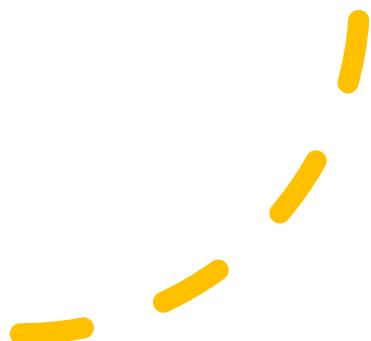


Internet of Things

SMART FARMING

- Abstract
- Objective
- Introduction
- Existing System
- Proposed System
- Block diagram
- Components & its Connections
- Work progress
- Working of prototype
- Advantages
- Results

- CONTENTS:-





What Is Smart Farming?

- Smart farming or Smart Agriculture system is the term used to describe the adoption of modern information and communications technologies in order to enhance, monitor, automate or improve agricultural operations and processes.
- The Sensors collect all information such as soil moisture, **fertilization**, weather and transmit that through a gateway over cellular wireless network to a central hub providing farmers real time access to information and analysis on their land, crop, livestock, logistics and machinery.

ABSTRACT:-

- Agriculture is the science and art of cultivating plants. Agriculture is done manually from ages.
- As the world is trending in to new technologies and implementation it is necessary goal to trend up with agriculture.
- IOT plays a very important role in smart agriculture. IOT sensors are capable of providing information about agricultural fields.
- This smart agriculture using IOT is powered by Arduino, it consists of Temperature sensor, Moisture sensor ,Humidity sensor ,Motion sensor .

ABSTRACT:-

- When IOT based agriculture starts it check parameters like humidity, moisture level. Temperature can be set on a particular level, it is based on type of crops cultivated.
- This smart agriculture system also senses the invasion of animals through motion sensor, which is a primary reason for reduction of crops.
- This all information can be seen through Blynk IOT platform where it shows the real time data based on per minute.

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.



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

INTRODUCTION:-

- India has agriculture as its primary Occupation. According to IBEF(India Brand Equity Foundation), 58% of the people living in rural areas in India are dependent on agriculture.
- Mostly Indian Farming are dependent on rains, soil, dampness and environment challenge.
- It is the time that Indian farmer need to introduce the Smart Agricultural systems for higher crop yield.
- Smart agriculture can forecast weather data, dampness of soil in terms of moisture levels with the help of sensors which are interfaced to process module Arduino-UNO.
- The smart Agriculture can be operated from anywhere with the help of networking technology.

EXISTING SYSTEM:-

- Farmers, especially in rural areas, follow traditional farming methods to produce their food crops and these are specifically tailored to suit their environments.
- However there are no weather monitoring, moisture dampness and water management, they depend on rains.
- The system consists of Arduino, it is a main board which is an open source microcontroller based kit
- To the Arduino board soil moisture sensor, Humidity sensor, Temperature sensor, motor, relay, GSM,LCD module are used.
- Temperature and humidity is placed on the LCD screen based upon the agriculture field.

EXISTING SYSTEM:-

- When soil moisture gets low then soil moisture sensor detect and sends the signal to the Arduino
- The Arduino alert the user through GSM module and an SMS will be sent to the user to know soil is low, and motor will get turn on and it is displayed in LCD.
- The system does not consists of automatic motor off method that means at what level the motor should turn off.
- The system does not contain motion detection and air quality monitoring system.

