ACM 6th WOMENS HACKATHON

Report Submitted For Final Evaluation on 28.11.21

Over Problem Statement

Crop Care System

Statement number - 3

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1.INTRODUCTION

1.1 Overview

Decision-making in various stages of crop cultivation is challenging for farmers. climate change and its impact on agriculture, traditional practices followed by farmers fail to produce profitable yields. Internet of Things (IoT) plays a crucial role in smart agriculture. Smart farming is an emerging concept, where IoT sensors are capable of providing information about their agriculture fields. Monitoring environmental factors is the major factor to improve the yield of the efficient crops. The feature of this paper includes monitoring temperature, humidity, light level, soil moisture level and ph in agricultural field through sensors usage

1.2 Purpose

Agriculture plays major role in the economy of the country. More than 70% of Indian population relies on agriculture for their sustenance. As the contribution of agriculture to Gross Domestic product is declining nowadays, we are in urge to increase crop productivity with efficient and effective water usage.Agriculture in India is still carried out in conventional way and lags behind in integrating modern technologies. Around 55 percentage of Indian population has been engaged in agriculture and allied activities which constitute only 15 percent of GDP so it becomes much important for the stakeholders involved to come out of the conventional agricultural practices and modernize the agriculture using technology. The economic contribution of agriculture to India’s GDP is steadily declining with the country’s broad-based economic growth while large number of people continues

to work in agricultural sector. Hence, there is an immediate need to improve the system, which can increase the yield and produce healthy organic food.

2.LITERATURE SURVEY

2.1 Existing problem

• Excessive use of fertilizers, insecticides and pesticides makes the soil dependent on them, erodes fertility, increases resistance in insects and pests, pollutes groundwater and nearby water bodies whenever it rains.

• Different plants require different amount of moisture, humidity, temperature and light wavelength, and lack of awareness of this information or negligence of a person cultivating land can cause plants to die before maturing.

2.2 Proposed solution

• All the above mentioned aspects of present agricultural practices should be improved to get higher yield. Hence, we move towards a smart farming model where the plant is provided with an environment for its optimum growth.

• nsects and pests cannot enter inside, thereby eliminating the requirement of Glowing LED lights are switched on whenever light intensity is low for photosynthesis, this ensures faster rate of growth.

• The humidity and temperature of air are measured by sensor and whenever temperature is high or air moisture becomes too low, fogger is turned on to provide the required moisture and cool down the temperature.

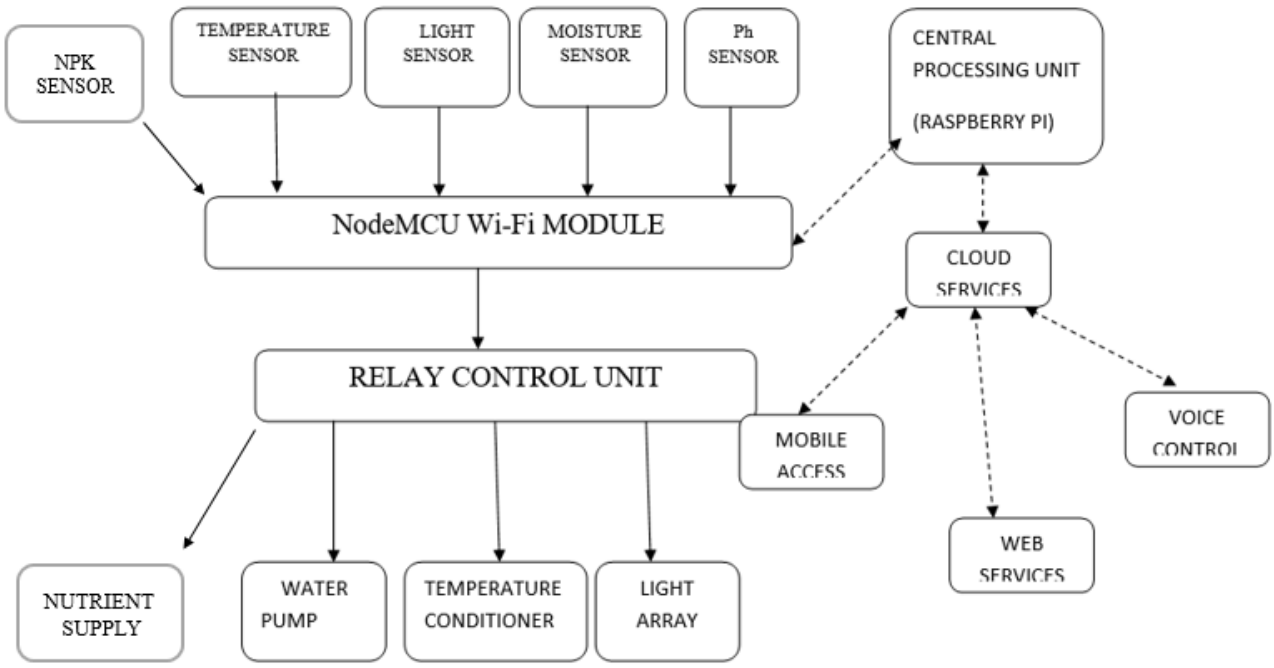
• Internet of Things (IoT) is widely used in connecting devices and collecting data information. Internet of Things is used with IoT frameworks to handle and interact with data and information.

