# Automatic Crop Monitoring System

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*Abstract*— Many advanced techniques have been introduced in agriculture automation to flourish and deliver its full potential. To get more benefits of these technologies, we should not just consider the implication of developing a new single technology but should look at the wider issues for complete development of a system. This system is designed by using raspberry pi to overcome limitations and difficulties faced by the farmer in farming. In this project we use different sensors to sense the environmental conditions. This automated system will not only save time but will also help farmer to take appropriate actions on time to save the crops.

***Key words:*** Raspberry Pi, Temperature Sensor, Humidity Sensor, CO Sensor, Moisture Sensor, Infrared Sensor, Motor, Mobile

## I. INTRODUCTION

The Crop Monitoring system has its practical significance as a large scale application of agriculture. As the global climate is changing, not only a wide range of research and study of the crop growth is needed, the small scale environment for the growth of crops needs to be understood. The growth pattern and the environmental parameters of crop growth provide scientific guidance and counter measures for agricultural production. An environmental parameter model of different regions of the crop growth pattern of the different environments can be established to improve the overall efficiency of agriculture.

## II. LITERATURE REVIEW

### *A. 'Automatic Crop Monitoring Using Embedded System' By Mr. Takkasila Akbar Saleem and Mr. K.Sreenivasa Rao*

The project aimed at sensing the environmental conditions such as temperature, moisture, humidity, poisonous gases and rainfall using LPC2148 controller and sends message through GSM. It also has a PIR sensor for field security using RFID.

### *B. 'GSM based automatic irrigation system for efficient use of resources and crop planning using mobile.' By Ms.B. Anitha*

The system has an incorporated Bluetooth for remote monitoring. The smoke sensors used to send emergency information to user incase of fire in field or burning of motor.

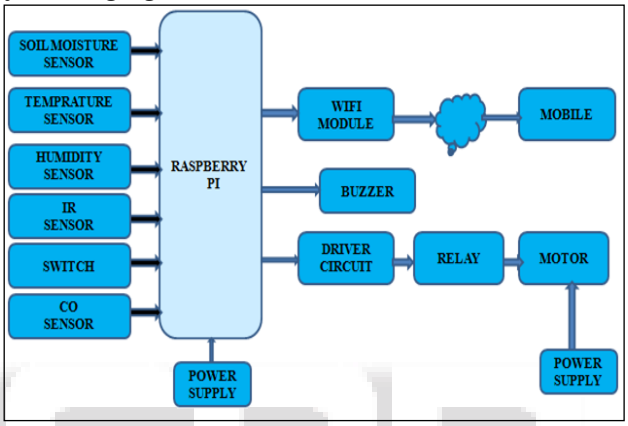
### *C. 'Automatic crop monitoring system for a precision agriculture based on wireless sensor network; By Mr. Manikandan K. Rajaram*

The project is carried out using AVR microcontroller with wireless sensor network, for finding out irrigation data in particular area. This project finds the application in domestic agricultural field in faithful irrigation.

## III. SYSTEM DESIGN

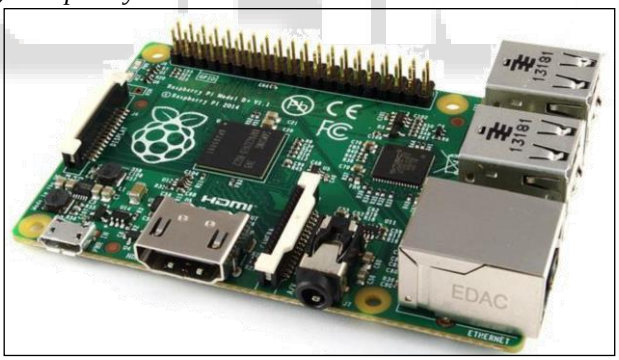
### *A. Block Diagram*

This is the basic block diagram for the system. The different components used are soil moisture sensor, temperature sensor, humidity sensor, IR sensor, CO sensor, relay, motor pump, switch. The programming for Raspberry Pi is done in Python language.




### *B. Component Description*

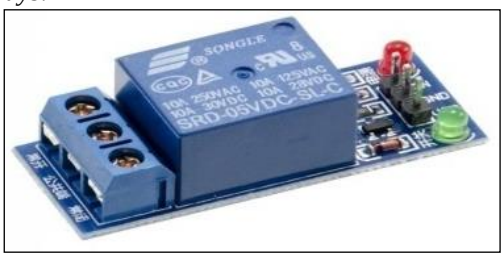
#### *1) Raspberry Pi:*



Raspberry Pi is a small, powerful, cheap, and education oriented computer board introduced in 2012. This credit card-sized computer with many for interfacing with many devices. The Raspberry Pi board contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices. Some of these devices are essential, others are optional. The Raspberry Pi model has the CPU named BCM2835 which is cheap, powerful, and it does not consume a lot of power. Raspberry Pi operates in the same way as a standard PC, requiring a keyword for command entry a display unit and a power supply. SD-Flash memory card normally used in digital cameras is configured in such a way to look like a hard drive to Raspberry Pi's processor. The unit is powered via the micro USB connector. Internet connectivity may be via an Ethernet/LAN cable or via an USB dongle (Wi-Fi connectivity).

