IOT FARM ASSIST

PROJECT REPORT

Submitted by

Dhruv Haribhakti -16BIS0034

Dhiraj Tatarvathi -16BIS0137

Venkata Naga Shanmukh -16BIS0016

(ECE4009)

PROJECT SUPERVISOR
Prof. Budhaditya Bhattacharyya

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DHRUV HARIBHAKTI

DHIRAJ TATARVATHI

VENKATA NAGA SHANMUKH

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ABSTRACT

In IoT Farm Assist we are targeting to help all the farmers of the country who face a lot of troubles in maintaining and protecting their fields. One of the main problems is that the additional run-over of the unneeded water into the fields. This creates the shortage for water for the farmer and his entire family. One other problem faced by the farmers is that the fence alone in their fields cannot protect their crops from the animals as the farmer is completely unaware of the destruction happening to his crops by the animals.

In this project, we are making a system which reduces the extra man-work used up in managing and protecting the fields while farming. We are monitoring the field of the farmer and switching the motor according to the needs of the farmer. Here we are also protecting the field from wild animals. Using IR sensor and moisture sensor will post the readings of crop moisture level and transmit the data to the cloud and in case of any wild animal entering the field IR sensor will detect the presence and send a notification to cloud service. We can also switch the motor accordingly using the Mobile App.

INTRODUCTION

Agriculture uses 85% of available freshwater resources worldwide, and this percentage will continue to be dominant in water consumption because of population growth and increased food demand. There is an urgent need to create strategies based on science and technology for sustainable use of water, including technical, agronomic, managerial, and institutional improvements.

Drip irrigation system makes the efficient use of water and fertilizer. Water is slowly dripped to the roots of the plants through narrow tubes and valves. Water is fed directly to the base of the plants which is a perfect way to water plants. There should be proper drainage in the fields or pot plants to avoid any water logging which in case may affect the productivity.

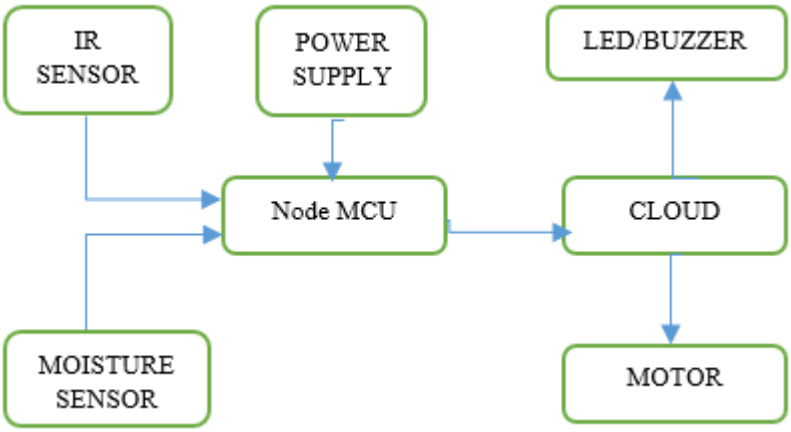
In this project we will make automatic drip irrigation system which water plants based on soil humidity. We are also preventing agricultural land from the destruction by animals using IR sensor.

The Soil humidity sensor will sense the humidity content in the soil and send the value on the cloud using Node MCU and will be posted on the Mobile App used by the farmer, so that he can himself monitor the motor using the App. Using the digital data from the IR sensor the presence of the animals near the field region will be notified to the farmer by the App so that he can take immediate action.

SYSTEM MODEL

In the proposed system we are using sensors like IR sensor and soil moisture sensor, which sense the environment and send signal to Node MCU. Here, the Node MCU acts as the microcontroller which analyses the data input and act accordingly, and it also has an inbuilt Wi-Fi chip which enables it to interact with the cloud directly. We will be using Node MCU board for processing the data from these sensors and sending it to the cloud. The IR sensor detect the motion of animal and send the information to farmer using Node MCU, at the same time buzzer and led will automatically turn ON in the agriculture land. Soil moisture sensor is used to find the moisture of the land and automatically control the motor with the help of driver board.

