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# IOT - Based Water Management System

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**ABSTRACT:** An IoT-based water management system using the NODE MCU microcontroller, solenoid valve, flow sensor, relay module, water level indicator circuit, and Blynk app can be used to control and monitor the flow of water in a variety of applications, such as irrigation systems, water tanks, and pipelines. The NODE MCU microcontroller is a low-cost, low-power microcontroller that is well suited for IoT applications. It has built-in Wi-Fi and Bluetooth connectivity, which allows it to communicate with other devices and the cloud. The solenoid valve is a valve that is controlled by an electric current. When the current is applied, the valve opens, allowing water to flow. When the current is removed, the valve closes, stopping the flow of water. The flow sensor is a sensor that measures the rate of flow of water. It can be used to detect leaks, measure water consumption, and control the flow of water. The relay module is used to control the solenoid valve. It is a switch that is controlled by a low-voltage signal from the NODE MCU microcontroller. When the signal is applied, the relay module switches on, allowing the current to flow to the solenoid valve, opening the valve. When the signal is removed, the relay module switches off, stopping the flow of current to the solenoid valve, closing the valve. The water level indicator circuit is used to measure the water level in a tank or reservoir. It can be used to detect overfilling and underfilling, and to control the flow of water into and out of the tank or reservoir. The Blynk app is a mobile app that can be used to control and monitor IoT devices. It provides a user friendly interface for creating dashboards to display data from sensors and actuators, and for sending commands to control devices. System academic certificates, employers, educational institutions, and other relevant parties can make informed decisions based on accurate information. The benefits are numerous. Firstly, it helps prevent fraud and misrepresentation of qualifications, ensuring that individuals are qualified for the positions they apply for. This enhances the credibility and integrity of the hiring process and educational institutions. Additionally, it helps protect employers and educational institutions from potential legal and reputational risks associated with hiring or admitting individuals with fraudulent or inadequate qualifications. Furthermore, . promotes a fair and competitive environment by ensuring that individuals are evaluated based on their genuine qualifications, rather than false claims

**KEYWORDS:** Internet of Things, IoT communication technologies, IoT services, water distribution network ect

## I. INTRODUCTION

An IoT-based water management system using an NODE MCU microcontroller, solenoid valve, flow sensor, relay module, water level indicator circuit, and Blynk app can be used to remotely control and monitor the flow of water in a variety of applications, such as:

**Water conservation:** The system can be used to automatically turn off water pumps when tanks are full or when leaks are detected, which can help to save water and reduce costs.

**Irrigation:** The system can be used to automate the watering of lawns and gardens, ensuring that plants receive the right amount of water at the right time.

**Industrial applications:** The system can be used to monitor and control the flow of water in industrial processes, such as food and beverage production, chemical processing, and manufacturing. The system works by using the NODE MCU microcontroller to read the water level sensor and flow sensor data. The NODE MCU then uses this data to control the solenoid valve, which turns the water on and off. The relay module is used to amplify the NODE MCU's output signal so that it can control the solenoid valve. The water level indicator circuit is used to provide a visual indication of the water level in the tank. The Blynk app is used to provide a remote interface for controlling and monitoring the system.

Problem Water is a precious resource, and it is important to manage it efficiently. However, traditional water management systems are often inefficient and wasteful. For example, they may rely on manual monitoring and control, which can lead to human error and delays. Additionally, traditional systems may not be able to provide real-time data on water usage, which can make it difficult to identify and address problems. Solution An IoT-based water management system using an NODE MCU microcontroller can solve these problems. An NODE MCU microcontroller is a lowcost, low-power device that is well-suited for IoT applications. It has built-in Wi-Fi and Bluetooth connectivity, which makes it easy to connect to other devices and send data to the cloud. The system can be implemented using the following components: NODE MCU microcontroller Solenoid valve Flow sensor Relay module Water level indicator circuit Blynk app The NODE MCU microcontroller will be used to monitor the water level and flow, and to control the solenoid valve. The flow sensor will be used to measure the flow of water, and the water level indicator circuit will be used to de-tect the water level in the tank. The relay module will be used to control the solenoid valve. The Blynk app will be used to monitor and control the system remotely. Methodologies of Problem Solving The following methodologies can be used to solve the problem of water management inefficiency: Data collection: The first step is to collect data on water usage. This data can be collected using sensors, such as flow sensors and water level sensors. Data analysis: The collected data can be analyzed to identify trends and patterns in water usage. This analysis can be used to identify areas where water is being wasted. Problem identification: Once the areas of water wastage have been identified, the root cause of the problem can be investigated. Solution design: Once the root cause of the problem has been identified, a solution can be designed. The solution may involve changes in equipment, procedures, or both. Implementation and monitoring: The solution can then be implemented and monitored to ensure that it is effective.

## II. RELATED WORK

The system consists of an NODE MCU microcontroller connected to a solenoid valve, flow sensor, relay module, and water level indicator circuit. The NODE MCU microcontroller is responsible for monitoring the water level and controlling the solenoid valve. The flow sensor measures the rate of water flow, and the relay module is used to turn on and off the water pump. The water level indicator circuit is used to indicate the water level in the tank. The NODE MCU microcontroller is connected to the internet using Wi-Fi. The Blynk app is used to control and monitor the system remotely.