• In the system users can register their sensors, create streams of data and process information. IoT are applicable in various methodologies of agriculture. Applications of IoT are Smart Cities, Smart Environment, Smart Water, Smart Metering, Security and Emergency, Industrial Control, Smart Agriculture, Home Automation, e-Health etc .'Internet of Things' is based on device which is capable of analyzing the sensed information and then transmitting it to the user.

3.THEORITICAL ANALYSIS

3.1 Block diagram

The system architecture of greenhouse automation consists of three important elements such as sensors, Wi-Fi module, Central Processing Unit(Raspberry pi).



3.2 Hardware / Software designing

Hardware requirements

- Different Sensors
- NodeMCU
- Central Processing Unit(Raspberry pi)
- Relay Control Unit

Software requirements

- Arduino IDE

4. SENSORS OVERVIEW

NPK Sensor

Knowing the nutrient content of the soil can assist us understand about nutritional deficit or abundance in soils used to support plant development. There are several ways for assessing soil nutrient concentration, such as utilizing optical sensors or a spectrometer. However, the spectrum analysis approach is inconvenient.

The sensor doesn’t require any chemical reagent. Since it has High measurement accuracy, fast response speed, and good interchangeability, it can be used with any microcontroller. You cannot use the sensor directly with the microcontroller as it has a Modbus Communication port. Hence you need any Modbus Module like RS485/MAX485 and connect the sensor to the microcontroller.

Humidity/Temperature Sensor

Humidity sensors work by detecting changes that alter electrical currents or temperature in the air. There are three basic types of humidity sensors: capacitive, resistive and thermal. All three types will monitor minute changes in the atmosphere in order to calculate the humidity in the air.

