SMART AGRICULTURE USING IOT TECHNOLOGY

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ABSTRACT- Agriculture in India is the backbone for our country and also a way of life for many people. Environment plays a major role in the irrigation of crops. Any lapse in the environment format may arise to a drastic down fall to the agricultural system. So there is a need to introduce a new technology in a smart way. The project presents Internet of Things (IOT) based agricultural monitoring system which helps the farmers to monitor the environment by using sensors. Main purpose of this project is to design a monitoring unit to analyze the environment for farmers to take right decisions regarding harvesting and irrigation. The main feature of the model includes a Wi-Fi model, which helps in sending messages regarding the sensor output to the farmers. Sensors which are utilized here are soil moisture sensor, temperature sensor, humidity sensor, methane gas sensor. All these connections are done on an Arduino UNO R3 board. Final object is to convert a man monitored agricultural system to a smart agricultural society using IOT technology.

Keywords: Arduino, LCD display, Internet of Things (IOT), Wi-Fi Module

I. INTRODUCTION

Agricultural is one of the significant economic activity. India, being an agricultural state consists of 71% of people live in villages and most of them are dependent on agricultural for source of life and revenue. The climate of India being tropical has many extraordinary changes so this will affect the growth of a plant. By keeping all above reasons in mind we need to implement new method of cultivation of plant that is smart agriculture using IOT (Internet of Things). This will help the farmers in monitoring the important parameters that which are required for a plant growth. Here we are using four types of sensors, a LCD display, and a DC motor for watering the plants, a WI-FI and GSM module.

II. NEED OF SMART AGRICULGTURE

Smart farming is a capital intensive and Hi-Tech system of growing food cleanly and sustainable for the masses. It is the application of modern ICT (Information and communication technology) into agriculture. IOT refers to a network of things, which make a self-configuring network. In IOT smart farming a system is build (ATmega328) for monitoring the crop field with the help of the sensors. The development of smart farming using IOT based devices is turning the face of agriculture day by day. The aim/objective of the paper is to produce a smart system, which will enable them to do farming and increase their overall yield in production.

III. WORKING AND BLOCK DIAGRAM

The working can be clearly demonstrated using a flowchart with Fig.1

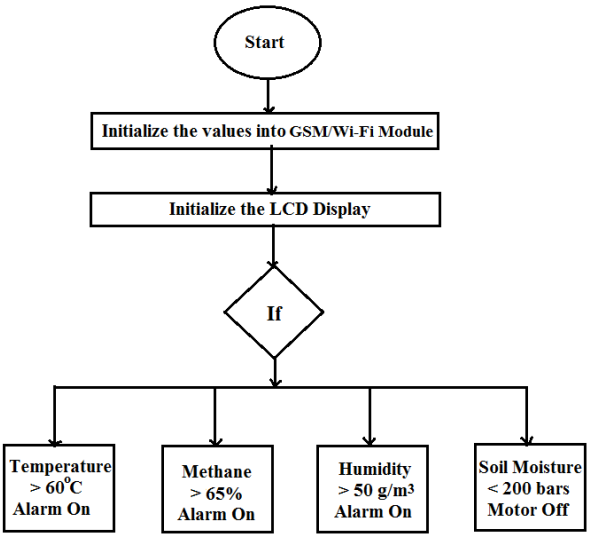

Fig.1 Flow Chart to Explain the Operation

Let us first discuss about the working of the project by the above flowchart (Fig.1), here initially the values that which are read by the sensors are assign to WI-FI module through a microcontroller, which is a heart of the project, where preprocessing of output takes place and it should also satisfy the conditions which we provide them, after that all the implementation of the values will be displayed through a 16 *2 LCD display. All this requirements can be achieved by a step by step instructions called program which can be written in either c or C++ language. Now the objective of item in the project will be demonstrated below:-

COMPONENTS REQUIRED

1. Power supply unit
2. Arduino Uno rev3
3. 16*2 LCD display
4. WI-FI module
5. GSM module
6. Soil Moisture sensor
7. Temperature sensor
8. Humidity sensor
9. Methane gas sensor

10. DC motor
11. Relay

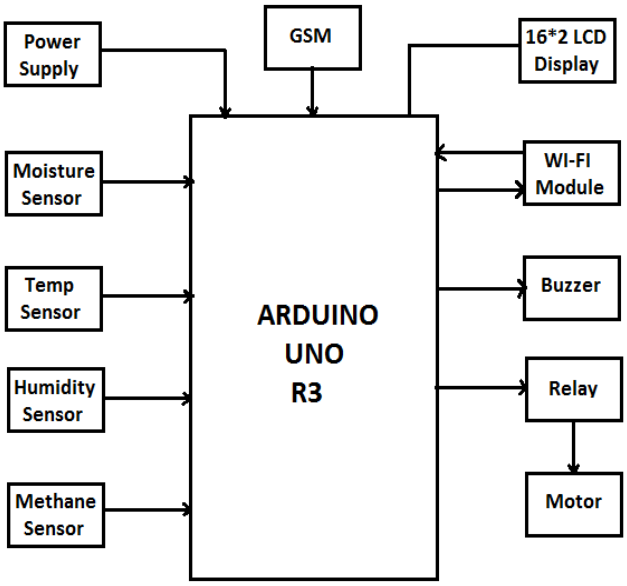

Fig.2 Block Diagram to Show the Connections of All the Modules to Arduino Uno R3

Let's have brief explanation and usage of individual component in their respective field;

