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IoT Based Smart Agriculture System

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Abstract: *In every country agriculture is done from ages which are considered to be science and also art of cultivating plants. In day today life, technology is updating and it is also necessary to trend up agriculture too. IoT plays a key role in smart agriculture. Internets of Things (IoT) sensors are used to provide necessary information about agriculture fields. The main advantage of IoT is to monitor the agriculture by using the wireless sensor networks and collect the data from different sensors which are deployed at various no des and send by wireless protocol. By using IoT system the smart agriculture is powered by Node MCU. It includes the NPK sensor, moisture sensor and DC motor. This system starts to check the NPK level and moisture level. The sensors are used to sense the level of water & fertilizer and if the level is below the range, then the system automatically stars watering. According to the change in temperature level the sensor does its job. IoT also shows the information of NPK level, moisture level by including date and time*

Keywords: IoT, Soil Moisture and NPK sensors, Relay, Wi-Fi module ESP8266, GPS, etc

I. INTRODUCTION

This project is a combination of hardware and software. The hardware is consisting of Power source, Moisture Sensor, NPK sensor, display peripheral (in this case we use LED display module) and the Wi-Fi module ESP8255 microcontroller. firstly, NPK sensor check the contain of fertilizer in soil. The contain of fertilizer in soil is above the threshold value then the motor will be off and the contain of fertilizer in the soil is below the threshold value then motor will be started. The microcontroller sends the SMS to registered mobile number thought GSM module. IoT also shows the information of NPK level, moisture level by including date and time.

II. LITERATURE SURVEY

Soil is of great importance to agriculture, especially the moisture and nutrients in the soil are the essential ingredients for growing plants and crops. Therefore, benefits and importance of a soil moisture and nutrient monitoring system in modern agriculture and gardening is undeniable. It can also be an interesting feature of an intelligent home or smart agriculture system using the internet of things (IoT) technology. This paper presents an IoT application in Arduino platform aiming to monitor the change in soil moisture and Nitrogen (N), Phosphorus (P), Potassium (K) (NPK) value for an indoor plant using moisture sensors.

An IOT Based Crop-field monitoring an irrigation automation system describes how to monitor a crop field. A system is developed by using sensors and according to the decision from a server based on sensed data, the irrigation system is automated. Through wireless transmission the sensed data is forwarded to web server database. If the irrigation is automated then the moisture and fertilizer of fields are decreased below the potential range. The user can monitor and control the system remotely with the help of application which provides a web interface to user. By smart Agriculture monitoring system and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method farmers by themselves verify all the parameter and calculate the reading. The system focuses on developing devices and tool to manage, display and alert the users using the advantages of a sensor network system. It aims at mak0ing agriculture smart using IoT technologies.

III. METHODOLOGY

Power supplied to node MUC 8266 through power supply and voltage regulator. Soil Moisture sensor senses the moisture content in the soil. If the measured moisture content of the soil is higher than the predetermined value then no signal will be sent to relay through node MUC 8266. Drip Irrigation pump will be in OFF State. If the measured moisture content of the soil is lower than the predetermined value then output signal will be sent to relay through Node MUC 8266.

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Relay gets activated the electromagnet makes the switch in ON condition which in turn Drip Irrigation pump operates (ON State). SMS (i.e., WATER PUMP ON) will send to registered mobile number. The soil NPK sensor is suitable for detecting the content of nitrogen, potassium, phosphorus in the soil.

3.1 Block diagram:

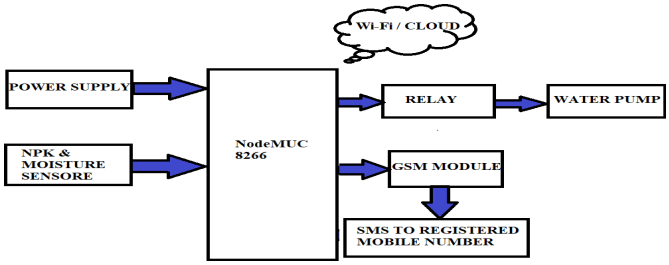

Figure 1: Block diagram of proposed work

3.2 Hardware Requirements

- Soil NPK and moisture sensor
- WI-FI Module ESP8266
- GSM
- Water Pump
- Relay
- Power supply

