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MONITORING AGRICULTURAL ENVIRONMENT USING IOT

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Abstract - Agriculture is the science and art of Cultivating plants. Agriculture is done from long ages. As the world is now trending in to new technologies and implementation it is time to trend up with agriculture also. IOT plays a very important role in agriculture. IOT sensors are capable of providing the accurate information about agricultural fields. This agriculture based IOT is done by Arduino, it consists of Temperature sensor, Moisture sensor, Humidity sensor, Motion sensor, air quality sensor. When IOT based agriculture starts it check parameters like humidity, moisture level, how much quality of air is present. Temperature can be set on a particular level, it will be based on particular crops they cultivate. This system also senses the invasion of animals through motion sensor, which is a primary reason for reduction of crops. This information can be seen through Blynk IOT platform where it shows the real time data based on per minute.

***Key Words*: :** Soil moisture, Detection of animals, Humidity, temperature

1.INTRODUCTION

Agriculture plays a important role for the well-being of a nation. Agriculture is the main reason for cultivating crops like rice, wheat, etc. and many more. Agriculture is an art of raising vegetarian from the soil for the use of mankind. fundamental aim of agriculture is to lift stronger and more fruitful crops and plants and to help them for their growth by improving the soil and supplying the water. Agriculture is a backbone of Indian economy. In India about 64% of the total population is depending on agriculture for their livlihood. Generally, crops need a lot of quantity of water for the purpose of cultivating. As we can see that the population is increasing every day and the water demand is increasing additionally. In many countries like India, most of the people depends on farming, and most of its national income comes from farming

As the world is trending with new technologies every where, but the agriculture area is still following the old conventional technology. Most of the farmers still following to traditional methods like manual distribution of seeds, two crops per year pattern, unscientific systems of cultivation. They are still depending upon rains, dampness of the soil etc. So due to this we get inadequate yield and low productivity. So, by implementing of the new scientific methods in the field of agriculture can bring a lot of changes in the productivity of crops in the agriculture, due to improved efficiency in the farming techniques. As we know IOT is used every where and it is proven to be successful in many fields across the world. This IOT sensors gives the adequate information about the agriculture. So, through these IOT sensors like temperature, humidity etc, that collects data from the various sensors present in the field and it sends the data to server, through this we can monitor the agricultural environment easily. This method mainly focuses on studying the environmental factors to improve crop yield productively

2. OBJECTIVE

The objective of this project is to offer assistance to farmers in getting Live Data of

- Temperature
- Humidity
- Moisture of soil
- Quality of air
- Detection of Animals, Insects etc

For the purpose of the efficient environment monitoring which will enable the farmers to increase their overall yield and quality of products.

3. PROPOSED SYSTEM

The development of a monitoring of agricultural environment using sensors, microcontroller with the help of an IOT system is presented. The main aim of the implementation is to demonstrate the smart, automatic and intelligent capabilities of the microcontroller to allow the decisions to be taken on watering the plants by the continuous monitoring of the environmental conditions in the field.

It works on a predefined irrigation schedule as per the farmers requirement, uploaded into the application developed for the same. The implementation is a automated irrigation system which consists of a soil moisture and temperature sensors deployed in the root zones of the plants. These sensors

continuously monitor the parameters and send the data to the Arduino board for further processing which works on an IOT platform. This platform has been given the wireless capability by consisting an internal WiFi module which will be parallely updating the data to the cloud. This receiver unit also has a duplex communication link based on a cellular-Internet interface. Through this we can monitor the realtime environmental conditions of the field by using the Blynk IOT Application.

The farmer has to set the certain threshold values of soil moisture like. if the dampness of the soil is below the 20% then the water pump has to turn on automatically, so the plant can get sufficient water content. If the dampness of the soil is greater than 80% the water pump has to turn off automatically, so that the crop can be protected from the excess water level. By the same way the IR motion sensor also works when the animals come near the plants the buzzer will gives syren sound, so the animals will go far away and the crop will be safe. In that we can get the live data of Temperature, Humidity, Soil Moisture, Quality of air.