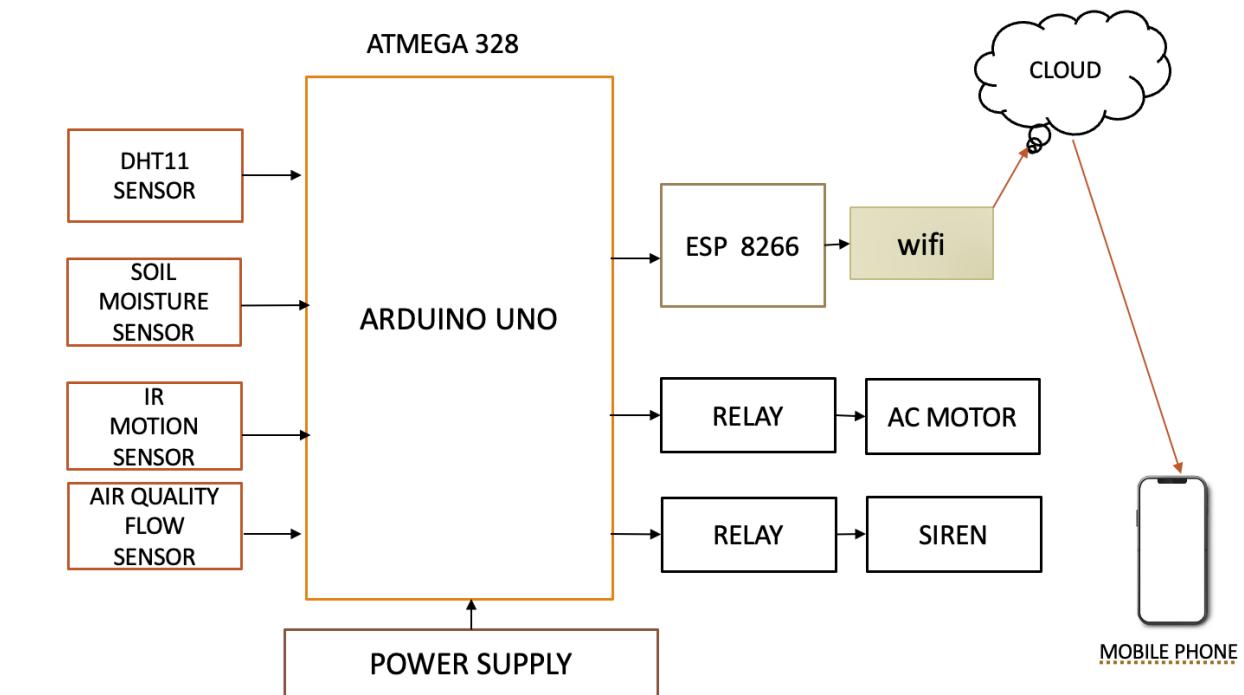
PROPOSED SYSTEM:-

- To overcome the drawbacks of existing system, Monitoring agricultural Environment by using IOT has been developed.
- IOT advancement helps in finding the information based on conditions like temperature humidity and level of water.
- In this model water pump is connected to the relay
- If the moisture of the soil is dry then relay activates the water pump and it gets automatically turns ON and if the soil is wet then water pump automatically switches off.

PROPOSED SYSTEM:-

- This model consists of siren through which it makes sound when animals enter in to the field through IR motion sensor
- It also consists of Air quality sensor which shows the quality of air present in the field.
- All this information can be monitored through Blynk Iot app, where it shows the real time data . It also shows alert messages to the user by the blynk app.
- The farmers can know get details of farm conditions with the help of Blynk IOT Platform through mobile.

BLOCK DIAGRAM:-



COMPONENTS & ITS CONNECTIONS:-

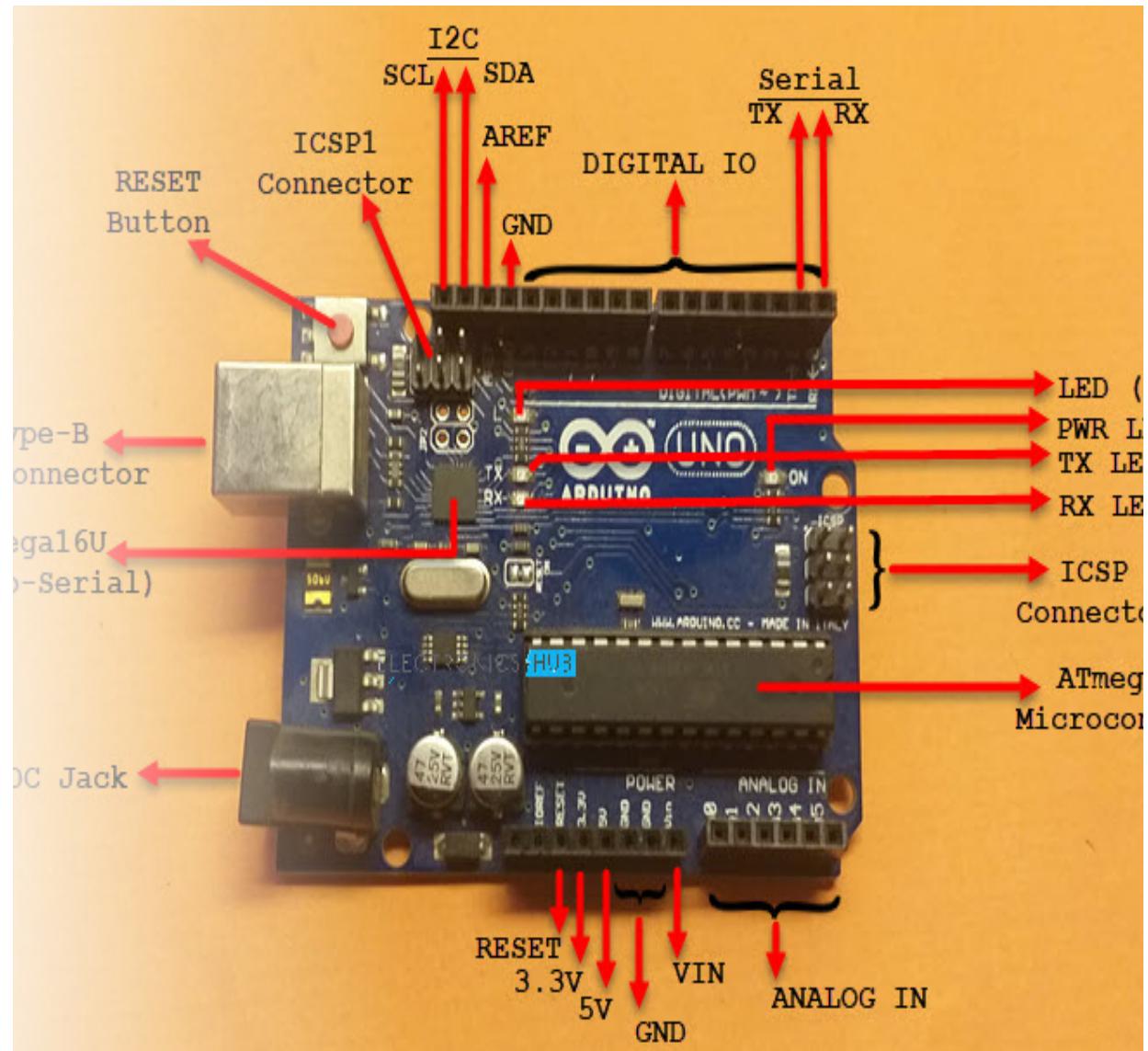
ARDUINO:

