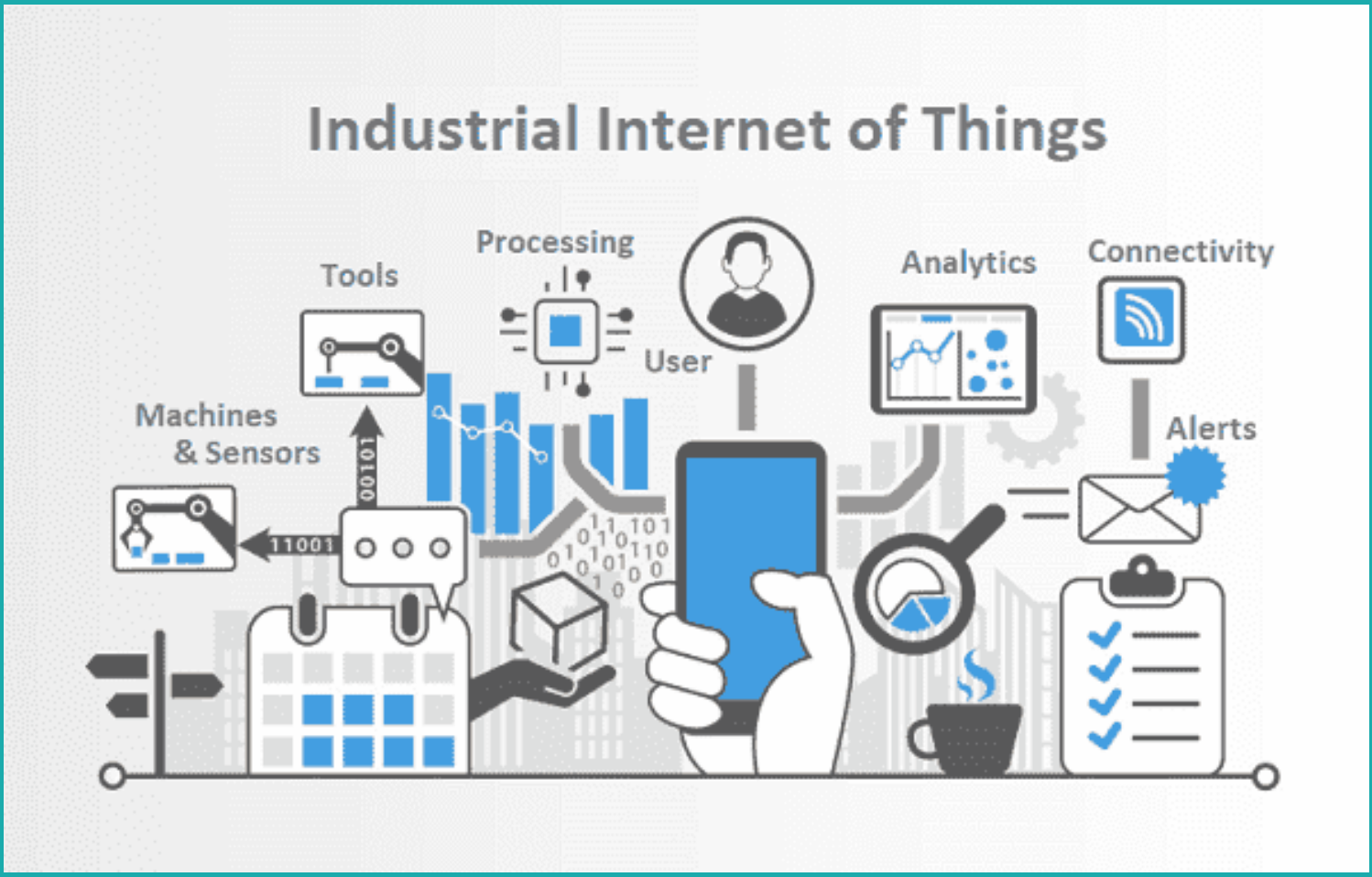
CO326
Final Project Report

Gruop 13

- Mahea Bandara E/18/036
- Lakshitha Konara E/18/181
- Yojith Sandaruwan E/18/150