IOT advancement helps in finding the information based on conditions like atmosphere, temperature and productivity of soil, level of water. The farmers can know get details of farm conditions with the help of Blynk IOT Platform through mobile.

4. SENSORS USED

4.1 Soil moisture Sensor

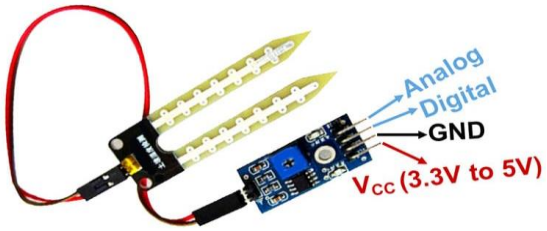


Fig -1: Soil moisture sensor

Soil moisture sensor mainly used to know the quantity of water present in the soil of agricultural field. Anyone can easily use this sensor by inserting this sensor into the earth and the status of the water content in the soil can be reported in the form of a percentage. This sensor have four terminals one is ground terminal, analog terminal, digital terminal, VCC terminal. Four terminals are used for the connection purpose. By utilizing capacitance it measures dielectric permittivity around it.

4.2 DHT11 Sensor

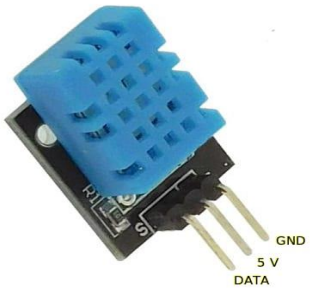


Fig -2: DHT11 sensor

The digital temperature and humidity sensor DHT11 and it can detect digital output of temperature and humidity through the standard single-wire interface. The DHT11 is a basic, very low-cost temperature and humidity sensor. DHT11 is simple to use, it can interface with any microcontroller like Arduino, Raspberry Pi, etc. and get live data results. DHT11 sensor consists of three pins followed by ground pin,5v input pin and data signal pin.

4.3 IR Motion Sensor

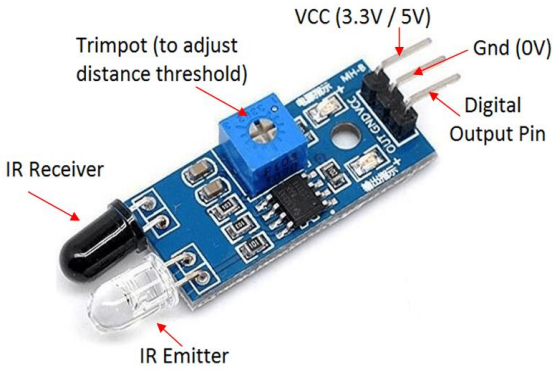


Fig -3: IR motion sensor

Infrared sensors are used motion detection. The advantages of using IR sensors can detect infrared light from large distance over a large area. Infrared technology is simple to understand and easy to use. With the help of heat radiation that changes over time with the movement of people. It senses the motion of people, animals.IR sensor contains three terminals one is ground terminal, output terminal terminal.IR sensor can detect colours like blue, red, green. IR sensors also used in building services. There are another type of motion detection sensors are there but IR sensor is low-cost good performance sensor.

4.4 Air quality Sensor

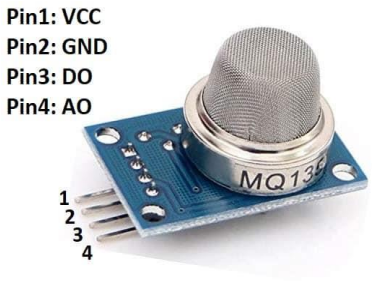


Fig -4: Air quality sensor

Data is managed by air quality monitors, which keep track of gases like ozone, nitrogen dioxide, carbon dioxide, and particulate matter. Then To get an approximate outcome, the air quality sensor needs to be preheated for 20 seconds before use. NH3, CO2, benzene, smoke, and other hazardous gases that are prevalent in the atmosphere do not affect it as much because of how sensitive it is. The analog pin of the air quality sensor must be used to acquire the analog output voltage, which provides an approximation of the gas concentration in the air as measured by the air quality sensor. Due to the different chemical characteristics of these concentrations, not all air pollutants can be detected by a single instrument. It contains 4 pins one is vcc,other is gnd and other two pins represent analog and digital.