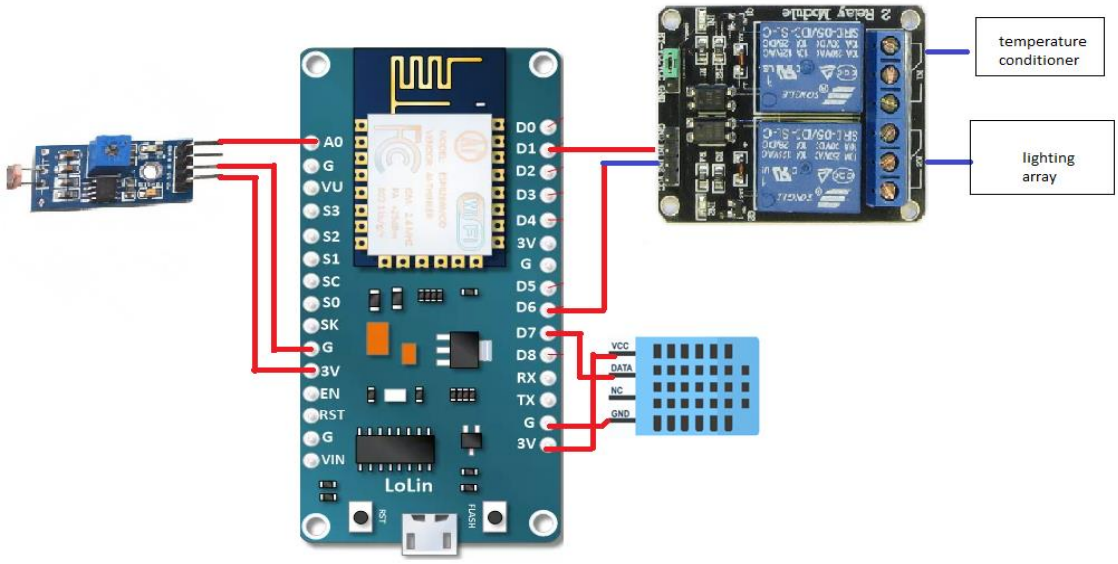
A capacitive humidity sensor measures relative humidity by placing a thin strip of metal oxide between two electrodes. The metal oxide's electrical capacity changes with the atmosphere's relative humidity. Weather, commercial and industries are the major application areas. Resistive humidity sensors utilize ions in salts to measure the electrical impedance of atoms. As humidity changes, so does the resistance of the electrodes on either side of the salt medium. Two thermal sensors conduct electricity based upon the humidity of the surrounding air. One sensor is encased in dry nitrogen while the other measures ambient air. The difference between the two measures the humidity.

Light Sensor

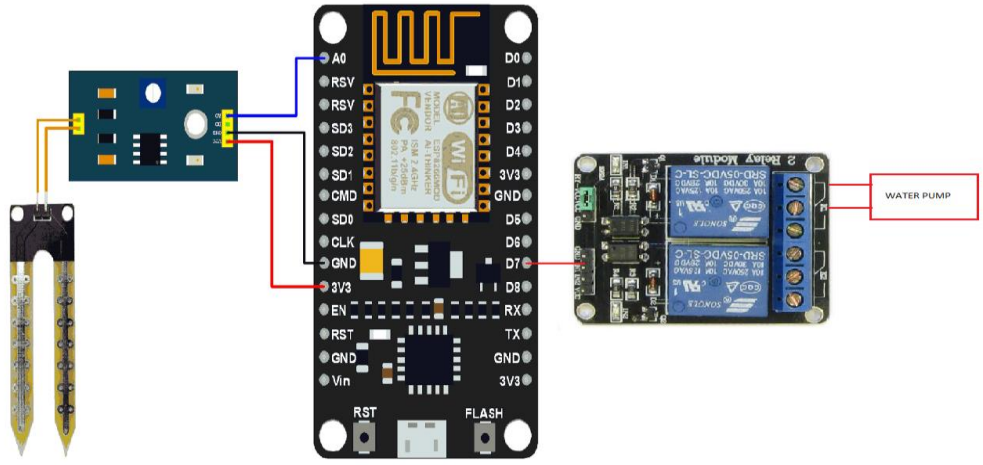
The light sensor is a passive device that converts the light energy into an electrical signal output. Light sensors are more commonly known as Photoelectric Devices or Photo Sensors because they convert light energy (photons) into electronic signal (electrons). Phototransistors, photo resistors, and photodiodes are some of the more common type of light intensity sensors, Photo electric sensors use a beam of light to detect the presence or absence of an object. It emits a light beam (visible or infrared) from its light-emitting element. A reflective-type photoelectric sensor is used to detect the light beam reflected from the target. A beam of light is emitted from the light emitting element and is received by the light receiving element. Both

the light emitting and light receiving elements are contained in a single housing. The sensor receives the light reflected from the target.

