

WATER MANAGEMENT SYSTEM BASED ON IOT

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Abstract:

This project aims in providing a user friendly, reliable and automated water pumping system at fields. Now a day's technology is running with time, it completely occupied the life style of human beings. Even though there is such an importance for technology in our routine life there are even people whose life styles are very far to this well-known term technology. So it is our responsibility to design few reliable systems which can be even efficiently used by them. This basic idea gave birth to the project Node MCU based water pump controller at fields using Relay switches. The project mainly aims in designing water management system using soil moisture sensors at fields and water level sensor near water tank. Here the automation process is done through the Node MCU, status of the water pumps and main motor is sent to Blynk application using IoT.

Keywords:

Power supply, Node MCU, Water level sensor, Soil moisture sensor, LED indicator, Relay with driver.

1. Introduction:

Internet of Things (IoT) is rapidly increasing technology. IoT is the network of physical objects or things embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data. In this paper, we are developing a system which will automatically monitor the water pumps at agriculture fields and control them using relay switches.

In our project we make use of one Node MCU, which is dedicated at the water pump. The Node MCU forms the heart of the device and soil moisture sensors which are placed at the field meant for detecting the moisture in the soil and controls the water pumps using relay switches. We use water level sensor placed at the water tank checks the water level inside the

tank and controls the main water motor using relay switch when the sensor detects overflow of water. The status of the water pumps and main water motor details can be sent to the Blynk App Application using IoT.

The design of this system is very much sensitive and should be handled with utmost care because the sensors and Node MCU uses 5 volts device and it is employed to monitor the house hold power consumption per day where it should be interfaced with a 240 volts energy meter. So every small parameter should be given high importance while designing the interfacing circuit between the controller and the water motor.

2. LITERATURE SURVEY:

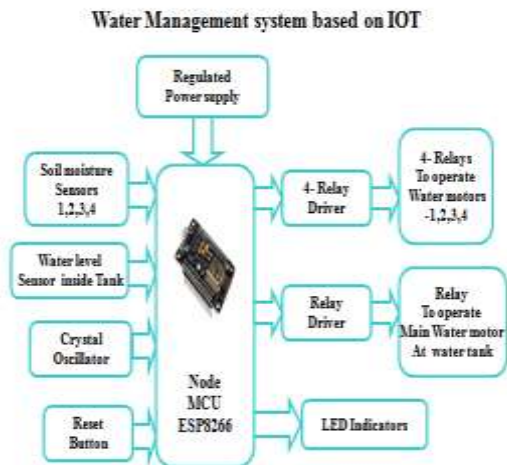
FIWARE has been used as a computing platform for many IoT-based applications for smart farming. Rodriguez et al. compiled a short literature review and presented the Agriculus platform for precision farming. López-Riquelme et al. presented an implementation of FIWARE for a specific scenario of precision irrigation in agriculture in the south of Spain, however, it is focused on a specific use case, providing details of devices and equipment, as well as irrigation techniques. In contrast, this paper presents an architecture and a platform based on FIWARE, as well as configurations for system deployments in four scenarios.

Abhishek Gupta, Automated Plant Watering System In, the paper demonstrates the integration of all the hardware parts related to agriculture. Soil moisture sensor is used for detecting dryness of soil and according to the value detected by sensor watering will be done to the plant. Efficient use of all the hardware whichever is used for developing the system.

K.Lokesh Krishna , A ZigBee based Energy Efficient Environmental Monitoring Alerting and Controlling System in this Paper a novel ZigBee based energy efficient environmental monitoring, alerting and controlling system for agriculture is designed and

implemented. This system utilizes an ARM7 processor, various sensors and ZigBee communication module. Sensors gather various physical data from the field in real time and transmit it to the processor and to the end user via ZigBee communication. Then necessary actions are initiated to perform action on behalf of people to reduce or eliminate the need for human labor.

3. Implementation:



3.1 Block diagram of WATER MANAGEMENT SYSTEM BASED ON IOT

The design can be implemented with NodeMCU module. The interfaced devices to the NodeMCU are 4 soil moisture sensors which is placed at the field, 4 field motors which is used to pump the water at the field, main water motor which is used to fill the water into the main water tank, water level sensor which is placed in side of the water tank to measure the water level. Here relays works as a switch to on and off the field motors and main motor. 5 relays are interfaced to the NodeMCU module. NodeMCU module continuously read the data from soil moisture sensors and water level sensor. Based on the moisture level the system switches on/off the field motors through relay. And also the system monitor the water level inside the tank and based on that the system switches on/off the main water motor trough relay. The main controlling device of the project is NodeMCU module and it has inbuilt Wi-Fi and user get the status of the water pumps and main water motor into the blynk APP over IOT so user can check his field from anywhere in the world.

4. Related Work:

The brief introduction of different modules used in this project is discussed below:

4.1. Nodemcu:



Fig: NodeMCU

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.

The NodeMCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs.

FEATURES:

- The ESP8266 NodeMCU has total 17 GPIO pins broken out to the pin headers on both sides of the development board. These pins can be assigned to all sorts of peripheral duties, including:
- ADC channel – A 10-bit ADC channel.
- UART interface – UART interface is used to load code serially.
- PWM outputs – PWM pins for dimming LEDs or controlling motors.
- SPI, I2C & I2S interface – SPI and I2C interface to hook up all sorts of sensors and peripherals.
- I2S interface – I2S interface if you want to add sound to your project.

4.2. Water level sensor:



Fig: water level sensor

A float switch is a device used to sense the level of liquid within a tank. The switch may actuate a pump, an indicator, an alarm, or other device. Use them with hydroponics, saltwater tank, freshwater tank, gardening, aquariums for power head control, pet bowls, fish tanks, filtration, heating, pumps, ponds, basement alarms, boats, air condition drain pans, pressure washers, carpet cleaning mach, reef aquarium, fluid control, ice machines, coffee pots, marine, automotive, automobiles, tropical fish tanks, evaporator coils, condensation line, in relays, or whatever your project may be. It can be easily converted from normally open to normally close by inverting the float.

Specifications:-

- Cable Length: 30.5(cm)
- Maximum Load: 50 W
- Max Switching Voltage: 100V DC
- Minimum Voltage: 250V DC
- Maximum Switching Current: 0.5 A
- Max Load Current: 1.0 A
- Max Contact Resistance: 0.4 Ω Temp Rating: -20~ 80 degree

4.3. Soil moisture sensor:

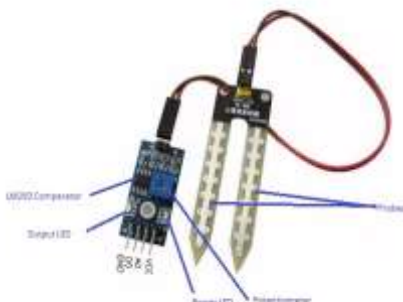


Fig: soil moisture sensor

Moisture sensor will be used to find presence of moisture at soil. We will insert this sensor in to the soil. It always check the presence of moisture. If the

soil is dry/wet then it will give information to Microcontroller for monitoring. This sensor measures the volumetric content of water inside the soil and gives us the moisture level as output. The sensor is equipped with both analog and digital output, so it can be used in both analog and digital mode.

4.4 Relay:



Fig : Relays

Relay is an electromagnetic switch. . It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a movable iron armature, and a set, or sets, of contacts; two in the relay pictured. The armature is hinged to the yoke and mechanically linked to a moving contact or contacts.

When an electric current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact

5. CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arduino. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for “**WATER MANAGEMENT SYSTEM BASED ON IOT**” has been designed perfectly. The device provides an automated solution to continuously monitor the moisture availability in the paddy fields and turns OFF the motor automatically. It reduces the burden to human beings and being a device the OFF timings are strictly implemented which is going to be the important in cultivation. The system able to send the status about field motor and main motor to the blynk APP over IOT.

6. ACKNOWLEDGEMENT

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7. RESULTS:

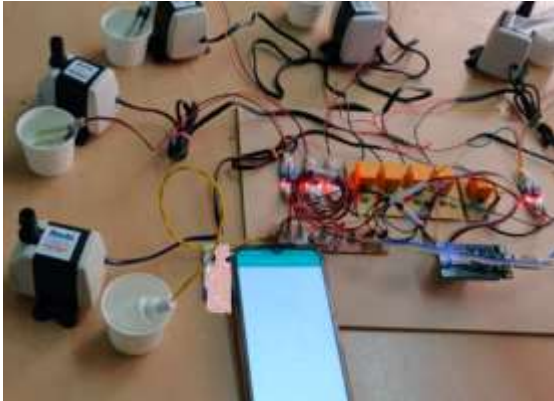


Fig: project output image

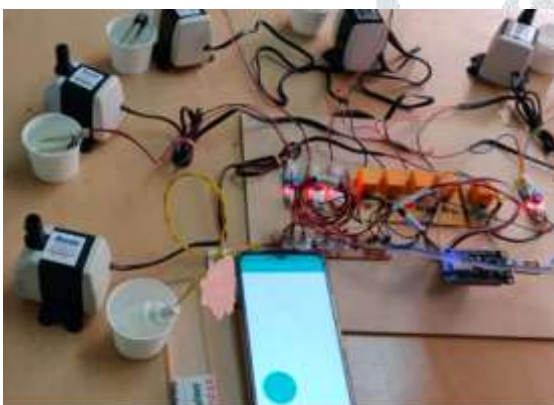


Fig: 7.3 Field motor status into the blynk app



Fig: 7.4 Main water motor status into the blynk app

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