SMART IRRIGATION CARE UNIT

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Abstract: The proposed system mainly focuses on an efficient economical and automated solution for irrigation and Ph. detection. This irrigation care unit that carries water tank and fertilizers module using "INTERNET OF THINGS (IOT)" farmers get information about soil which connects the different sensors, control unit and other embedded services. Hence, in this proposed system all those parameters are detected and controlled with the help of node MCU. Moisture sensor to detect moisture content. Which pH sensor to detect the pH value of soil. Wi-Fi is used to display the information to the farmers. These devices are having an influence on reducing costs and reduce the time.

Index Terms – **Moisture sensor, ph sensor, IoT, Node MCU**

I. INTRODUCTION

Plant plays a crucial role in the survival of human life in such a way that they provide oxygen when we need it. To get a better crop, the most important things that should be there in the land that has accurate fertilizer, better irrigation facilities and best methods for cultivation. This project is a smart farming system based on internet of things which has brought changes to every field of common man's life by making everything smart and intelligent. This project aims to innovate a small IOT based agriculture guides the farmers by the updated data like pH and moisture detection of soil. Thus it makes the farmers yield good profits. This project proposed using node MCU technology, a breadboard with different sensors and live data will feed to the farmers. There are different types of method for irrigating farms for different types of crops. most commonly, farmer use methods like channel or canal system, sprinkler system, dripping system etc. Here we propose a smart irrigation system in which soil moisture sensor and pH sensor is used for feedback to the valve and the motor for water and fertilizer supply

II. METHODOLOGY

Almost every system can be automated with the help of timers, sensors, or computers, this is also true for our proposed system. this system carries water and fertilizers tanks on both sides. The moisture level of the soil is sensed by the sensor which gives the signal to the controlling module whether the land needs water or not. When the soil is dry, water is sprinkled on the dry land through a solenoid 2-way motor by turning on the switch and the pH level of the soil is sensed by the pH sensor, when the soil pH is greater or less than the threshold value i.e., 6.5 to 7.5, the fertilizer is sprinkled through a solenoid 3-way motor by turning on the Switch
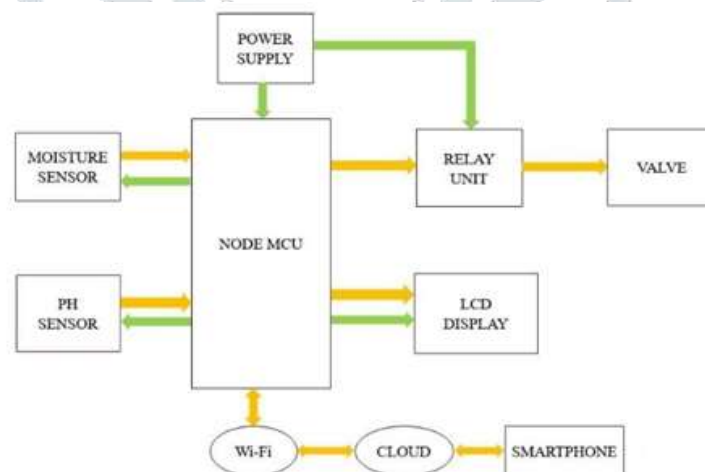

Fig 1 Block diagram

Wi-Fi is used to display the information to the farmers. These devices are having an influence on reducing costs and reduce the time. This system consists of two solenoid valve (2-way and 3-way) 2-way is used for moisture sensor and 3-way is used for pH sensor and last thing is LCD display finally the output of the sensors are shown in LCD display and data sense to user through Wi-Fi.

III. PROPOSED SYSTEM

Our study is the extension of the existing system as we are using the latest IOT technology, which helps in collecting information about condition like moisture and pH of the soil, of the field. Sensors like moisture, pH are used for the detection of the plant condition and here node MCU are used to control and automate the farm processing. Here GSM module is used to control and automate the farming processing. GSM module is used for sending and receiving the updated message through smart phones to the farmers with the ongoing condition of his agriculture land using IOT at any time and any part of the world.
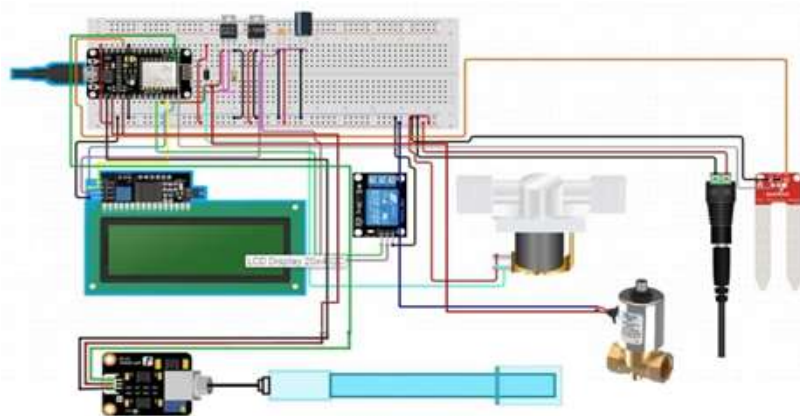
Fig 2 proposed system

This is the schematic diagram of this proposed system. It is having a node MCU (ESP8266). Then the moisture sensor and the pH sensor is connected to the node MCU. Sensors senses the given data and send to node MCU. Our next connection is the relay unit. The relay unit here acts as switching circuit. It uses an electromagnet to turn on or off, so here we are supplying 12v. Then if the moisture value is less than threshold value, the relay is energized and the switch is on so the valve is open also same procedure for pH sensor. This system consists of two-solenoid valve (2-way and 3-way). 2-way is used for moisture sensor and 3-way is used for pH sensor and the last thing is LCD display. Finally, the output of the sensors is shown in LCD display and data sense to user through Wi-Fi.