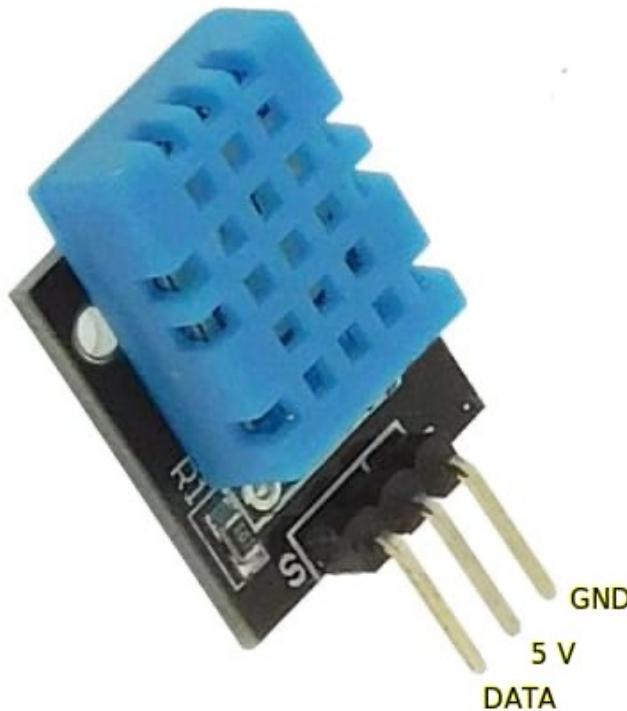
- Arduino is an open source electronics platform that is based on beginner level hardware and software.
- The hardware component of Arduino board is a programmable circuit board that is also known as a microcontroller.
- A microcontroller is a small computer with a processor, memory, and other peripherals designed for embedded applications.
- The software component is called Arduino IDE (Integrated Development Environment) where developers write and upload code onto the microcontroller.



ARDUINO board layout

- USB jack is used to dump the code into the ARDUINO UNO.
- Power jack is used to connect the external power supply.
- Reset button is used to restart the program.





DHT11:

- DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output.
- DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results.

➤ Connections

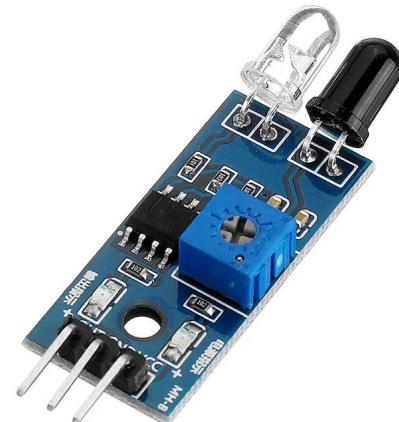
- DHT11 contains Three terminals vcc(5v), data, GND.
- Ground pin in the DHT11 is connected to the Ground pin in the power supply.
- 5V pin in the DHT11 is connected to the positive terminal of the power supply
- Data pin in the DHT11 is connected to the pin 6 in the Arduino

IR MOTION SENSOR:

- An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings.
- An IR sensor can measure the detections of the motion.

Connections

- IR sensor have three terminals Vcc, Gnd and Out
- VCC pin connected to the positive terminal of power supply.
- Ground pin in the IR motion sensor connected to the negative terminal of the power supply.
- Out is connected to the pin 7 of the arduino



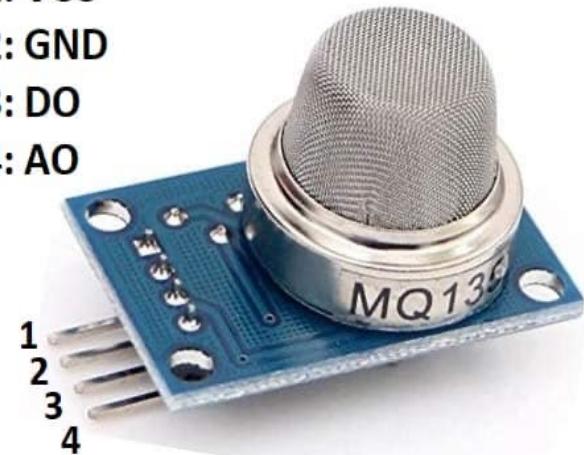
AIR QUALITY SENSOR:

- Air quality sensor is used to know how much quality of air is present in the agricultural field.
- It measures the CO₂,NO₂,etc gases in the air.

