International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

IOT BASED SMART AGRICULTURE MONITORING SYSTEM

T. RAJESH[1], Y. THRINAYANA[2], D. SRINIVASULU[3]

[1,2]Student, Dept. of Electronics & Communication Engineering, SACET, Chirala, Andhra Pradesh, India
[3]Associate Professor, Dept. of Electronics & Communication Engineering, SACET, Chirala, Andhra Pradesh, India

---

Abstract – *Agriculture is done in every country from ages. Agriculture is the science and art of cultivating plants. Agriculture was the key development in the rise of sedentary human civilization. Agriculture is done manually from ages. As the world is trending into new technologies and implementations it is a necessary goal to trend up with agriculture also. But now due to migration of people from rural to urban there is hindrance in agriculture. So to overcome this problem we have proposed an IOT and smart agriculture system.*

Where IOT plays a very important role in agriculture, IOT sensors are capable of providing information about agriculture fields. This IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensor deployed at various nodes and sends it through the wireless protocol. And it is powered by Arduino. It consists of temperature sensor, humidity sensor, water level sensor, PIR sensor and GSM module. When the IOT based agriculture monitoring system starts it checks the water level, humidity and moisture level. It sends SMS alert to the phone about the levels of the water. And controlling these parameters are through any remote device or internet services and the operations are performed by interfacing sensor, Wi-Fi, camera with micro controller. This concept is created as a product and given to the farmer's welfare.

***Key Words*: ARDUINO UNO, GSM modem, Soil moisture sensor, PIR sensor, Humidity sensor, Temperature sensor, WI-FI module.**

1. INTRODUCTION

As the world is trending into new technologies and implementations it is necessary goal to trend up in agriculture also. Agriculture is considered as the basis of life for the human species as it is the main source of food grains and raw materials. Where it plays vital role in the growth of country's economy. It also provides large ample employment opportunities to the people. Growth in agriculture sector is necessary for the development of economic condition of the country . Unfortunately, many farmers still use the traditional methods of farming which results in low yielding of crops and fruits. But wherever automation had been implemented and human being had been replaced by automatic machineries, the yield has been improved. Hence there is need to implement modern science and technology in the agriculture sector for increasing the yield.

Where technology is rapidly growing and new inventions are being created day by day even then farmers are facing a lot of problem about their fields. This is the duty of an every individual to create an environment where farmers must feel comfort and good production and mainly protecting their fields from different mammals.

1.1 PROBLEM STATEMENT:

The problem arises whenever there is any critical situation that cannot be handled at the specified time i.e., When the climate varies then automatically field parameters also suddenly changes. Whenever there is heavy rainfall or temperature varies or may be any mammals are roaming or grazing in the field, this may become very hard to analyze the situation and it causes a major problem.

Taking this as a problem into consideration, designing of IOT based agriculture monitoring system is very needed. This IOT server can be easily monitored from anywhere and comfortable to access the changes in the fields. We can monitor from anywhere through our mobile phone easily based on the IOT servers and SMS alerts.

1.2 OBJECTIVE:

The main objective of this paper is to design a IOT based agriculture monitoring system. This system acts a protect of the fields from various problems.

2. LITERATURE SURVEY:

[1] The newer scenario of decreasing water tables, dying up of the rivers and tanks, unpredictable environment present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture sensor at suitable locations for monitoring of crops is implemented an algorithm developed with threshold values of temperature and soil moisture can be programmed into a microcontroller-based gateway to control water quantity. The system can be powered by photovoltaic panels and can have a duplex communication link based on cellular internet interface through a web page.

[2] The existing method and one of the oldest ways in agriculture is the manual method of checking the parameters. In this method farmers they themselves verify all the parameter and calculate the reading.

[3] It focuses on developing devices and tool to manage, display and alert the users using the advantages of a wireless sensor network system. It aims at making agriculture smart using automation and IOT technologies. The highlighting features are smart GPS based remote controlled robot to perform task like weeding, spraying, moisture sensing, human detection and keeping vigilance.

[4] The cloud computing devices that can create a whole computing system from sensors to tools that observe data from agriculture field. It proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigator system through wireless communication technology.

[5] It proposes a low cost and efficient wireless sensor network technique to acquire from different sensors. As per need of the crop controller to take decision whether the irrigation is enabled or not. It proposes an idea about how automated irrigation system was developed to optimize water use for agriculture.

