

# **LITERATURE SURVEY**

## **IOT Based Smart Crop Protection System for Agriculture**

A.Abina Jerome, J.J.Ajeesha James, E.Angelin Benita, M.A.Anu Nandhini, R.Aslin Shahana.

St.Xavier's Catholic College of Engineering,  
Chunkankadai, Nagercoil.

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### **ABSTRACT:**

As new technologies has been introduced and utilized in modern world, there is a need to bring advancement in the field of agriculture also. Various Researches have been undergone to improve crop cultivation and have been widely used. In order to improve the crop productivity efficiently, it is necessary to monitor the environmental conditions in and around the field. The parameters that has to be properly monitored to enhance the yield are soil characteristics, weather conditions, moisture, temperature, etc., Internet of Things (IOT) is being used in several real time applications. The introduction of IOT along with the sensor network in agriculture refurbish the traditional way of farming. Online crop monitoring using IOT helps the farmers to stay connected to his field from anywhere and anytime. Various sensors are used to monitor and collect information about the field conditions. Collectively the about the farm condition is sent to the farmer through GSM technology.

### **1.INTRODUCTION:**

One of the main aspects of human survival is the agriculture which is the main source of food. Unfortunately most of the farmers in our country use traditional way of farming which is a hectic process to

analyse data manually related to soil and crops. This can be overcome by modern farming methods. As the agriculture industry is one of the important aspects of a country's economic growth, it is necessary to bring automation in agriculture which relatively enhance the crop yield and helps in developing economy. Deployment of automation in agriculture leads to effective crop monitoring without human intervention in the field. Internet of things is the network of physical objects embedded with sensors, software and electronic components like microcontrollers, as sensors and microcontrollers cannot be connected to the internet directly. The crop system effectively, sensor is deployed in the field which senses the water requirement of the soil and provides irrigation automatically. The farmer will be able to view the information of his field through GSM technology.

## 2. LITERATURE REVIEW

A system using sensors that monitor different conditions of environment like water level, humidity, temperature etc., the processor along with IC-S8817BS and wireless transceiver module with zigbee protocol is used. The field condition is sent to the farmer via mobile text messages and email from the experts. With this system Sensor node failure and energy efficiency are managed. Zigbee technology is used which sometimes lack in range of communication .

A system is proposed for intelligent agriculture greenhouse monitoring system based on Zigbee technology. The system performs data acquisition, processing, transmission and reception functions. The aim of their experiments is to realize greenhouse environment system, where the of system efficiency to manage the environment area and reduce the money and farming cost and also save energy. IOT technology here is based on the BS structure and cc2530 used like processing chip to work for wireless sensor node and coordinator. The gateway has Linux operating system and cortex

A8 processor act as core. Overall the design realizes remote intelligent monitoring and control of greenhouse and also replaces the traditional wired technology to wireless, also reduces manpower cost .

A system is proposed for plant growth which can be monitored using thermal imaging technique. Here the irrigation temperature distribution measurement (ITDM) technique has been implied. In real time the thermal images comprising of both low and high temperature ITDM values gives better irrigation. Thermal imaging can provide temperature value of all pixels in the field when compared to thermometry which only provides an average value. For temperatures which are very close in range, thermal imaging leads to inaccurate information so that the objects can become indifferenciable .

A method to evaluate the use of wireless sensor network used in automating irrigation and data are sent to the web server through wireless communication. The sensors are used to sense the temperature, humidity, moisture for crop monitoring. The irrigation is automated when the sensor reading goes below the threshold values. The farmer is regularly intimated with the field conditions. It also explained that in greenhouses, light intensity control can also be automated in addition to irrigation. Here, the prediction of crop water requirement is not efficient.

### 3. RELATED WORK

Here, thermal imaging is used for irrigation in the crop field. There is no need for modifications in the surface temperatures when thermal imaging technique is used which is a noncontact and nonintrusive technique. Water stress, gas exchange, evapotranspiration rate stomatal conductance. As a result of this the canopy temperature increases. The stomata start to close and transpires so that the plants starts heating order to measure stomatal conductance, plant temperature and evapotranspiration rate by determining stomatal responses, thermal remote sensing is used.

The advantage of using thermal imaging is that thermal imaging can provide temperature value of all pixels in the field when compared to thermometry which only provides an average value.

Image processing and data analytic techniques are used in thermal imaging for reducing crop water stress and to provide scheduled irrigation. Cloud of things (COT) network which comprises of Internet of Things and cyber physical system is used. The disadvantage of thermal imaging is that for temperatures which are very close in range, thermal imaging leads to inaccurate information taken from the camera so that the objects can become indifferenciabale. Thermal imaging cameras are not widely used because of its high cost .

#### 4. PROPOSED SYSTEM

In the proposed system, Crop monitoring is done where sensors are used to collect information in the agricultural field.