About Project

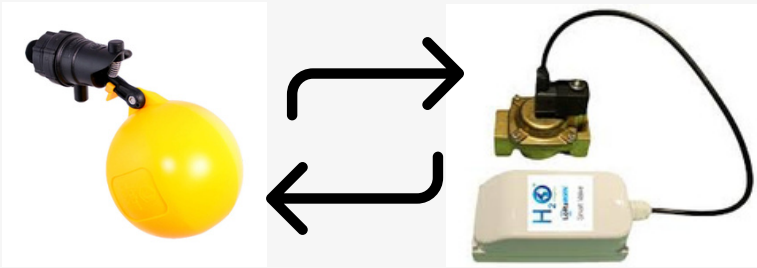


Introduction

A cutting-edge option for residential water tanks that allows real-time water level monitoring is the Smart Water Level Monitor. This system is practical and effective, using an ESP32 microcontroller, an ultrasonic sensor, a MQTT broker, and a database. Homeowners can monitor water levels with ease, make knowledgeable choices, and save water. It avoids overflows and makes sure there is a sufficient supply of water thanks to remote monitoring and prompt alarms. This approachable project encourages sustainability, improves home surroundings, and optimizes water management.

Project Description

Stock tank - Smart valve controller

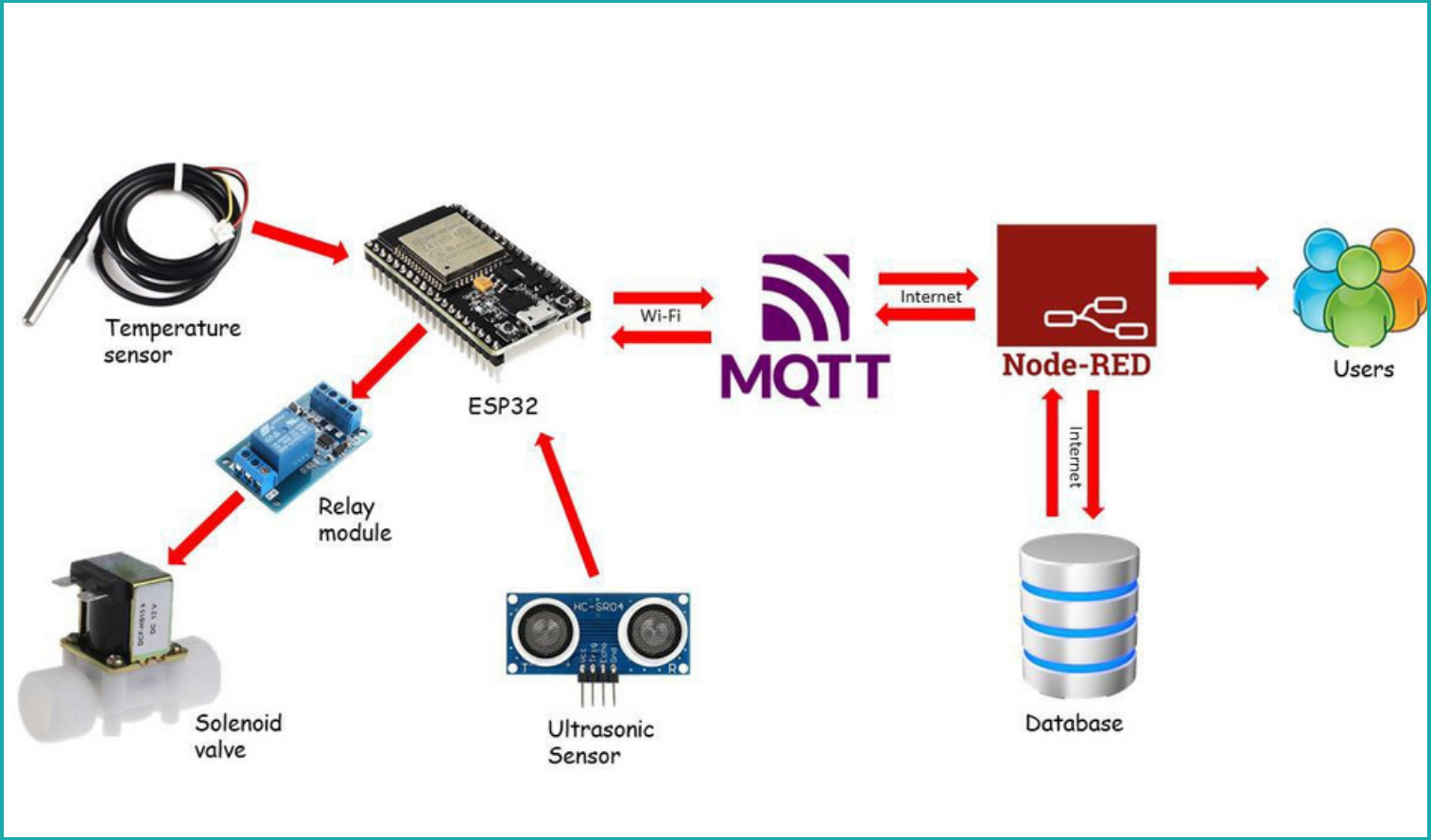


A precise and effective method of checking the water level in residential water tanks is offered by the Smart Water Level Monitor project. The project makes use of an ultrasonic sensor for accurate water level monitoring, an ESP32 microcontroller for overall control, and a MQTT broker for streamlined communication.

A database is also included in the project to save the sensor data for further study and reference. Real-time water level measurement is made possible by the ESP32 microcontroller and ultrasonic sensor through the use of sound waves that are emitted and distance measurements to the water's surface. Following collection, the data is sent to a MQTT broker, enabling simple interaction with other hardware and software for monitoring and analysis.

The project also contains a database where the water level information is kept. This makes it possible to track historical data, analyze trends, and produce insights about changes in water consumption and usage patterns. Making data-driven decisions, improving water management plans, and spotting any irregularities or patterns in water levels are all made possible by the database. The Smart Water