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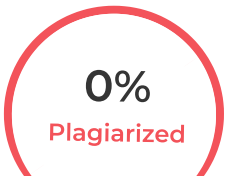
Plagiarism Scan Report



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Project Description: For our course CSE 412, we have taken up a very interesting and hands-on project, the Water Level Monitoring System. The project, for us, was not just a mere exercise for the classroom; it was actually the application of our learning. It required a system to monitor water levels with accuracy, hence the use of the ESP8266 microcontroller and ultrasonic sensor. In this way, we could measure the water levels only by sensing, which represents great importance for tasks such as water tank maintenance, irrigation system management, and even management of environmental water sources. This was such an interesting project since it was a mix of interfacing with hardware and software programming, which gave us hands-on experience within the domain of the Internet of Things. It has been a great platform to see interaction by which the operating systems can control the hardware and how these skills could be put to use to solve practical problems. In this project, we were really not learning coding or circuits but trying to understand how to fit all the pieces together in order to eventually come up with a tool that is functional and valuable. This was a step forward in the direction of making theoretical knowledge practical in the field of computer science and engineering. Environment setup: For our Water Level Monitoring System, our data collection is simple and automated. The way the process is explained: Measurement: Ultrasonic sensor is mounted at a certain point and measures the distance to the water surface. Every time the ultrasonic function is called in the implementation of the loop. Data Processing: The ESP8266 microcontroller processes the water level by subtracting this distance from the actual distance of maximum level of the tank. We store each reading in an array for averaging. Averaging: After every 20 readings, the system does average measurements for the water levels. This is done by merely adding up all the readings in the array and finding their means by division by 20. Data Transmission: The current water level is transmitted to the Blynk application after each measurement (up to the Blynk command Blynk.virtualWrite(V0, blynkDistance)). A 20th measurement average readings are sent after the 20th measurement (using the Blynk command Blynk.virtualWrite(V2, MaxLevel-average)). Display: The current water level and average (on the 20th average reading) are displayed on the LCD display concurrently for live viewing. With this, we can monitor and record the water level at each instance or in real time, whereby we monitor it instantly or get it as averaged data for general water level observations. Data Collection

Procedure: The HC-SR04 ultrasonic sensor will be interfaced with the ESP8266 microcontroller by interfacing the trigger pin and echo pin with the assigned GPIO pins. The sensor generates high-frequency sound pulse and the pulse travels across space, then reflects from the water surface, and its echo is collected at the receiver pin. The ESP8266 microcontroller will sense the time taken by the pulse in travel to the water surface and back. The round-trip time is then used to calculate distance to water surface by the speed of sound. The distance data detected is further processed by ESP8266 and hence can be displayed on an LCD or can be sent over to a server or even used to control any other device based on preset thresholds like water pumps or alarms. Data Visualization: Our project on the water level monitoring system is reliant upon the Blynk platform for a rich and easy-to-use data visualization experience. We approached how to achieve the goal of obtaining this by creating the dashboards, either one, each tailor-made for one of the platforms. Web Dashboard: The dashboard is constructed for desktop display and large screen interactions. It is useful in giving an overview of data on the water level. The dashboard is quite successful, especially in analysis and long-term monitoring. Mobile Dashboard: The mobile dashboard is designed for high portability and the ability to receive water level data in any part of the world. The overall design for this application focused on the clarity and simplification of reading and use on small screens. Both dashboards were equipped with two key gauge components: Current Water Level Gauge: This is a gauge component showing the water levels in the tank in real time. This is important for easy observation of the instantaneous status. Average Water Level Gauge: This is a gauge that gives a more stabilized, less fluctuating view of the water level trends. It calculates and displays the average value of the water level over a predetermined number of readings. It was through these dashboards that we managed to achieve very dynamic and effective ways of visualization and interpretation of our system's data, helping us increase our understanding and respond toward water-level changes. Conclusion: This ESP8266 microcontroller-based water level monitoring system is developed with the best efficiency for measurement and monitoring by the ultrasonic sensor. The system will have real-time visual indication with LEDs and an LCD display to get precise control and management of the water level movements. It then incorporates a relay module, through which immobilization—on and off of the water pump—is done by the system. This increases the reliability and the performance of the system in different applications. References: ESP8266 Documentation: ESP8266 NodeMCU Documentation for the ESP8266 microcontroller itself is pretty informative in terms of capability and program features. Ultrasonic Sensor Datasheet: HC-SR04 Ultrasonic Sensor Datasheet offers detailed specifications and operational guidelines for the ultrasonic sensor. Online Tutorials: How to Interface Ultrasonic Sensor with ESP8266 from Random Tutorials provides a step-by-step guide on connecting and programming the ultrasonic sensor with the ESP8266. Water Level Monitoring System Using ESP8266 and Ultrasonic Sensor on Circuit Digest gives a comprehensive tutorial on building a water level monitoring system. YouTube Videos: ESP8266

NodeMCU and Ultrasonic Sensor Tutorial on YouTube provides a visual and practical demonstration of setting up and programming the sensor with the ESP8266.

Sources