The NODE MCU microcontroller continuously monitors the water level in the tank. If the water level drops below a certain threshold, the NODE MCU microcontroller turns on the solenoid valve, allowing water to flow into the tank. The flow sensor measures the rate of water flow and sends the data to the NODE MCU microcontroller. The NODE MCU microcontroller uses this data to calculate the total amount of water that has flowed into the tank. Once the water level reaches the desired level, the ESP32 microcontroller turns off the solenoid valve. The Blynk app is used to monitor the water level in the tank and to control the solenoid valve. The app displays the current water level in the tank and allows the user to turn on and off the solenoid valve remotely.

An IoTbased water management system can help to con-serve water by reducing water wastage. The system can be programmed to turn off the water supply automatically when the tank is full or when there is no water flow. An IoT-based water management system can help to improve the efficiency of water management. The system can be programmed to water plants at specific times and days of the week. The system can also be used to monitor the water level in the tank and to receive alerts if the water level drops below acertain threshold.

An IoTbased water management system can be monitored and controlled remotely using a smartphone or computer. This can be useful for people who need to monitor the water level in their tank while they are away from home.

## III. PROPOSED METHODOLOGY

The water management system works as follows:

The NODE MCU microcontroller reads the data from the flow sensor and water level indicator circuit. The NODE MCU microcontroller compares the water level to the desired water level. If the water level is below the desired water level, the NODE MCU microcontroller sends a signal to the relay module to turn on the solenoid valve. The solenoid valve opens and allows water to flow into the tank. The NODE MCU microcontroller monitors the water level until it reaches the desired water level. Once the desired water level is reached, the NODE MCU microcontroller sends a signal to the relay module to turn off the solenoid valve. The solenoid valve closes and stops the flow of water. The NODE



MCU microcontroller also sends the water level and flow rate data to the Blynk app over the internet. Users can view this data on the Blynk app and also use the app to control the solenoid valve and turn the water on and off manually

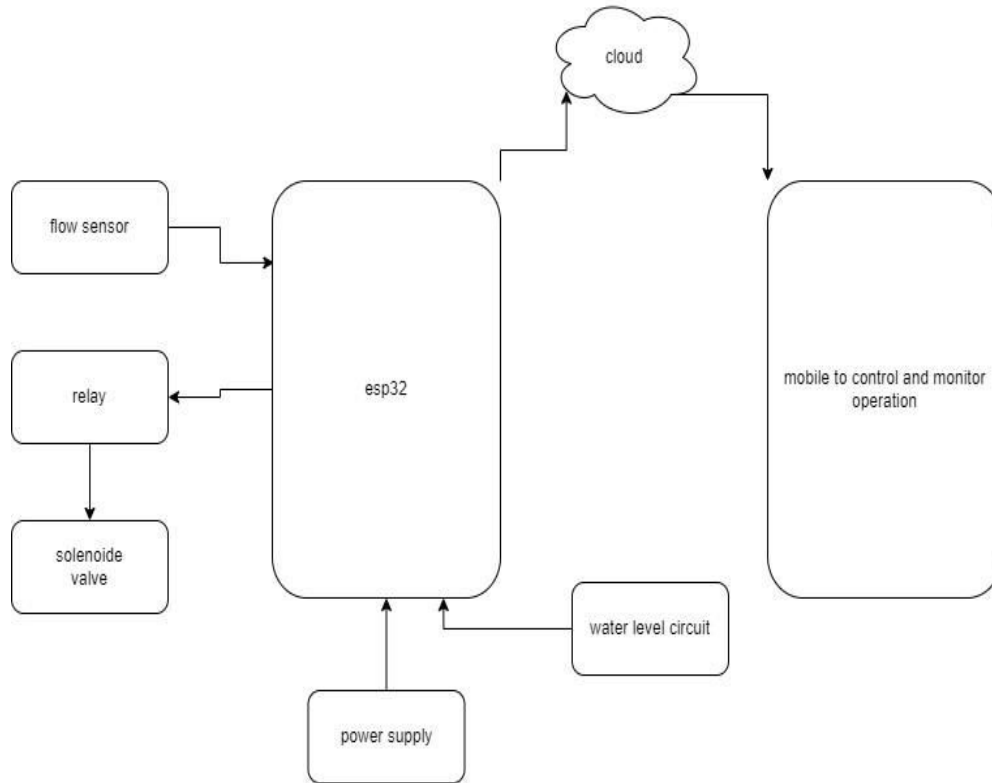


Figure 1: System Architecture

#### IV. WORKING MODULE

The NODE MCU microcontroller is the central unit of the system. It is responsible for reading the data from the sensors, controlling the solenoid valve, and communicating with the Blynk app. The solenoid valve is used to control the flow of water. It is connected to the NODE MCU microcontroller through the relay module. When the NODE MCU microcontroller sends a signal to the relay module, the solenoid valve opens and allows water to flow. The solenoid valve is used to control the flow of water. It is connected to the NODE MCU microcontroller through the relay module. When the NODE MCU microcontroller sends a signal to the relay module, the solenoid valve opens and allows water to flow.

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#### V. CONCLUSION

An IoT-based water management system using an NODE MCU microcontroller is a versatile and cost-effective solution for a variety of water management applications. It can be used to improve efficiency, conserve water, and reduce costs. This system has the potential to help users to save water and reduce their water bills. It can also be used to improve water conservation efforts in agriculture and other industries.

In the future, the system can be extended to include additional features, such as: Support for additional types of sensors, such as water quality sensors and soil moisture sensors. And Integration with other smart home

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