1. POWER SUPPLY UNIT (PSU)

The amount of power required for Arduino to work ranges for about 3.3V-12V because all the electronic circuits can accept only low power, if it is above the permissible level the circuit may damage. That is the reason why we use a PSU to convert high power to low power. In thePSU we have a bridge circuit which is used to convert alternate current to pulsated direct current. From that a capacitor accepts this pulsated DC and transforms it into complete direct current. Afterthis transformation a regulator 7805 is have its presence for regulating the current as per requirement, after this capacitor will store the current obtained and lead to the Arduino board.

2. ARDUINO UNO REV3

The Arduino UNO is the most used and documented board in the Arduino family. UNO is a great choice for first Arduino as it is relatively cheap and very easy to setup and it is the toughest board you can play with. It contain the following specifications. The module can be demonstrated as Fig.2.

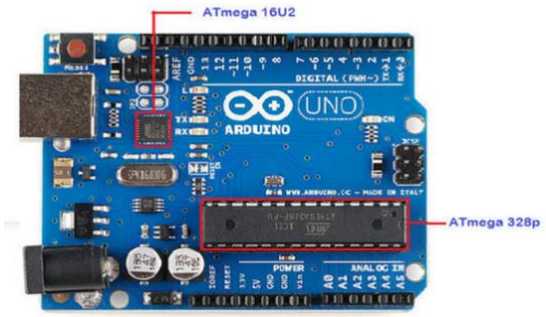

Fig.3 Arduino Uno R3

3.16*2 LCD DISPLAY

The 16*2 LCD display is named as such for the reason it can accept up to 16 characters and can be displayed in 2 line. It have a built in microprocessor 8-bit MPU with a 5*7 dot characters along with a cursor. All this can be viewed with an area of 64.0mm (L)*14mm (W)*11.5mm (H) as shown in Fig.3. The input power of 3.3v is used for running it.

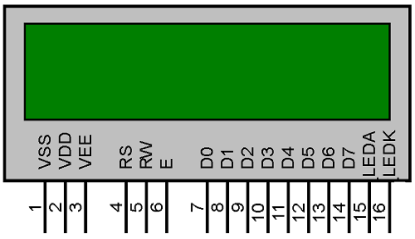

Fig.3 16*2 LCD Display

4. WI-FI MODULE

The Wi-Fi module used in this project is ESP8266. Main purpose of the module is used for continues monitoring of the output of sensors and this output can also be updated in cloud so that we can get wave form of the output if it's above threshold level. This is shown as in Fig.4

Fig.4 WI-FI Module

5. GSM MODULE

Main purpose of GSM module is if Wi-Fi network is absent then this GSM module is useful so that when can get message to user. This module consists of 2 rows of 8 pins and mainly 4, 5 i.e. RX and TX pins as shown in Fig.5 which are used for communicationand program module respectively.

Fig. 5 GSM Module

6. MOISTURE SENSOR

The Moisture sensor is used to measure the water content (moisture) of soil. This sensor reminds the user to water their plants and also monitors the moisture content of soil. The working voltage that is required operation is 5v because it's an electronic device. This sensor contains of three four pins one is Vcc which is for power supply while GND is ground connections and remaining two are A0 and D0 for analog read and digital output of the circuit respectively as shown in Fig.6

Fig.6 Moisture Sensor

7. TEMPERATURE SENSOR

This is resistance temperature detector (RTD) which measures the temperature and even alert the user if it is above the proximity level. It consists of three pins they are GND, Vout, Vin. Mostly we used LM35 as shown in Fig.7 with acronym as linear monolithic.

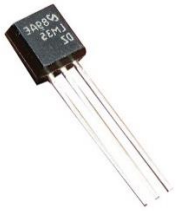

Fig.7 Temperature Sensor

8. HUMIDITY SENSOR

As we have humidity in nature and it have its own specific role in project, its working is as same as remaining equipment. And the specification. The Fig.8 is module of humidity sensor

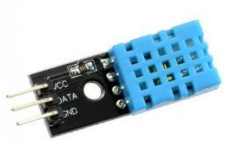

Fig .8 Humidity Sensor

9. METHANEGAS SENSOR

This will help in detecting methane gas in and around the soil this will help in monitoring the availability of content in soil. The operating input is 5v, detection zone is 300-1000ppm, recovery time is >10sec, response time is<10sec.It consists of four pins as shown Fig.9

Fig.9 Methane gas sensor

10. DC MOTOR

A Submersible well pump is designed to operate beneath the earth surface and this tube has a hermetically sealed motor that is closed coupled to the body of the water pump .Sealing the motor prevents the water from getting inside and causing short circuit as shown in Fig.10. The operating voltage required for the motor is 2.5 to 12v which drives the current for about 130 to 220mA. It flows with the rate of 20-120L/H .the driving mode of the pump is DC with work life of 500 hours.