Level Monitor project, in its entirety, integrates a database, an ESP32 microcontroller, an ultrasonic sensor, a MQTT broker, and other components to offer a comprehensive and effective method for managing and monitoring water levels. It improves remote monitoring, aids in better management of water resources, and enables data-driven decision-making based on previous water level data

Solution Architecture .....



Hardware components

HC-SR04 4 Pin Ultrasonic Sensor Modul

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The sensor module emits ultrasonic pulses at a frequency of around 40 kHz and detects the reflected pulses using the Echo pin. It has a beam angle of approximately 15 degrees and a sampling rate of no more than 0.5 Hz, making it suitable for applications where slower data acquisition is acceptable. With its small size of 15.1mm x 25mm x 7.7mm and 4-pin interface, it is easy to integrate into various electronic projects. The HC-SR04 sensor module is commonly used in applications such as home automation, weather monitoring, HVAC systems, and agriculture, due to its affordability, reliability, and accuracy in distance measurements using ultrasonic technology.

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NodeMcu ESP8266 (CH340G) Development Board

NodeMCU, with its built-in Wi-Fi capabilities and GPIO pins, is an ideal choice for your project. It allows you to connect water level sensors to measure the water level accurately and reliably. By utilizing the NodeMCU's Wi-Fi connectivity, you can send the measured data to a remote server or cloud platform for real-time monitoring and analysis. Additionally, you can use the GPIO pins to control valves based on the water level, enabling automated valve operations. NodeMCU's flexibility, programming options, and community support make it a valuable tool for your water level measurement and valve control project.