3. BLOCK DIAGRAM:

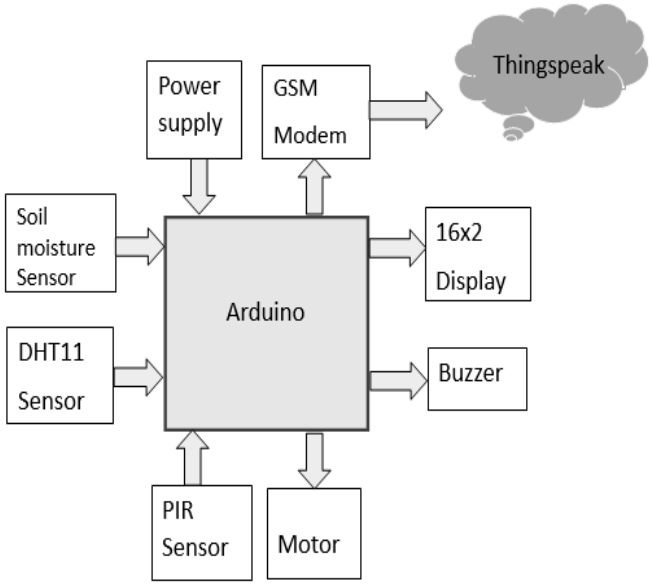

Fig-3: Block diagram of the project

3.1 DESCRIPTION:

ARDUINO UNO:

ARDUINO UNO is a microcontroller board works with ATmega328p micro controller. It also has ATmega16U microcontroller. For Atmega328p It has high performance Atmel Pico power 8bit AVR RISC based microcontroller which is capable of executing powerful instruction in single clock cycle. The board is equipped with set of 14 digital and 8 analog input output pins. It is interfaced to various expansion boards and other peripherals for different applications. The power supply for the board is given by using mini USB connection of 5V. It is the one of the best AVR controllers and is used in many ARDUINO boards.

GSM:

GSM means Global system for Moblie communications. The operating voltage of GSM SIM800L is 3.4V – 4.4V. GSM is used to send the alret messages and calls to the registered contact numbers. The working of GSM modem is based on AT (Attention) commands, where these AT commands are given to the GSM modem with the help of microcontroller.

SOIL MOISTURE SENSOR:

The soil moisture sensor uses capacitance to measure the waster content of soil. Simply insert the rugged sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent. It measure the dielectric permittivity of the surrounding medium. The sensor creates a voltages proportional to the dielectric permittivity, and therefore the water content of the soil.

Fig-3.1.1: Soil Moisture Sensor

HUMIDITY SENSOR:

The humidity sensor manufactured by Honeywell is used for sensing the humidity. It delivers instrumentation quality RH(Relative Humidity) sensing performance in a low cost, solder able SIP(Single In-line Package). Relative humidity is a measure, in percentage, of the vapour in the air compared to the total amount of the vapour that could be held in the air at a given temperature.

Fig-3.1.2: Humidity Sensor

PIR SENSOR:

PIR sensor are more complicated than many of the other sensors. It self has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance. When the ambient amount radiated from or walls or outdoors. When a warm body like a man or animal radiated from the room or walls or outdoors. When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, which causes a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected.

Fig-3.1.3: PIR Sensor

LCD (16x2 DISPLAY):

LCD means liquid crystal. A 16x2 LCD display is very commonly used device, where each character is represented with 5x8 pixel matrix. It operates at 4.7V-5.3V. it consist of 16 pins.

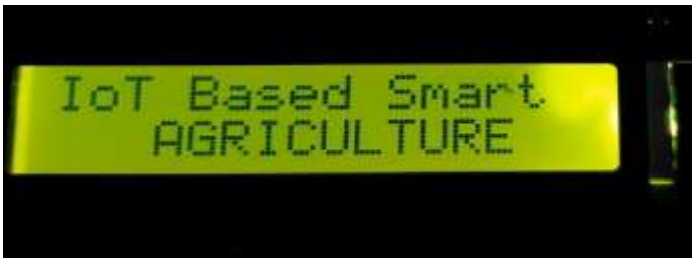

Fig-3.1.4: Liquid Crystal Display

BUZZER:

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game show. It most commonly consists of a number of switches or sensor connected to a control unit that determines if and which button was pushed or a present time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on a electromechanical system which was identical to an electrical bell without the metal gong (which makes the ringing noise)

Fig-3.1.5: Buzzer

THINGSPEAK:

ThingSpeak is an IOT analytics platform service that allows you to aggregate, visualize, and analyze live data streams in the cloud. You can send data to ThingSpeak from your devices, create instant visualization of live data, and send alerts.