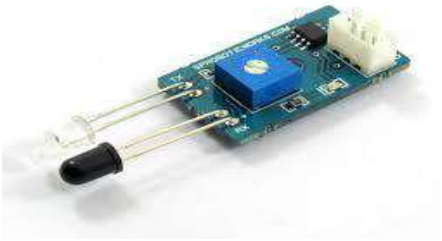
The working procedure of the hardware is given below in the block diagram:-



Following are the components used for the making up of this project's prototype:

1. IR 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 heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Infrared radiation is the portion of electromagnetic spectrum having wavelengths longer than visible light wavelengths the region roughly from 0.75µm to 1000µm is the infrared region.

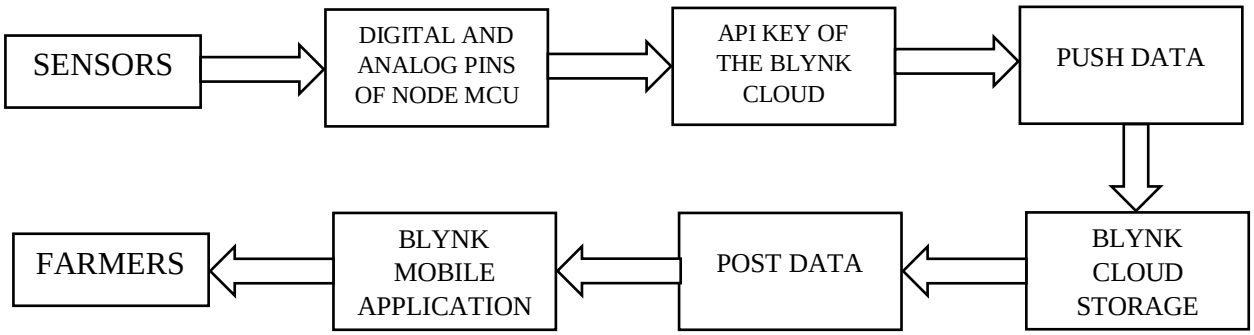


2. Soil Moisture Sensor
   Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.

3. Node MCU
   The NodeMCU (Node MicroController Unit) is an open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266. It uses the Lua scripting language. It is based on the eLua project, and built on the ESP8266 SDK 1.4. It uses many open source projects, such as lua-cjson, and spiffs. It includes firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12 module.

METHODOLOGY

The Flow of the data from the sensors to the farmer is very simple. Following is the flow chart of the events happening during the flow of data from sensors to the farmer.



BLYNK MOBILE CLOUD APPLICATION

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

- Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.
- Blynk Server - responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. Its open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
- Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands.

Following are the steps required while creating the Blynk Mobile App:-

1. Create a Blynk Account
2. Create a New Project
3. Choose Your Hardware
4. Get the Auth Token on email
5. Add a Widget
6. Run The Project

CODE

Following is the Arduino Code with Node MCU Board:-

```
 * Interface InfraRed Sensor Using NodeMCU
 * By TheCircuit
 * Red :     5V
 * Brown: Sensor output
 * Black : Ground
*/
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>

char auth[] = "5604868c44e242ae882b93c1731527c7";
char ssid[] = "yoyo";
char pass[] = "12345678";

int inputPin = 13; // choose input pin (for Infrared sensor)
int inputPin1=5;//moisture
int val =0;// variable for reading the pin status
int val1=0;
int LED = D8;
int outputpin= A0;//for nodemcu
WidgetLED led1(V1);
WidgetLED led2(V2);
void setup()
{
  Serial.begin(9600);
  Serial.print("Connecting to ");
  Serial.println(ssid);
  WiFi.begin(ssid, pass);

  Blynk.begin(auth, ssid, pass);
```

```
// connects to ntwk and estbls cnctn wth blynk


 while (WiFi.status() != WL_CONNECTED)
  {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
   pinMode(inputPin, INPUT); // declare Infrared sensor as input
   pinMode(inputPin1, INPUT);
   pinMode(LED, OUTPUT); //Set the LED (D8) as an output
}
void loop()
{
  int analogValue = analogRead(outputpin);
float millivolts = (analogValue/1024.0) * 3300; //3300 is the voltage provided by NodeMCU
float celsius = millivolts/10;
Serial.print("in DegreeC=   ");
Serial.println(celsius);

//---------- Here is the calculation for Fahrenheit ----------//
float fahrenheit = ((celsius * 9)/5 + 32);
Serial.print(" in Farenheit=   ");
Serial.println(fahrenheit);
delay(1000);
   val = digitalRead(inputPin); // read input value
   val1=digitalRead(inputPin1);
   if (val == HIGH)
   { // check if the input is HIGH
      Serial.println("far"); // turn LED OFF
      led1.off();
```