5. BLOCK DIAGRAM

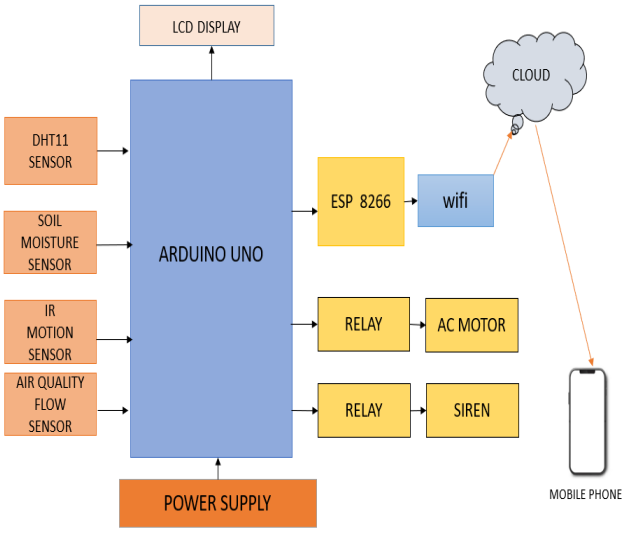


Fig -5: Block diagram

Arduino is a type of open-source hardware and software, which is used to design and manufacture single board microcontroller and micro controller kits which is used to build digital devices. Arduino is the main heart of the project which is used as an interface.

• In this project we are using three sensors they are soil moisture sensor, DHT11 sensor, Air quality sensor.
• These sensors are connected to the Arduino which is taken as input
• Through this Arduino ESP8266 is taken as output, which mainly contain antenna and WIFI module in to it.
• two relays are connected to the Arduino as output where one of the relay is for soil moisture detection. Another is for Motion detection
• The water pump is connected to the relay, when the moisture of the soil gets dry then automatically water pumps turn on
• The buzzer is connected to another relay, where any animals enter in to the field then buzzer is turned on.
• When the power supply is on, the sensors send the data to the cloud, so we can monitor all this information through mobile with the help of android application like Blynk IOt.
• LCD display is connected to display the values of the temperature, humidity, air quality, moisture of the soil

6. WORKING MODEL

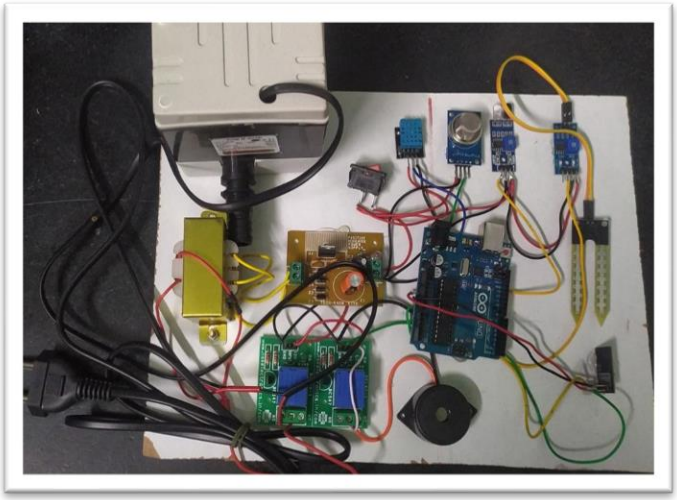
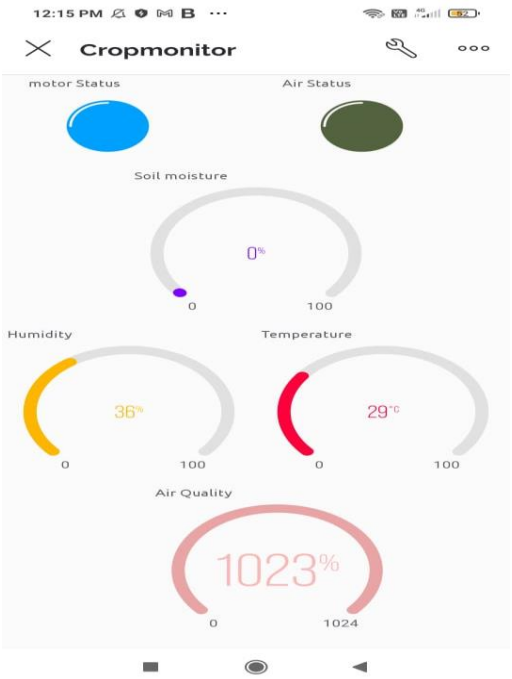