Connections

- Air quality sensor have four terminals vcc, gnd, D0, A0
- VCC pin in the air quality sensor is connected to the positive terminal of power supply.
- Ground pin in the air quality sensor connected to the negative terminal in the power supply.
- A0 pin in the air quality sensor is connected to the A0 pin in the arduino

Pin1: VCC
Pin2: GND
Pin3: DO
Pin4: AO



SIREN:

- Sirens are an outdoor warning system designed only to alert those who are outside that something dangerous is approaching.

Connections

- Siren contains the two terminals one is positive terminal and other is negative terminal.
- Siren negative terminal is connected to the ground pin of the relay.
- Siren positive terminal is connected to the input pin of the relay.

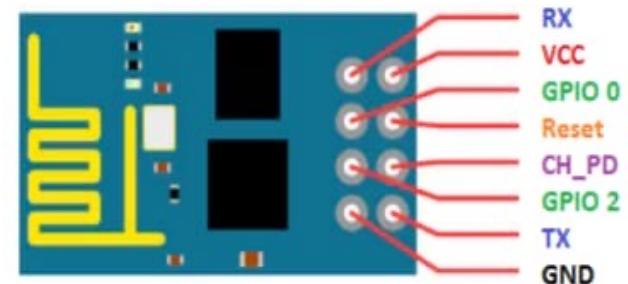


ESP 8266:-

- The ESP8266 is a WiFi microchip, with built-in TCP/IP networking software, and microcontroller capability, produced by Espressif Systems.
- ESP8266 is an open source platform based on which can connect objects and let data transfer using the Wi-Fi protocol.

Connections

- Ground pin in the ESP 8266 is connected to the ground pin in the arduino.
- Vcc is conneted to Vcc pin in the arduino.
- TX pin in the ESP 8266 is connected to the RX pin in the arduino
- RX pin in the ESP 8266 is connected to the TX pin in the arduino.

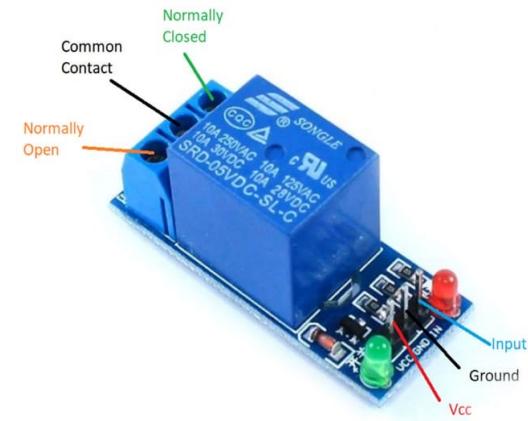


RELAY:

- A relay is an automatic switch that is commonly used in an automatic control circuit. Relay works on the principle of electromagnetic induction.

Connections

- The Arduino relay module has total of six pins: three on one side and three on other side.
- On the bottom side, there are three pins which are input vcc and ground. We will connect these pins with the Arduino.
- While on the other side, there are NC (Normally close), C (Common) and the NO (normally open) which are the output pins of the relay. There, we will connect the output device
- In our project we are using two relays .
- One relay for siren, another relay for water pump.



AC MOTOR WATER PUMP:

- A water pump is an electromechanical machine used to increase the pressure of water to move it from one point to another.

Connections

- In a AC water pump positive wire is connected to the main supply.
- Another wire is connected to the ground of the relay.

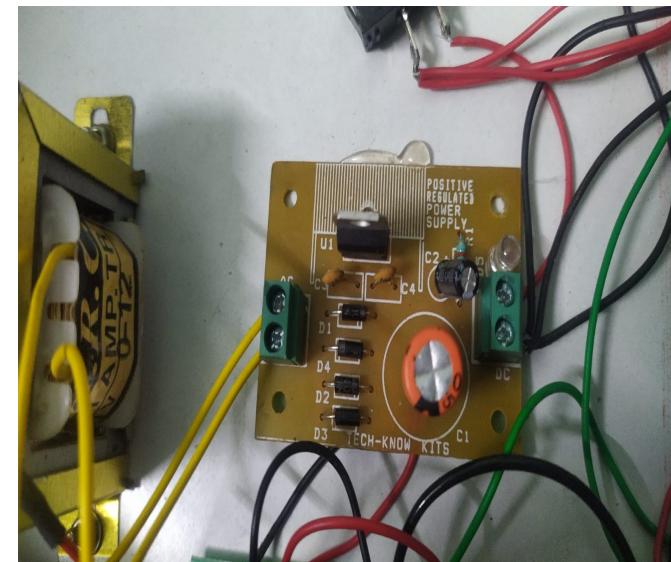


POWER SUPPLY:

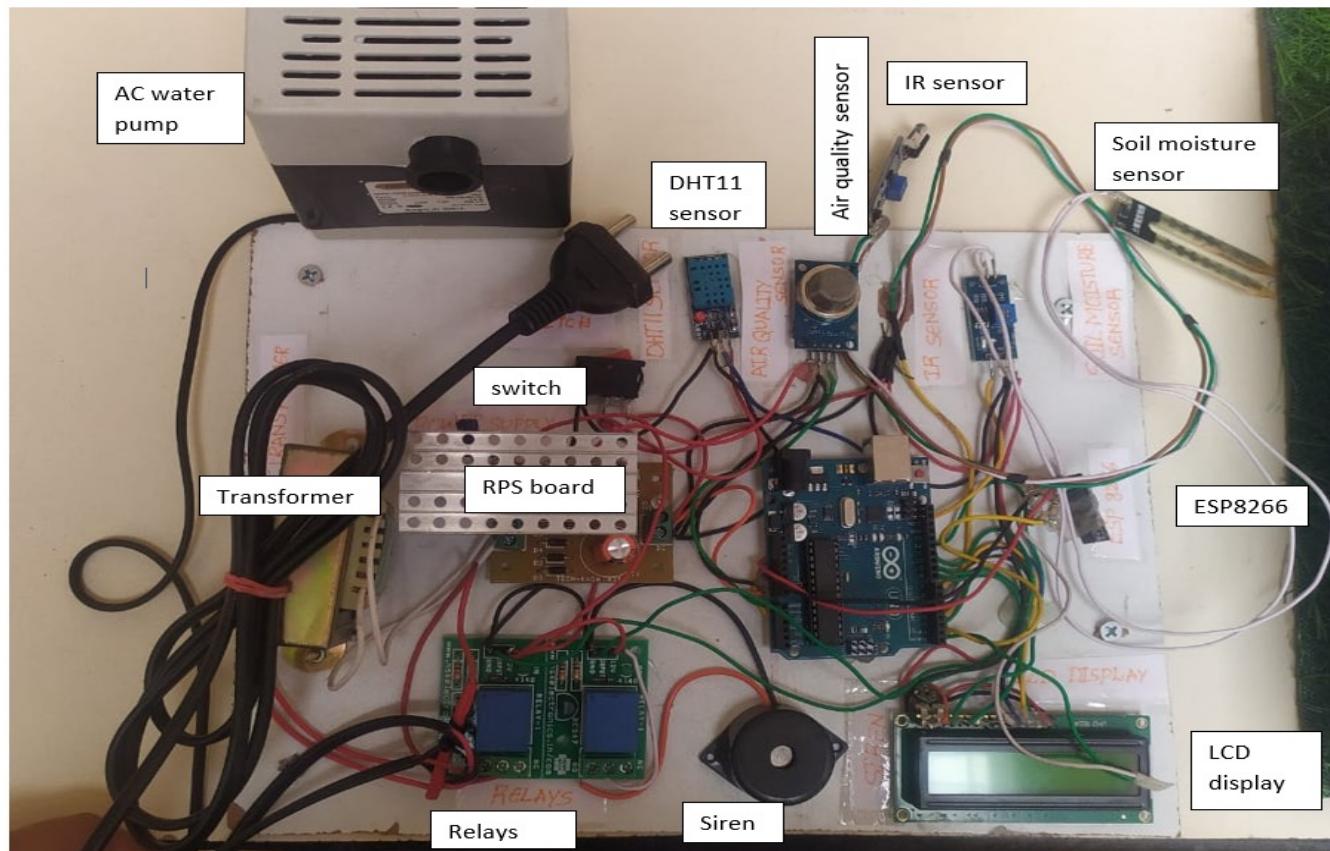
- This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal.
- The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V for various applications.

Connections

- A 12-0-12 2Amp Center Tapped Step Down Transformer primary is 230v, and secondary 12v.
- Primary is connected to the main supply secondary is connected to the relays



WORK PROGRESS:-



WORKING OF PROTOTYPE 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.
- In the circuit each sensor works of 5V regulated power supply and relay works of 12V and the transformer is 12V transformer.
- Soil moisture sensor it senses the moisture content if moisture content is low level then microcontroller command is switch on the relay and it will switch on motor.
- IR motion sensor is used to detect animals. when the animals are close to the trees then siren will give a large sound through relay and then animals will move away from the field..
- DHT11 sensor reads the temperature and humidity readings then this data we will see in the Blynk IoT application.

WORKING OF PROTOTYPE MODEL:-

- Air Quality MQ135 sensor will checks the quality of air like how much percentage of oxygen levels present in the air.
- In the Blynk IoT application 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 have to monitor all the readings and this data we have to see in the form of graph through the Blynk application.