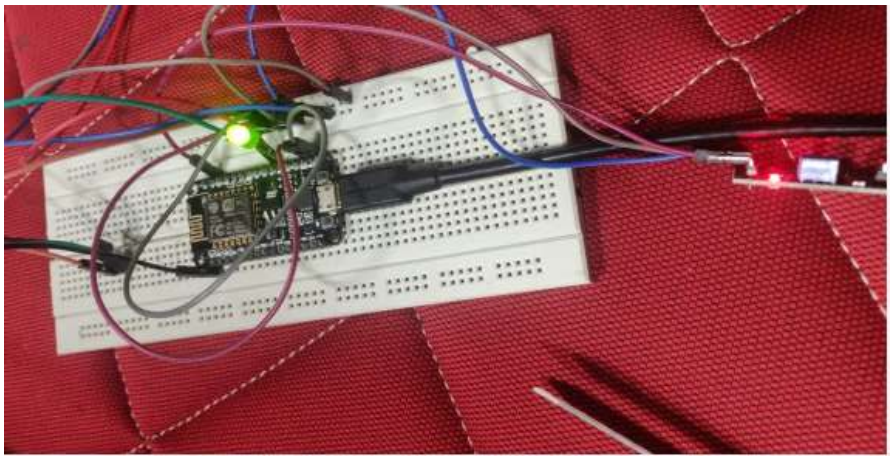
```
  }
  else


 {
    int a=1;
    Serial.println("near"); // turn LED ON
    led1.on();
  }
  if (val1 == HIGH)
  { // check if the input is HIGH
    Serial.println("LOW moisture"); // turn LED OFF
    led2.off();
  }
  else
  {
    int a=1;
    Serial.println("HIGH moisture"); // turn LED ON
    led2.on();
  }
Blynk.virtualWrite(0, celsius);
Blynk.run();
}
// This function will be called every time button Widget
// in Blynk app writes values to the Virtual Pin V3
BLYNK_WRITE(V3) {
 int pinValue = param.asInt(); // Assigning incoming value from pin V3 to a variable
 if (pinValue == 1) {
   digitalWrite(LED, HIGH); // Turn LED on.
  } else {    digitalWrite(LED, LOW); // Turn LED off.
}
}
```

RESULTS AND DISCUSSIONS

The resultant mobile application of the Blynk App was successfully created. The App show the output whenever an animal comes close to the field entrance covered by the IR sensors. This will automatically send a notification to the farmer in his mobile that there is some disturbance in the field's entrance and so he can act accordingly.

The Blynk Mobile Application will also show the farmer real time humidity in the soil. He can himself manually monitor the soil humidity by switching on/off button of the motor in the App itself without him actually having any burden. He can also set the monitoring of the motor as automatic where the App itself will turn on/off the motor according to the threshold humidity set by the farmer.

We have made a prototype where, when the user switches the button in the App On, the LED will starts blowing and stops blowing, when the button is turned off. Following is the image of the working model:-



Following are the images of the Blynk App Interface:-

CONCLUSION

The objective of this paper is to design a fully automated irrigation and protect agriculture land from animals using moisture sensor, IR sensor, cloud (ThingSpeak) and Atmega processor. The system provides a real time feedback control module which monitors and controls all the activities of drip irrigation system efficiently.

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