Soil NPK and moisture sensor:

The soil NPK sensor is suitable for detecting the content of nitrogen, phosphorus, and potassium in the soil. It helps in determining the fertility of the soil thereby facilitating the systematic assessment of the soil condition. Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighing of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

Wi-Fi Module ESP 8266:

The Node MUC (ESP8266) is a microcontroller with an inbuilt Wi-Fi module. The total pins on this device are 30 out of which 17 are GPIO (General Purpose Input/Output) pins which are connected to various sensors to receive data from the sensors and send output data to the connected devices. The Node MUC has 128KB of RAM and 4MB flash memory storage to store programs and data. The code is dumped into the Node MUC through USB and is stored in it. Whenever the Node MUC receives input data from the sensors, it crosschecks the data received and stores the received data. Depending on the data received it sends a pulse to the Relay Module which in-turn acts as a switch to on or off the pump. The operating frequency of the Node MUC ranges from 80 to 160 MHZ and the operating voltage of this device range from 3 to 3.5V. The Wi-H module presents in the Node MUC range from 46 (indoors) to 92 Outdoors) Meters.

GSM:

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). It is a widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operate at the 850mhz, 900mhz, 1800mhz, and 1900mhz frequency bands. GSM technology was developed as a digital system using the time division multiple access (TDMA) technique for communication purposes. A GSM digitizes and reduces the data, then sends it down through a channel with two

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different streams of client data, each in its own particular time slot. The digital system has the ability to carry 64 kbps to 120 Mbps of data rates

WATER PUMP:

The DC 3-6V Mini Micro Submersible Water Pump is a low cost, small size Submersible Pumps Motor. It operates with a 2.5 to 6V power supply. It can pump up to 120 litres per hour with a very low current consumption of 220ma, just connect the tube pipe to the motor outlet, submerge it in water, and power it.

Relay:

A relay is used as electrically operated switch. It has a set of input terminals for a single or multiple control signals and a set of operating contact terminals. The switch may contain number of contacts in multiple contact forms which make contacts or break contacts. Relay is used to turn on the water pump in order to maintain the moisture level of the crop**.**

Power supply:

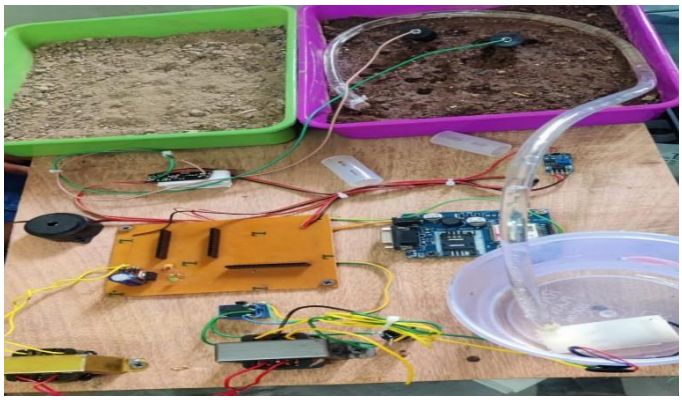
Power supply shown in Figure 7 is an electrical device which supplies electric power to an electrical load. The first function of a power supply is to convent electric current from a source to the correct voltage, current and frequency to power up the load. As a result, power supplies are also referred to as electric power converters. Some power supplies are separate standalone pieces of equipment while others are built into the load appliances that they power.

3.3 Software Tools Required

Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform application in which the functions are written in C and C++ languages. It is used to write and dump the written programs to Arduino compatible boards with the help of third- party cores and other vendor development boards.

IV. RESULT AND ANALYSIS



V. CONCLUSION

IoT will help to enhance smart farming. Using IoT the system can predict the soil moisture level and humidity so that the irrigation system can be monitored and controlled. IoT works in different domains of farming to improve time efficiency, water management, crop monitoring, soil management and control of insecticides and pesticides. This system also minimizes human efforts, simplifies techniques- of farming and helps to gain smart farming. Besides the advantages provided by this system, smart farming can also help to grow the market for farmer with single touch and minimum effort

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