Fig.10 DC Motor

11. RELAY

Relay is an electronic controllable switch. The main purpose of relay is to provide required amount of voltage to dc motor

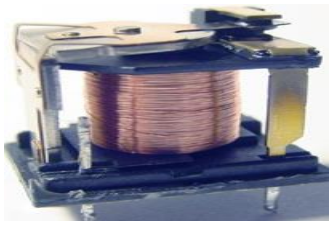

Fig.11 Relay

IV. PROJECT SETUP

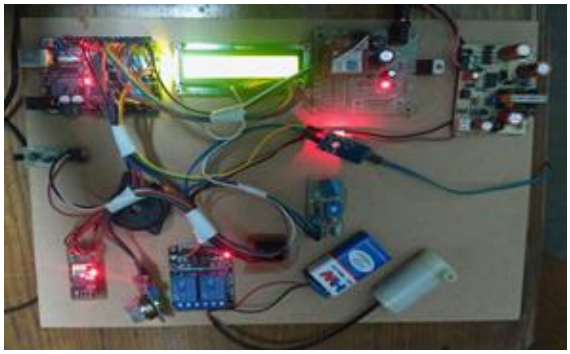

Fig.12 Project Setup

V. IMPLEMENTATION

Initially the WI-FI should be initialized with the values of the sensor so that they can be directed to LCD display and the following process take place after giving the power supply to the circuit. The sensor will acquire the require amount of data from the plant which are directed to the Arduino where the processing take place. Now according to the code,process take its chance to put on the buzzer to its requirement. The interface between the Arduino and the sensor is as per the analog and digital pins where all the sensors are connected to the analog pins of Arduino and GSM, WI-FI modules are connected to the digital pins so that acquired data can be project through waveform and messages respectively.

VI. OBSERVATIONS FROM SENSORSOUTPUT

S.NO	Methane Sensor	Temp Sensor	Moisture Sensor	Humidity Sensor
1	20 (Low)	18 (Low)	33 (Dry)	85
2	27	25	54	72
3	36	32	72	52
4	65 (High)	63 (High)	85 (Wet)	20

Fig.13 Tablular Form of Output

VII. OUTPUT WAVEFORMS

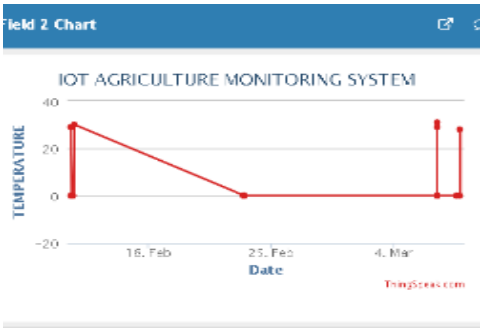

Fig.14 Methane Waveform

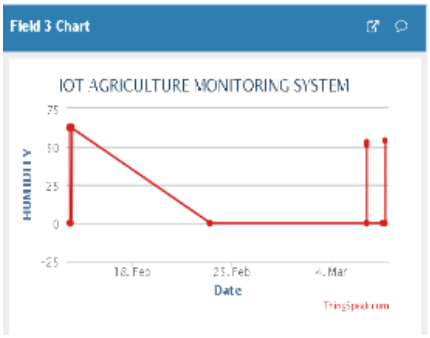

Fig.15 Humidity Waveform

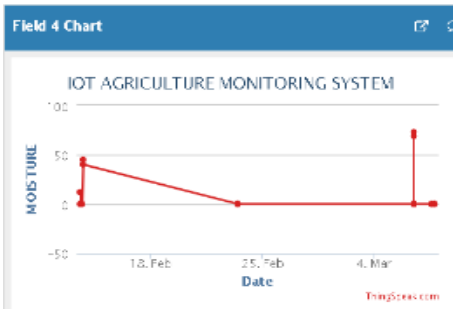

Fig.16 Moisture Waveform

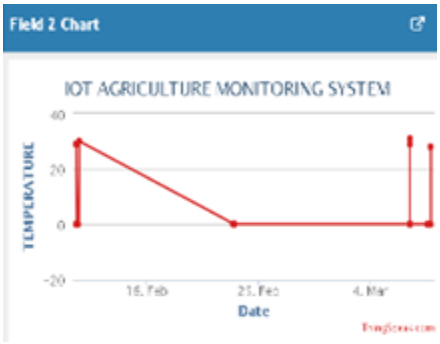

Fig.17 Temperature Waveform

VIII. CONCLUSION

By adapting smart agriculture will boost the growth of agriculture sector, as it's the major source of income in developing countries like India. IOT technology helps in providing real time monitoring and even analyse for agriculture. So hereby we can conclude smart agricultural to be another revolution for the prosperous development

IX. REFERENCES

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