*2) Relays:*

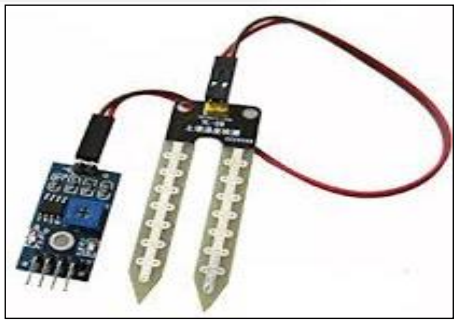



Relays are electromagnetic devices that use an electromagnet to operate a pair of movable contacts from an open position to a closed position. The advantage of relays is that it takes a relatively small amount of power to operate the relay coil, but the relay itself can be used to control monitors, heaters , lamps or AC circuits which themselves can draw a lot more electrical power. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw switch contacts.

*3) IR Sensor:*

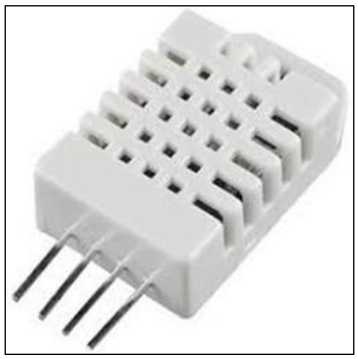
An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation .Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

*4) Soil moisture sensor:*



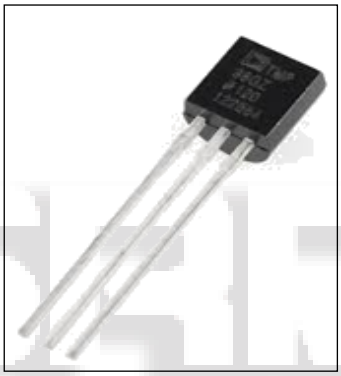
The Soil Moisture Sensor has two electrodes which are dipped into soil when power supply given if soil is wet then electricity flows from one electrode to another electrode and then given a trigger pulse to controller. The soil moisture sensor module, built around the LM393 comparator, gives an active-low (L) level output when the soil is dry.

*5) Humidity sensor:*



The DHT11 measures water vapour by measuring the electrical resistance between the two electrodes. The humidity sensing component is a moisture holding substrate with electrodes applied to the surface. When water vapour is absorbed by the substrate, ions are released by the substrate which increases conductivity between the electrodes. The change in resistance between the two electrodes is proportional to relative humidity.

*6) Temperature sensor:*



The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. It measures temperature in the range of -55'C to 110'C.

*7) CO sensor:*

MQ-7 is high sensitivity to Carbon Monoxide. The sensor used to find different gases contains CO; it is low cost and suitable for different application. CO sensor is a device that finds the presence of the CO in surrounding environment concentrations between 20 to 2000 ppm.

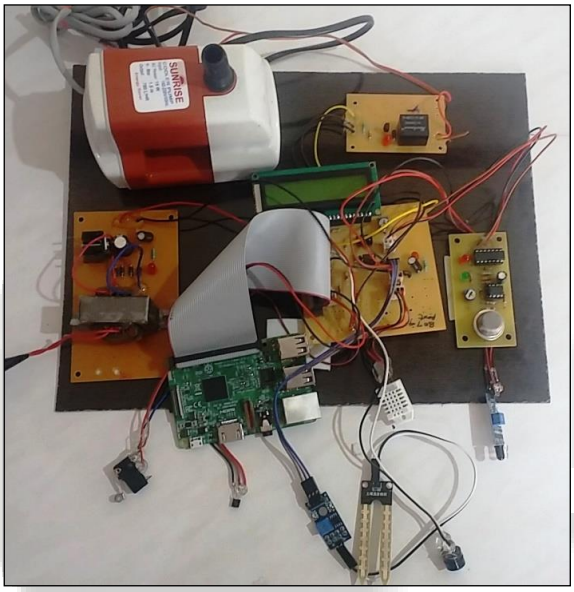
*C. Working*

In this project, all the sensors used are interfaced to Raspberry Pi. Raspberry Pi is the heart of the system. Soil moisture sensor measures the moisture content in soil and gives it to

the raspberry Pi in digital form. If the moisture content in soil is low, the relay will get triggered and the motor will turn ON, on the other hand if the moisture content is high the motor will automatically turn OFF through the relay. Temperature and humidity sensors will give the temperature and humidity respectively. If there is harmful gas present in the surrounding, the CO sensor will send high output to the Raspberry Pi otherwise low output will be maintained. If someone comes into the region of IR sensor the raspberry Pi will get a high signal and thus will trigger the buzzer and thus the buzzer will turn ON. There will be a secret switch for authorised person to turn the buzzer OFF. All the outputs of the sensors will be displayed in a LCD and as well as will be sent to farmer through the Wi-Fi module on the WEB page. Thus the farmer can keep a track from anywhere.

### *D. Hardware*



## IV. ADVANTAGES

- Wastage of water is avoided
- Harmful gases can be detected
- Crop can be protected from atmospheric variations.
- Farm is protected from unauthorised access

## V. RESULT

| No. | Sensors | Status |
|---|---|---|
| 1 | Temperature | 27 |
| 2 | Moisture | 33 |
| 3 | Humidity | 46 |
| 4 | GAS | DETECTED |

## VI. CONCLUSION

Irrigation has been the back bone of human civilization since man has started agriculture. As the generation evolved, man developed many methods of irrigation to supply water to the land. In the present scenario on conservation of water is of high importance. Present work is attempts to save the natural resources available for human kind. By continuously monitoring the status of the soil, we can control the flow of water and thereby reduce the wastage. By sensing the status of all the environmental conditions using different sensors we can keep a track of it, even without visiting the farm, through the WEB page. Thus saves time and wastage of water.

## REFERENCE

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