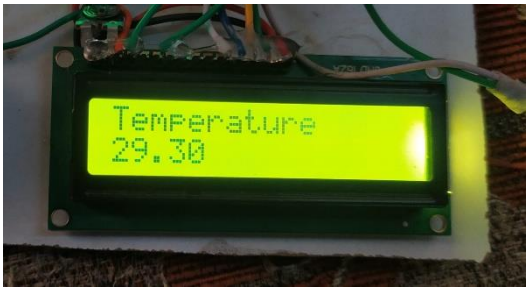
Fig -5: working model

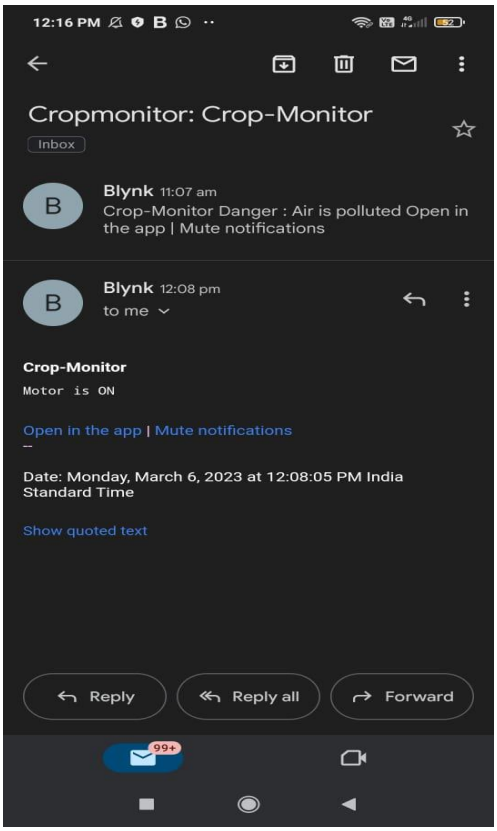
In the working prototype model, the IoT devices like sensors, Blynk IoT application, and cloud play a significant part in smart farming which acquires yield in the field of farming. All components are connected through Arduino pins and are used to control the target. Here all positive wires are connected to positive terminals and all black wires are connected to ground terminals. For working on each sensor, we required 5V and then relays required 12V and we have 12V power supply transformer. Here the power supply before the regulator is 12v and after the regulator is the voltage is 5v then this 5v output goes to sensors and microcontrollers. But the buzzer and relays operate on 12v.We presented a 12v transformer, and in this 12v transformer, the supply is converted from ac to dc through a bridge rectifier. For smoothing and noise filtration we are using a condenser and capacitor. This is regulator input. By taking the regulator7805 it gives 5v output and this 5v output only we have to use a controller. In our project the sensor first soil