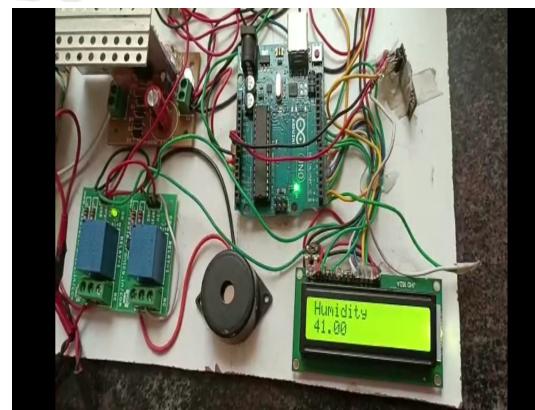


ADVANTAGES:-

- Water Conservation
- Real-Time Data and Production Insight
- Lowered Operation Costs
- Increased Quality of Production
- Accurate Farm and Field Evaluation
- Remote monitoring

RESULTS:-

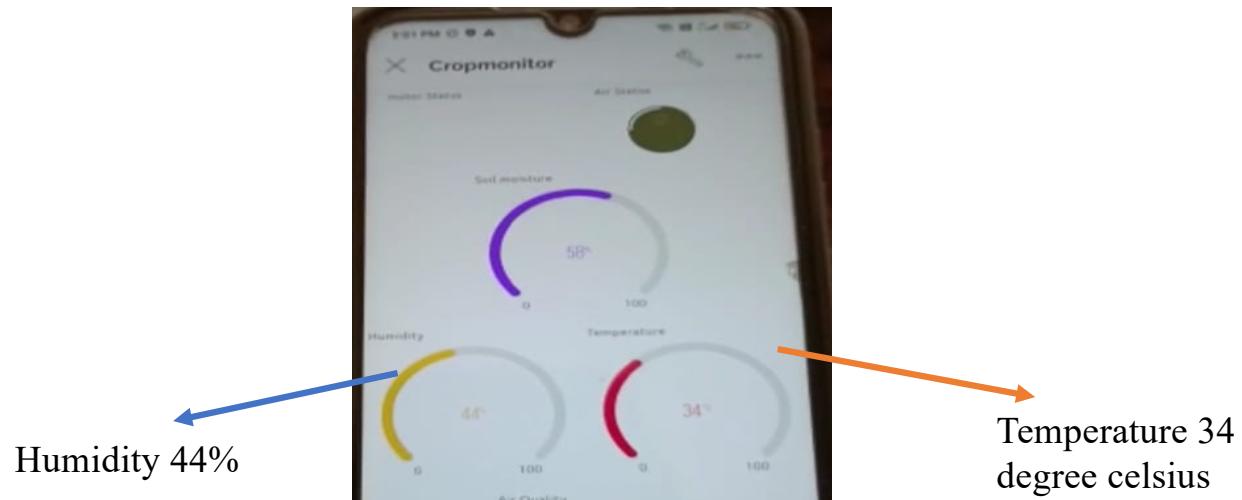
Case-1 : Monitoring Temperature and Humidity



The values of Temperature and Humidity displaying on LCD

- The values of Temperature and Humidity depends on agriculture field

Displaying values of Temperature and Humidity in Blynk IoT app



Case-2: When motor is ON

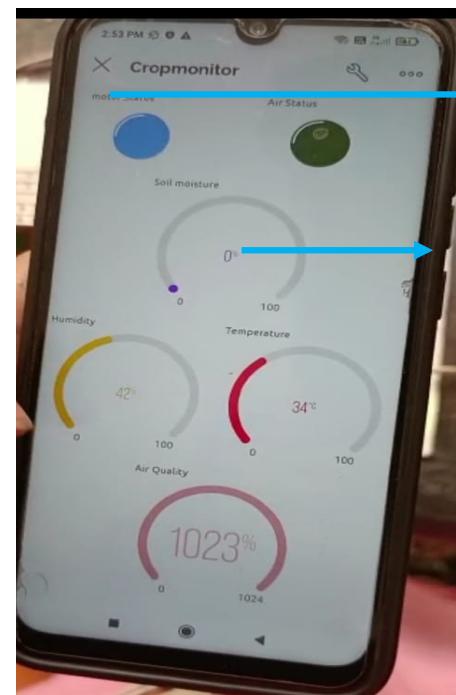


When the moisture of the soil is very low the motor will automatically turns ON

When the pump is ON water flows through sprinklers



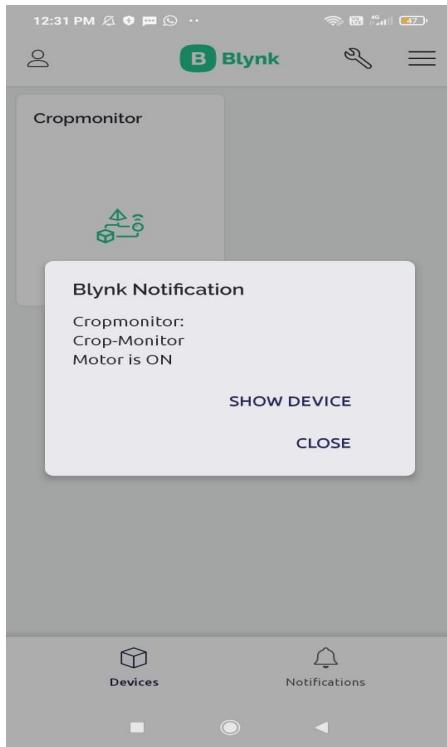
Displaying values of soil moisture level and LED Motor status in Blynk IoT app