●Electric Solenoid Valve 0.5-inch 12VDC NC Plastic Water

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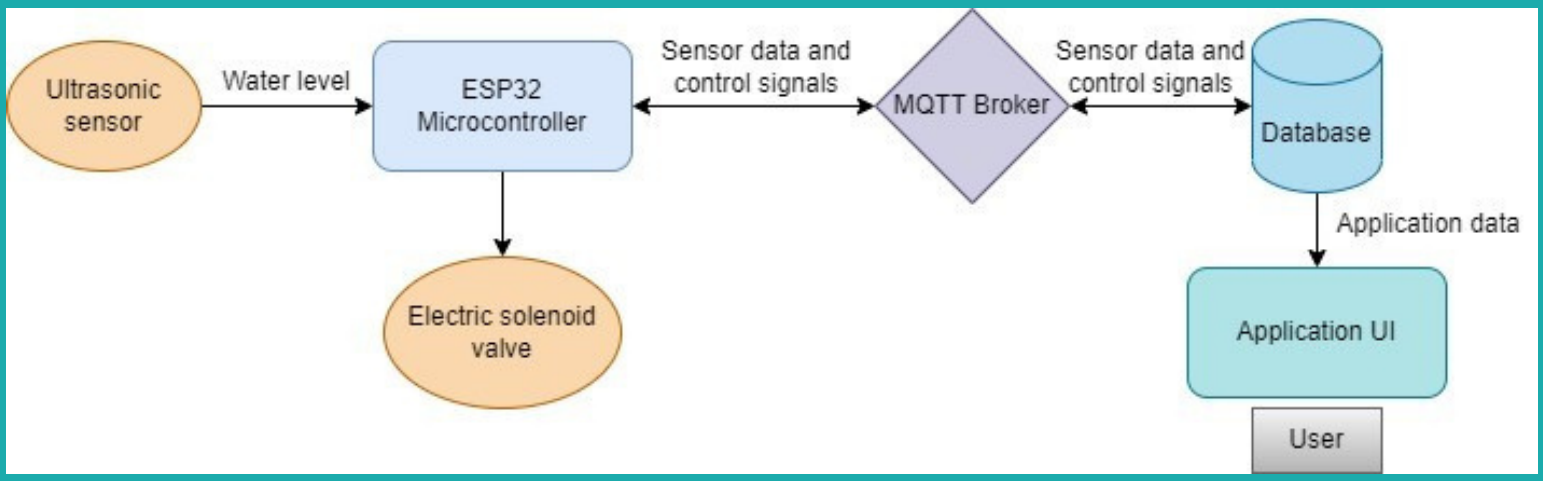
3V to 12V Relay

A 3V to 12V relay is an electromechanical switch that operates at a low voltage of 3 volts and can be triggered or activated by a higher voltage of 12 volts. It functions as a control device, allowing a low-voltage circuit to control a high-voltage circuit or load. The relay serves as an intermediary, enabling the low-voltage signal to energize an electromagnetic coil, which in turn switches the higher voltage circuit on or off. This type of relay is commonly used in various applications, including automotive, home automation, and industrial control systems, where it provides a reliable and safe means of controlling higher voltage components or systems using a lower voltage control signal.