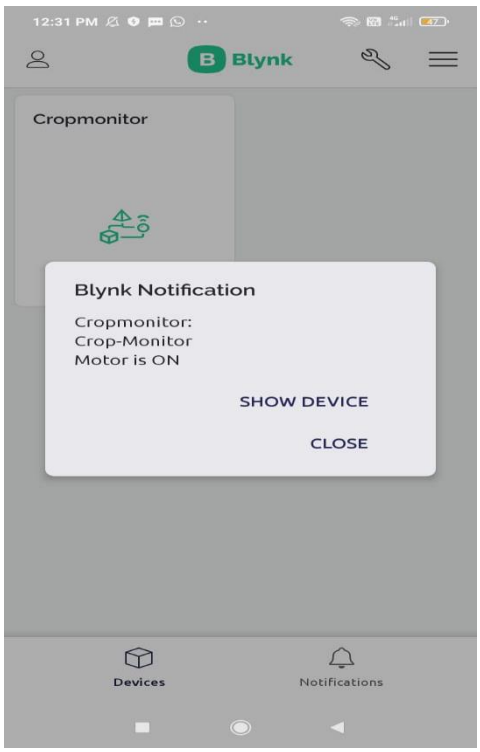
moisture sensor it senses the moisture content and when moisture content is decreased the microcontroller command is switch on the relay and through this relay the motor will be on and then content of moisture is increased the relay is switch of the motor through microcontroller command.IR motion sensor is used to detect animals and birds. Through this sensor we have to protect the trees when the animals are close to the trees the buzzer will give a siren sound and the animals went far away. DHT11 sensor reads the temperature and humidity readings and sends the microcontroller and then the microcontroller to the cloud through a small ESP01 WIFI module and then the data will be stored in the cloud. Air Quality MQ135 sensor will checks the quality of air like how much percentage of carbon dioxide and dusty air. We implemented an IoT platform that is Blynk IoT in this IoT platform we have to log in with our mail id they will give us one authentication code, this code we have to dump into the microcontroller through our program. Finally, we can monitor all the readings through the Blynk app. And it will have virtual components like switches, lights, LEDs, indicators, levels, etc. The levels are moisture level, temperature level, etc. These levels are what we have to see in form of a graph. All lives monitoring data we have to see in the Blynk IoT Platform.