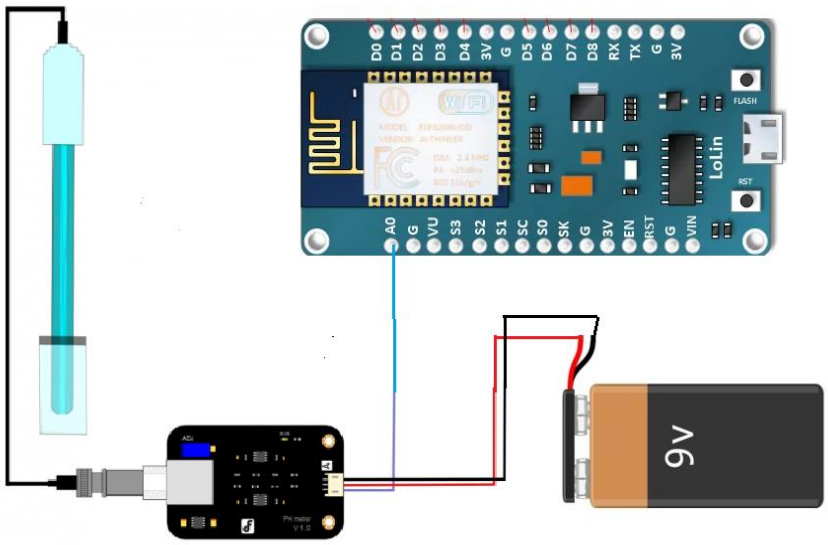
5. CIRCUIT CONNECTION



Circuit diagram of light and temperature sensors



Moisture sensor circuit diagram



pH sensor circuit diagram

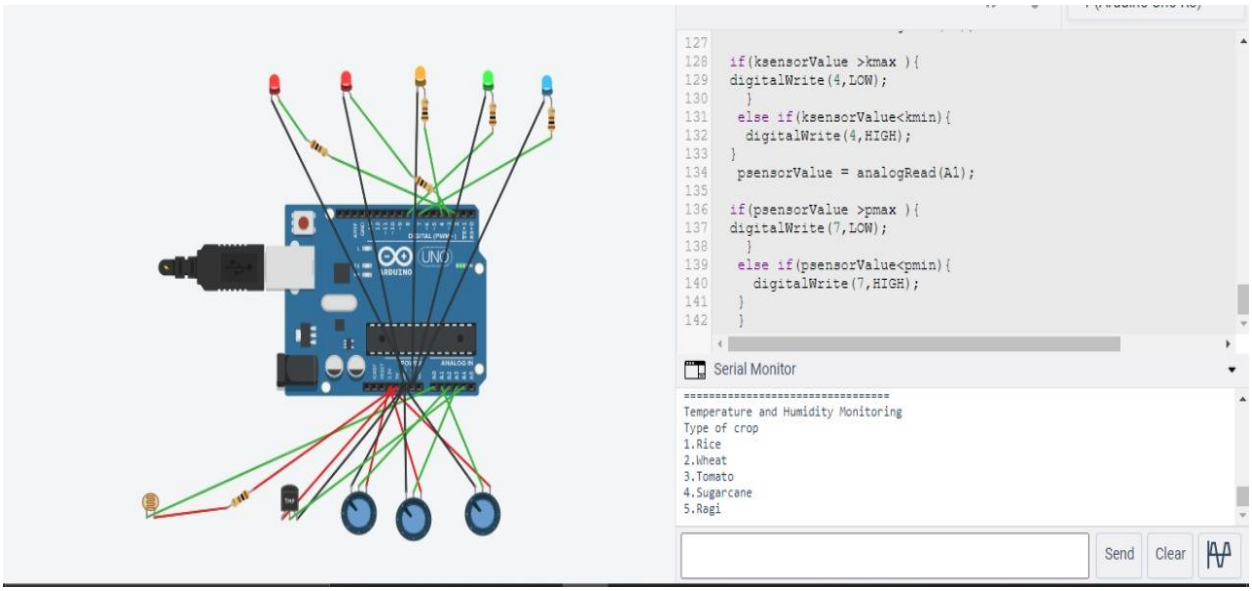
6. OUR SOLUTION

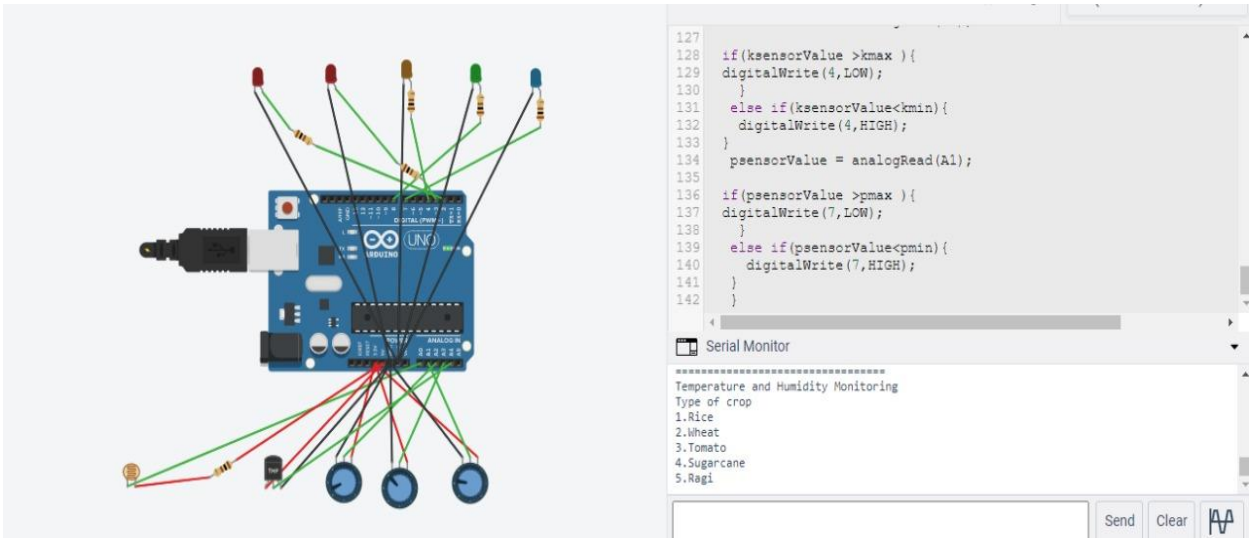
Internet of Things (IoT) is widely used in connecting devices and collecting data information. Internet of Things is used with IoT frameworks to handle and interact with data and information.

- Estimation of nutrient is done using an NPK monitoring unit, and sent to micro-controller, NPK levels for different plants are prescribed in the program before. The fertilizer is then mixed with water stream and sent in.
- The precision mixing of fertilizer is implemented using a solenoid valve and pump by which the amount of fertilizer discharged can be controlled.
- The water sending time is determined by the moisture sensor that is in contact with the soil. If humidity is found low water sprayer or fogger is implemented, Fogger is rolled in if the temperature is found really high
- pH is found, if the pH is low pH high is initiated and if it is high, pH low is implemented

7.RESULT

Prototype Implemented in Tinker CAD





7. ADVANTAGES & DISADVANTAGES

Advantages

- High precision farming can be implemented with the usage of NPK sensor
- Monitoring and automation of crop will lead to better yield

Disadvantages

- The result does not cover each and every agricultural product harvested in all the regions.
- Sensors require wi-fi services to connect to the Cloud and it might not be feasible in all regions

8. FUTURE SCOPE

- Implementation of the solution using wi-fi modules which is the efficient way for smart farming
- Switching to Raspberry pi from Arduino which will enable cloud storage which can lead to data analytics
- Using which models can be constructed and data science and AI be implemented
- Without the need of NPK sensor just with the region fertilizer level needed can be evaluated.