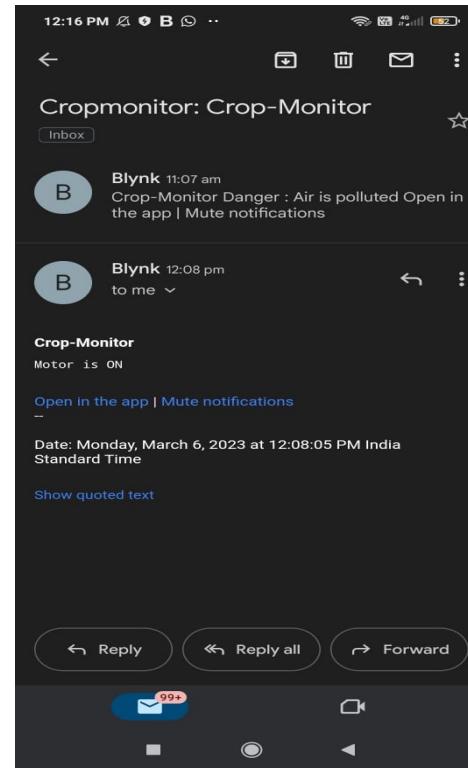
Blue LED shows
Motor is ON

Soil moisture is
0%(because soil is
dry)

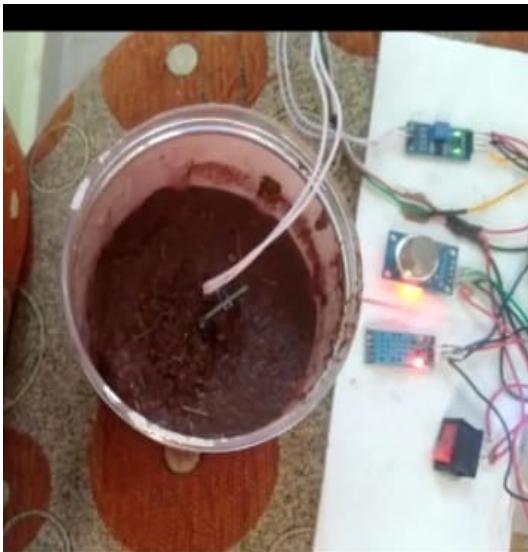
Receiving notification on
blynk app



Receiving Notification to the
authentication user when motor is ON



Case-2: When motor is OFF



When the moisture of the soil is high the motor will automatically turns OFF

When the pump is OFF water does not flow through sprinklers.



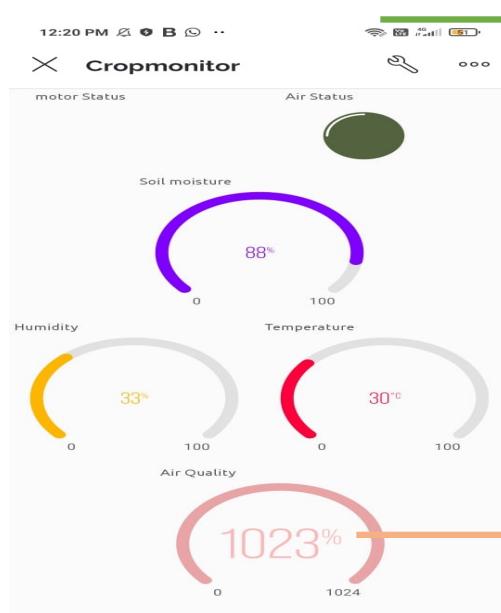
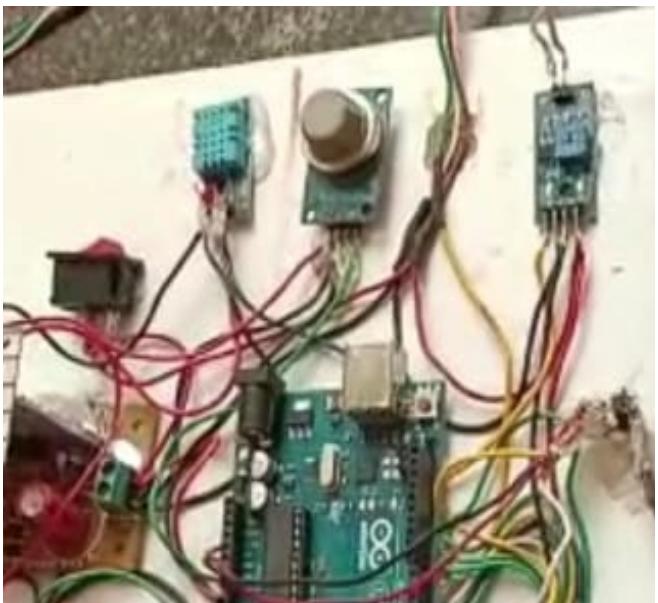
Displaying values of soil moisture level and LED Motor status in Blynk IoT app.