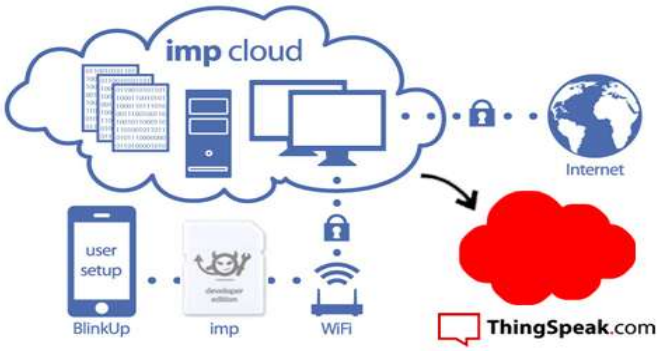

Fig-3.1.6: Internal Work of ThingSpeak

4. WORKING:

Initially the sensor like DHT 11, PIR sensor, Soil moisture sensor capture the data from the filed and is passes to the microcontroller. Now the microcontroller compares the received data with that of pre-existing data and if the values are beyond the threshold point the corresponding devices turns to ON state. Initially temperature inside the farm is compared with that of the pre-defined value in the micro controller and if it is beyond the threshold point then the fan gets ON. Later soil moisture inside the farm is compared with that of pre=defined value in the micro controller and if it is beyond the threshold point the alert messages are sent to the ThingSpeak IOT wed page through Wi=Fi module and is represented in a graphical format. After reaching the desired level these devices automatically turns OFF. Usually it takes 15 seconds to upload data of each and every sensor and this is a cyclic process. Where the every updates from field is continuously passes the information to the farmer through SMS alerts.

5. FLOW CHART:

The below shows the flowchart of the smart agriculture.

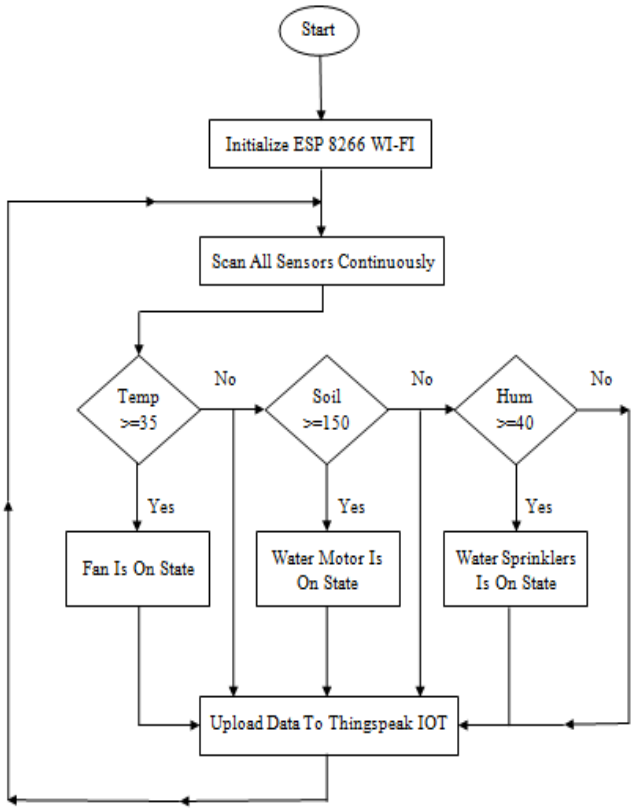

Fig-5: Flow chart

6. RESULTS AND CONCLUSION:

The proposed smart agriculture monitoring is very helpful for the famers, who is actually in need. Where GSM modem takes the information from the micro controller and forwards the messages to the respective contact numbers. And Wi-Fi model sends the parameters to the IOT server by graphical method. Then farmer performs the necessary pre-cautions to the field.