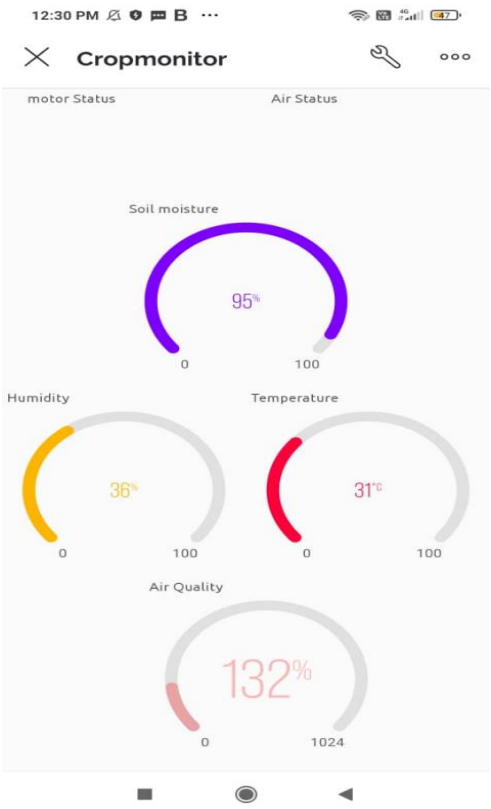


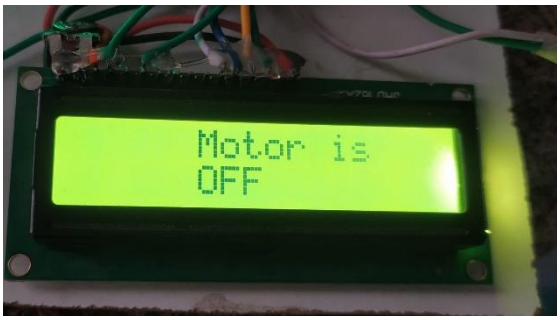
6.RESULTS

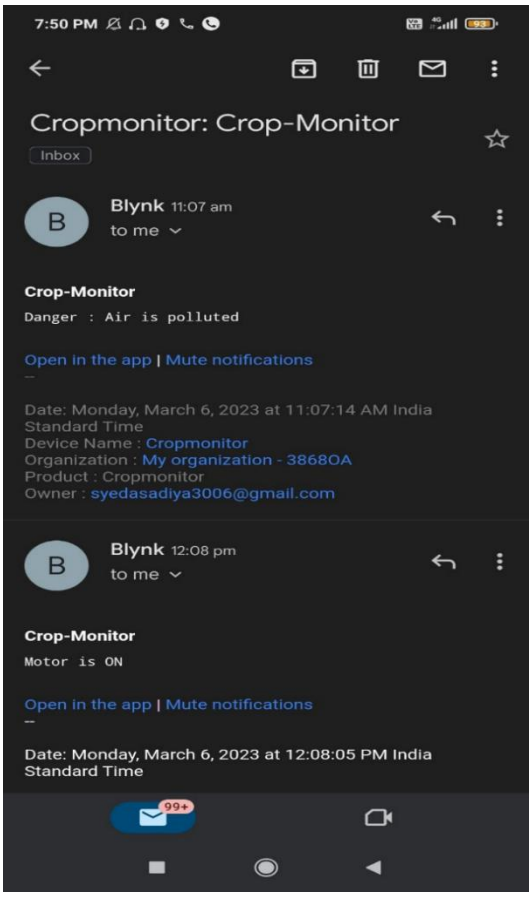


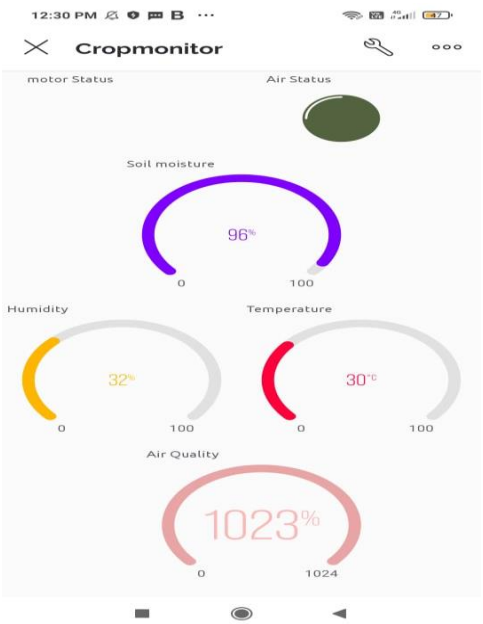



12:31 PM
Blynk
Cropmonitor
Blynk Notification
Cropmonitor:
Crop-Monitor
Motor is ON
SHOW DEVICE
CLOSE
Devices
Notifications


12:30 PM
Cropmonitor
motor Status
Air Status
Soil moisture
95%
0
100
Humidity
Temperature
36%
31°C
0
100
0
100
Air Quality
132%
0
1024


Motor is
OFF


7:50 PM
Cropmonitor: Crop-Monitor
Inbox
Blynk 11:07 am
to me
Crop-Monitor
Danger : Air is polluted
Open in the app | Mute notifications
Date: Monday, March 6, 2023 at 11:07:14 AM India Standard Time
Device Name : Cropmonitor
Organization : My organization - 38680A
Product : Cropmonitor
Owner : syedasadiya3006@gmail.com
Blynk 12:08 pm
to me
Crop-Monitor
Motor is ON
Open in the app | Mute notifications
Date: Monday, March 6, 2023 at 12:08:05 PM India Standard Time


12:30 PM
Cropmonitor
motor Status
Air Status
Soil moisture
96%
0
100
Humidity
Temperature
32%
30°C
0
100
0
100
Air Quality
1023%
0
1024

CONCLUSION

IOT will help to enhance smart farming. Using IOT the system we can monitor the soil moisture level and humidity so that the irrigation system can be scheduled and can be controlled. IoT works in different types of domains of farming to improve time efficiency, water management, crop monitoring, soil management etc. The main advantage of this system is it minimizes the human efforts, it simplifies the techniques of farming and help the farmers to gain smart farming to get the quality of products. This IOT based smart agriculture system can prove to be very helpful for farmers since over as well as less irrigation is not good for agriculture. The Threshold values for climatic conditions like humidity, temperature, moisture can be fixed based on the environmental conditions of that particular region to the type of crop they cultivate. This smart agriculture system also senses the invasion of animals which is a primary reason for reduction in crops through motion sensor. It generates the irrigation schedule based on the sensed real time data from field which we get information from the sensors. Continuous internet connectivity is required. The humidity, temperature, soil moisture data can be seen through android application like Blynk IOT app where we can monitor real time data based on per minute.

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BIOGRAPHIES

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