9. APPENDIX

```
int inByte;

void setup()

{

  pinMode(A0,OUTPUT);

  pinMode(2,OUTPUT);

   pinMode(8,OUTPUT);

  pinMode(3,OUTPUT);

  pinMode(A4,INPUT);

  pinMode(A2,INPUT);

  pinMode(4,OUTPUT);

  pinMode(7,OUTPUT);

  pinMode(A1,INPUT);

  Serial.begin(9600);

}

int sensorValue ;

int tempsensorValue;

int tempmin;

int tempmax;
```

```
int i=0;

int nmin;

int nmax;

int kmin;

int kmax;

int pmax;

int pmin;

int psensorValue;

int ksensorValue;

int nnsensorValue;

int getcrop()

{

  Serial.println("================================");

Serial.println("Temperature and Humidity Monitoring");

Serial.println("Type of crop\n1.Rice\n2.Wheat\n3.Tomato\n4.Sugarcane\n5.Ragi");

  while (Serial.available() == 0){

  }int inByte = Serial.parseInt();

  return inByte;

 i=0;}
```

```
void getdata()
{
   Serial.print("Temprature:");
  Serial.println(tempsensorValue);
Serial.print("Light sensor: ");
  Serial.println(sensorValue);
  Serial.print("Nitrogen level:");
  Serial.println(nnsensorValue);
Serial.print("Potassium level:");
  Serial.println(nnsensorValue);
Serial.print("Phosphorous level:");
  Serial.println(nnsensorValue);
  i=0;
}
int celsius()
{ return map(((analogRead(A4) - 20) * 3.04), 0, 1023, 23 , 125);
}
void loop()
{int j;
```

```
  if(i==1)
    j=getcrop();
   else if (i == 2)
     getdata();
 i=Serial.parseInt();
 if( j == 1){
tempmin =25;
tempmax =35;
nmin=15;
nmax=20;
kmax=20;
kmin=15;
pmin=20;
pmax=30;
}
else if ( j == 2)
{
tempmin = 20;
tempmax = 25;
```

```
nmin=100;
nmax = 100;
kmin=60;
kmax=64;
}
else if( j == 3){
tempmin =21;
tempmax =24;
nmax=200;
nmin=200;
kmin=250;
kmax=252;
}
else if( j == 4){
tempmin =27;
tempmax =27;
nmax=150;
nmin=150;
kmin=80;
```

```
kmax=83;
}
else if( j == 5){
tempmin =25;
tempmax =30;
nmin=60;
nmax=60;
kmin=30;
kmax=33;
}
tempsensorValue = celsius();
  if (tempsensorValue < tempmin){
  digitalWrite(3,HIGH);
  }
  else if (tempsensorValue > tempmax){
    digitalWrite(3,LOW);}
    sensorValue = analogRead(A0);
    if(sensorValue > 30){
  digitalWrite(2,LOW); }
else {
```

```
digitalWrite(2,HIGH);
 }
 nnsensorValue = analogRead(A2);
 if(nnsensorValue >nmax ){
 digitalWrite(8,LOW);}
  else if(nnsensorValue<nmin){
   digitalWrite(8,HIGH);
}
 ksensorValue = analogRead(A3);
  if(ksensorValue >kmax ){
 digitalWrite(4,LOW);
   }
  else if(ksensorValue<kmin){
digitalWrite(4,HIGH); }
  psensorValue = analogRead(A1);
if(psensorValue >pmax ){
 digitalWrite(7,LOW);
   } else if(psensorValue<pmin){
    digitalWrite(7,HIGH);
  } }
```

11. BIBILOGRAPHY

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