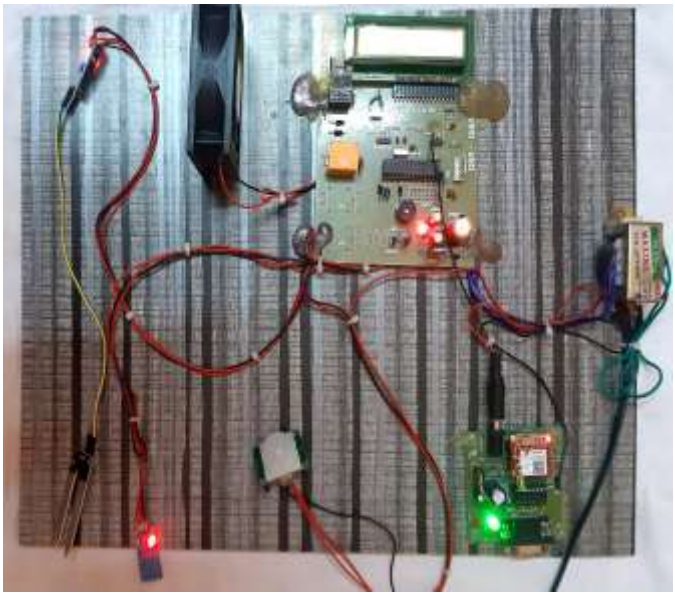

Fig-6.1: View of Hardware system

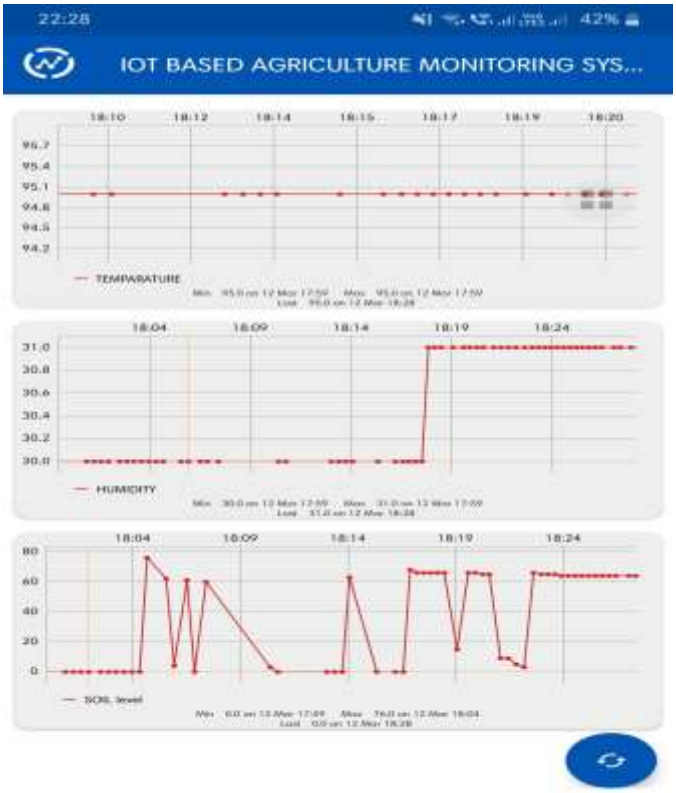

Fig-6.2: Graphical Representation of sensors

Fig-6.3: Received SMS Alerts

7. FUTURE SCOPE:

- The flood alert information can be displayed on LED display boards for road users and for safety reasons could be placed at strategic locations. Such information should be in real time and transmitted wireless from the measured location. A possible means of power supply for sensors and centralized control unit should be via solar cells. The flood monitoring system will be easy to installed and maintained if it is powered by solar cells. The use of solar energy will also provide cheaper source of the power to the entire system.

- Designing of this type smart agriculture system is very useful but size of the device must be very less and that process can be done by further VLSI size reduction process at which every farmer in this world can utilize this device in every seasons or daily farming unit.

REFERNCES:

[1] S. R. Nandurkar, V. R. Thool, "Design and Development Precision Agriculture System Using Wireless Sensor Network", IEEE International Conference on Automation, Control, Energy and Systems(ACES),2014

[2] JoaquinGutierrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Angel Porta-Gandara, "Automated Irrigation System Using a Wireless Sensor Network and GPRS Module", IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT,0018-9456,2013

[3] Dr. V. Vidya Devi, G. Meena Kumari, "Real- Time Automation and Monitoring System for Modernized Agriculture" , Interional Journal of Review and Research in Applied Sciences and Engineering (IJRRASE) Vol3 no.1. pp 7-12,2013

[4] Basha, Elizabeth, and Daniela Rus. " Design of early warnimng flood detection systems for developing countries." Information and Communication Technologies and Development, 2007. ICTD 2007. International Conference on. IEEE, 2007

[5] Danny Hughes, Phil Greenwood, Gordon Blair, Geoff Coulson, Florian pappenbeger, paul Smith and Keith Beven. An Intelligent and Adaptable Grid-based Flood Monitoring and Warning System (DRAFT). UK science All Hands Meeting 5th,2006.

[6] S. Yumuang, "2001 debris flow and debris flood in Nam Koarea, Phetchabun Province, central Thailand, "Environmental Geology(2006) 51: 545-564,2006.

[7] Sipalay Flood Control Project 2010 Available: http://goo.gl/UhkDfU.

[8] Wireless Sensor Networks Issues and Applications by Raj Kumar, Vani B A, Kiran Jadhav, Vidya S in IJCTA | Sept-Oct