IV. HARDWARE USED

This project consists of many hardware components. This proposed system helps to enable the different types of sensors throw the communication with the node MCU. This system helps the farmers

4.1 Node MCU

Esp8266 is a low cost Wi-Fi microchip. This is referred to as a mini board. It has various types of pins that is analog and digital pins. There are14 digital and six analog pins.

Fig 3 Node MCU

4.2 LCD Display

LCD is a flat panel display technology. It also uses in screens for mobile devices such as laptops tablets and mobile phones. Here we are using 20*4 LCD display.

Fig 4 LCD display

4.3 Relay unit

A relay is an electrically operated switch. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults. In modern electric power systems, these functions are performed by digital instruments still called protective relays

Fig 5 relay unit

4.4 Solenoid Valve

A solenoid valve is an electromechanical operated valve. Here we are using two types solenoid valve a two- way valve and a three -way valve. The node MCU ESP8266 also has two outputs that are connected to two relays.

Fig 6 Two-way valve   *Fig 7 three-way valve*

4.5 ph Sensor

A pH sensor is an instrument used to measure hydrogen ion activity in solutions in other words this instrument measures acidity and alkalinity of solution. A glass membrane is fused on as a pH sensor. This membrane is filled with a buffer solution of known Ph. The difference in H^+ ions creates a potential that is read verses the stable potential of the reference.

Fig 8 ph sensor

4.6 Moisture Sensor

Soil moisture sensors measure the volumetric water content in the soil. A small charge is placed on the electrodes and electrical resistance through the sensor is measured. As water is used by plants or as the soil moisture decreases, water is drawn from the sensor and resistance increases. Conversely, as soil moisture increases, resistance decreases
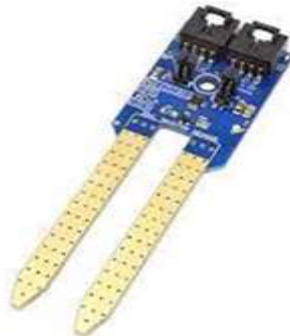

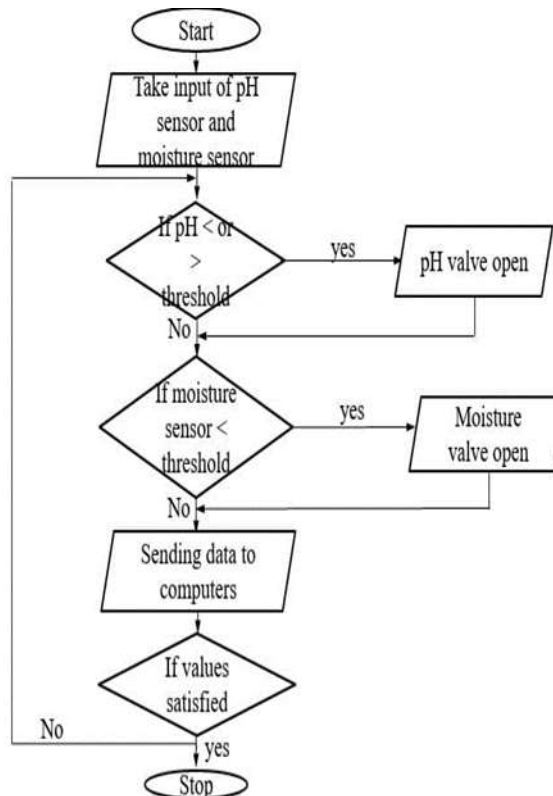*Fig 9 Moisture sensor*

V.FLOW CHART REPRESENTATION

Fig 10 flow chart

VI. RESULTS AND DISCUSSION

This project is interconnected with both hardware and software. The hardware consists of Node MCU with an inbuilt Wi-Fi module, Moisture sensor, pH sensor, and GSM module whereas software includes Embedded „C", Eagle software for PCB designing. Then we will connect the components to the Arduino Uno. The power supply will be automatically supplied from the node MCU of 5V. Also, connect the node MCU to GSM Module to deliver the SMS for the Farmer. After ensuring that the given connections are correct, then its corresponding code will be dump into the microcontroller so that the dumped code will not be erased until and unless another code will be dumped. Thus, the accurate results will be displayed on the LCD as well as message will convey to the farmer accordingly.
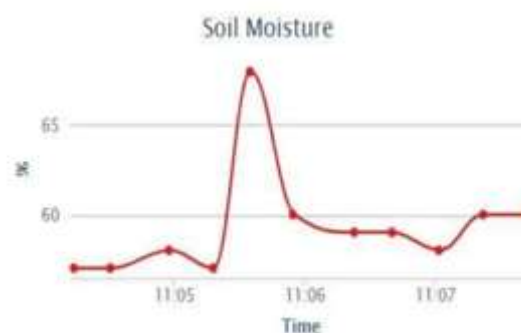

Fig 11 result

The figure shows the output of the moisture sensor. The x- axis represents the time and y- axis represents the moisture content in percentage. The normal moisture content for soil is 40- 60%. Initially the moisture content is below 60%. When water is poured, the moisture content increases to above 65% and decreases as the water goes deeper into the soil. It comes to point 60%.

VII.CONCLUSION

The system to monitor the soil of field using Node MCU, IOT Technology is proposed to improve quality of soil. With the use of IOT technology enhances the process of monitoring various aspects of soil such as pH value and moisture content issues proposed in this paper. Here, using the pH sensor gives the sense of different pH values of soil and moisture sensor senses the moisture content. Node MCU is the heart of this project, which control the entire process. Wi-Fi module connects the whole process to internet and LCD is used for the visual Output.

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