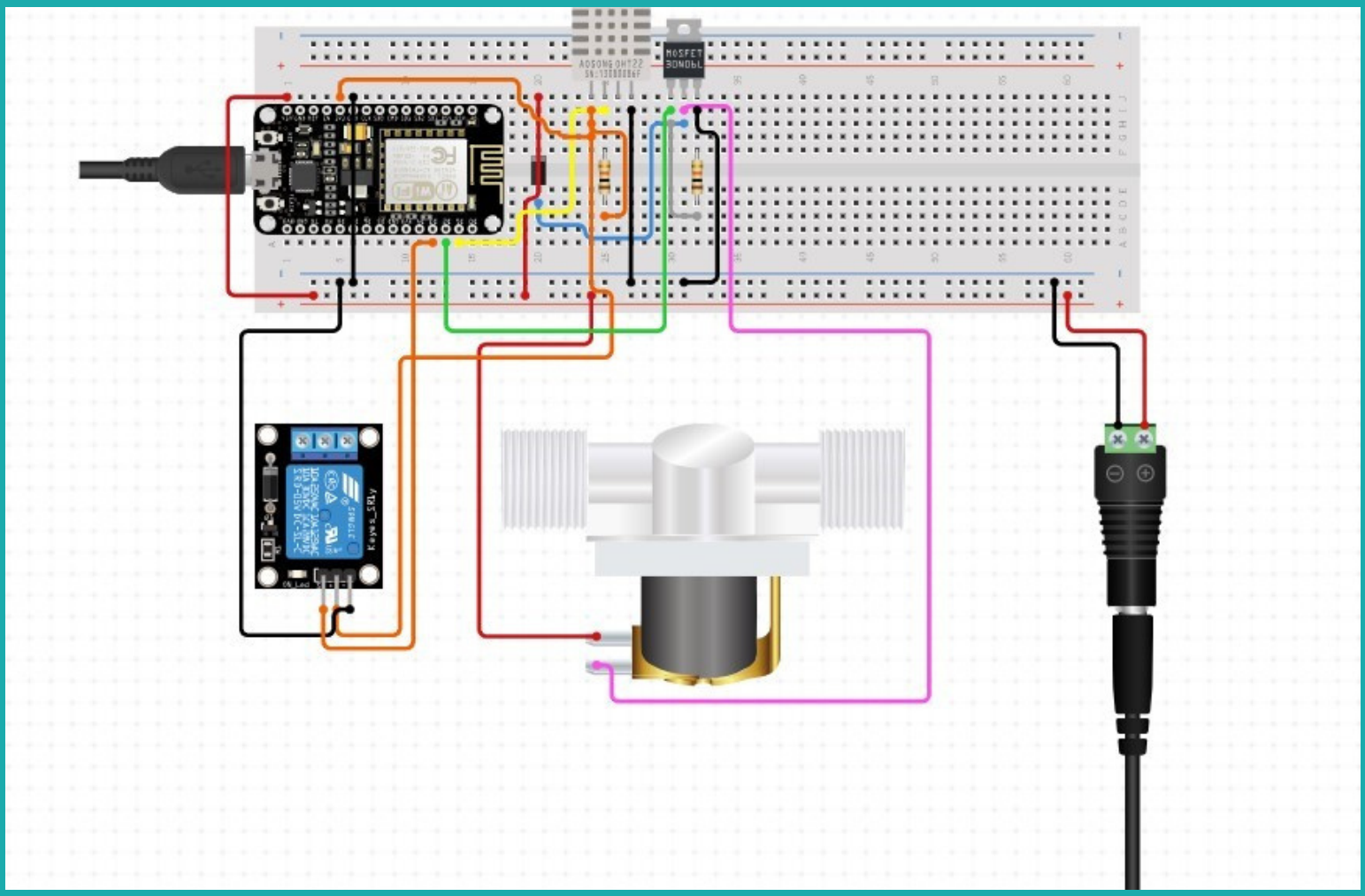
●●DHT21 Digital Temperature & Humidity Sensor

The DHT21 Digital Temperature & Humidity Sensor is a small electronic device that accurately measures both temperature and humidity levels in the surrounding environment. It utilizes a digital interface to provide precise readings and features a built-in sensor element for reliable data collection. The DHT21 is commonly used in various applications, such as weather monitoring, indoor climate control systems, and smart home automation. With its compact size and easy-to-use design, it offers a convenient solution for measuring temperature and humidity with high accuracy.

High Level SolutionArchitecture.....



Circuit Diagram .....



Budget Breakdown

EQUIPMENT	ESTIMATED BUDGET
NODEMCU	1150
ULTRASONIC SENSOR	310
3V TO 12V RELAY	350
DHT21	1650
SOLENOID VALVE	1000
OTHERS	1000
TOTAL	5460