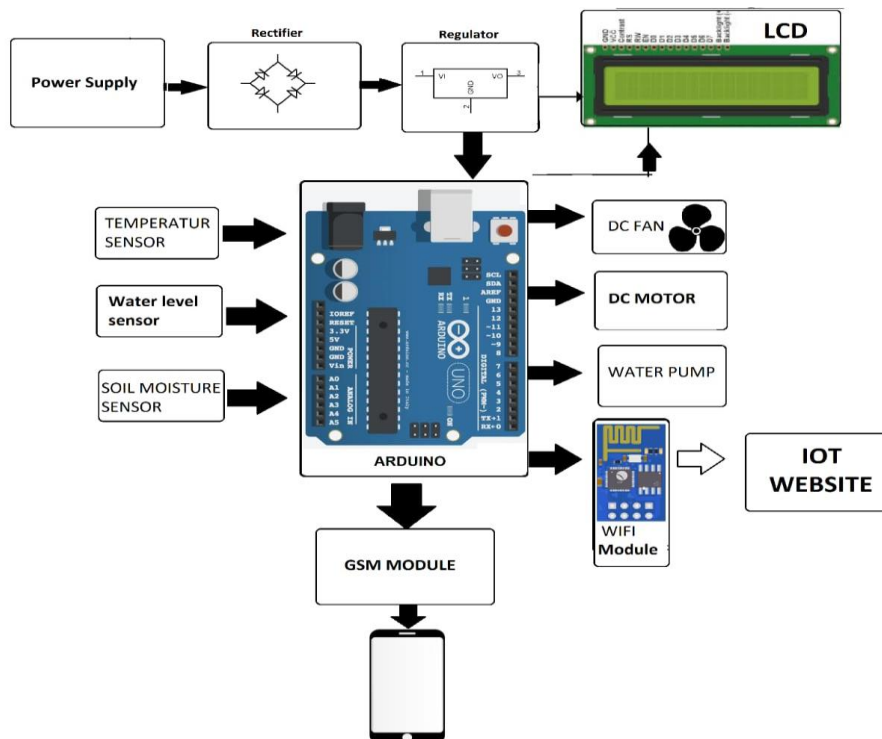


Fig 4.1 Block diagram for crop monitoring

The different sensors used are temperature and humidity sensor and soil moisture sensor. The information collected by the sensors is sent to the arduino microcontroller ATmega328. The collected information can be displayed in a LCD display. Webpage is created and the information collected by the sensors are updated periodically in it through Wi-Fi. A GSM module is connected with the microcontroller through which the message about the farm condition is sent to the authorised person.

## 5. HARDWARE USED

### A. Arduino microcontroller AT mega328:

AT mega 328 is a single chip microcontroller created by Atmel in the mega AVR family. The Atmel 8-bit AVR RISC-based microcontroller combines 32 kB ISP flash memory with read-while-write capabilities, 1 kB EEPROM, 2 kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

### B. Soil moisture sensor YL-69:

The soil moisture sensor or the hygrometer is usually used to detect the humidity of the soil. The sensor is set up by two pieces: the electronic board and the probe with two pads, that detects the water content. The sensor has a built-in potentiometer for sensitivity adjustment of the digital output (D0), a power LED and a digital output LED. The voltage that the sensor outputs changes accordingly to the water content in the soil.

### C. Temperature and Humidity sensor:

**DHT11** The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin. It does not need any analog input pin.

### D. GSM Module:

**SIM800** is a quad-band GSM/GPRS module designed for the global market. It work on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800 feature GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. SIM800 has 68 SMT pads ,and provides all hardware interfaces between the module and customers' boards. SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications.

### F. WiFi Module:

The **ESP8266** is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (microcontroller unit) capability produced by Shanghai-based Chinese manufacturer. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes style commands. The **ESP8285** is an ESP8266 with 1MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi. The successor to these microcontroller chips is the **ESP32**.  
**MAX 232** The MAX232 is an integrated circuit that converts signals from a TIA-232 (RS-232) serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual transmitter / dual receiver that typically is used to convert the RX, TX, CTS, RTS signals. The receivers reduce TIA-232 inputs, which may be as high as  $\pm 25$  volts, to standard 5 volt TTL levels.

## 6. SOFTWARE USED

### H. Arduino:

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output(I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

## 7. EXECUTION PROCEDURE

### **Soil moisture sensor (YL-69)**

Step 1: The soil moisture sensor (YL-69) consists of three pins namely A0, D0, VCC and SGND. □ The A0 pin of soil moisture sensor (YL-69) is connected to the analog input pin A0 of arduino UNO.

□ Connect VCC of YL -69 to 5V power supply pin of arduino UNO.

□ Connect the ground pins of YL -69 and arduino UNO.

Step 2: Compile the code to check for errors.

Step 3: Upload the code to the arduino board.

Step 4: Click Tools> Serial monitor to view the moisture content of the soil.

### **Temperature and Humidity sensor (DHT 11)**

Step 1: The temperature and humidity sensor (DHT11) consists of positive, output and negative pins. □ The positive pin of DHT 11 is connected to the 5V power supply of arduino UNO. □ The output pin of DHT 11 is connected to the digital output pin D7 of arduino UNO. □ The negative pin of DHT 11 is connected to the GND pin of arduino UNO.

Step 2:Compile the code to check for errors.

Step 3:Upload the code to the arduino board.

Step 4:Click Tools> Serial monitor to view the temperature and humidity.

## 8. CONCLUSION AND FUTUREWORK

In this paper, we proposed a method for efficient crop monitoring for agricultural field. With the application of IOT the datas can be stored and retrieved from anywhere. In this proposed work, the sensor part is limited only for monitoring of crops hence in future it can be automated for irrigation and the system can be enhanced with security of farmland under video surveillance which prevents it from obtruder intrusion.

## 9.REFERENCES

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