Blue LED is OFF shows
Motor is OFF

Soil moisture is
96%(because soil is wet)

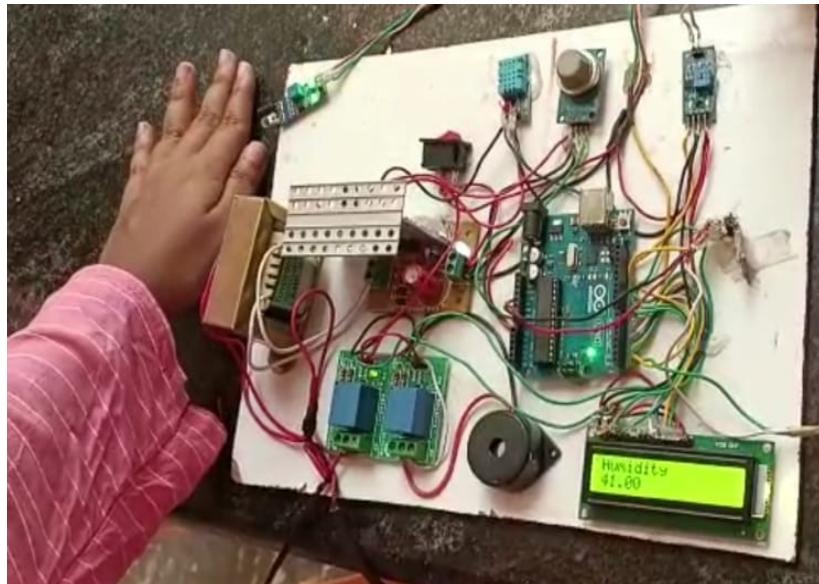
Case-3: Monitoring Air Quality



Green LED is ON because quality of air is good

Air quality percentage is high

Case-4: Detecting motion through IR sensor



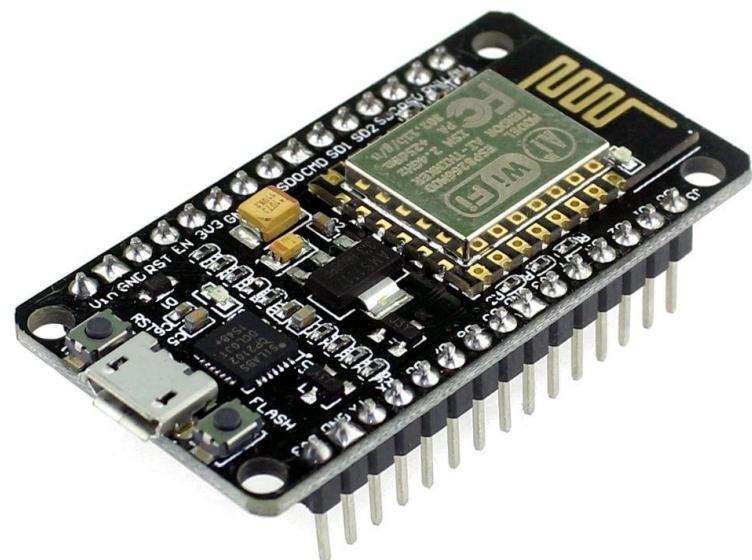
If any body comes to contact then IR sensor blinks in green colour then siren sound is heard

WHAT IS FERTIGATION?

- Fertigation is a method of fertilizer application in which fertilizer is incorporated within the irrigation water by the drip system.
- In this system fertilizer solution is distributed evenly in irrigation.
- The availability of nutrients is very high therefore the efficiency is more.
- In this method liquid fertilizer as well as water soluble fertilizers are used. By this method, fertilizer use efficiency is increased from 80 to 90 per cent.
- Fertigation is defined as the injection of fertilizers, soil amendments and other products typically needed by farmers into soil.

NODE MCU

- The NodeMCU is an open-source development board that uses the ESP8266 WiFi module. It's popular for IoT projects and is compatible with the Arduino IDE, making it easy to program and connect to the internet.
- If you have completed various Arduino projects and are familiar with Arduino, using NodeMCU instead of Arduino Uno is the logical next step if you're looking for a more compact module that encompasses Wi-Fi. NodeMCU is predicated on the Espressif ESP8266-12E WiFi System-On-Chip. It is based on Lua-based firmware and is open-source.



Components & Connections

SOLONOID VALVES

- Solenoid valves are used wherever fluid flow has to be controlled automatically. They are being used to an increasing degree in the most varied types of plants and equipment. The variety of different designs which are available enables a valve to be selected to specifically suit the application in question.

CONSTRUCTION

- Solenoid valves are control units which, when electrically energized or de-energized, either shut off or allow fluid flow. The actuator takes the form of an electromagnet. When energized, a magnetic field builds up which pulls a plunger or pivoted armature against the action of a spring. When de-energized, the plunger or pivoted armature is returned to its original position by the spring action.

RELAYS

- Relays are electrically operated switches that open and close the circuits by receiving electrical signals from outside sources. Some people may associate “relay” with a racing competition where members of the team take turns passing batons to complete the race.
- The “relays” embedded in electrical products work in a similar way; they receive an electrical signal and send the signal to other equipment by turning the switch on and off.