Integrated Farming Sensor System

By

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Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

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BONAFIDE CERTIFICATE

Certified that this project report entitled "**Integrated Farming Sensor System"** is a bonafide work of **Nitesh Kumar A (20BRS1172), Abraham Kuriakose (20BRS1119), Sai Teja Bandaru (20BRS1129) and Lalitaditya Cherapanjeri (20BRS1212)** who carried out the project work under my supervision and guidance for **ECE 2035 – Sensors Actuators and Signal Conditioning.**

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ABSTRACT

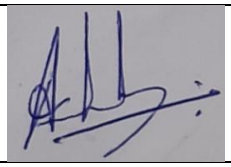
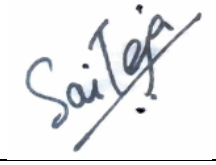
Agriculture is the main source for growth and development of economy and plays a crucial role in variety of industrial sectors. Unfortunately, farmers are still dependent on traditional methods of farming which has poor yields and other drawbacks. In the year 2014, almost 15000-16000 farmers committed suicide because of the problems faced in cultivation. Among these, 40 percent of the farmers had low yield and productivity, and irrigation problems. Thus, it was necessary to hear and provide a solution to their problems. Modern day farming demands increased production of food to accommodate the large global population. The alarming climate change, pest attacks, lack of mechanization and scarcity of water demand improved methods of farming for agriculture. Prediction of weather, reports and surveys regarding environment constraints can be useful in gaining knowledge about farming based on the information collected, such as what and which type of crops can be grown, to plan before a rain and optimize the crop productions by checking the background conditions.

As the world progresses in the field of information and technology, there is a need to shift towards automated farming systems based on sensors which can be used to integrate information corresponding to the ideal farming conditions and to use the output data for analysis and management. This sensor-based system contains channels for responding to the sensor outputs and can improve crop growth from the farms. This proposed system consists of sensors like soil moisture sensor, humidity sensor, pH sensor and temperature sensor. These sensors collect the present soil moisture, humidity, soil pH and temperature of the surrounding. This system can be implemented as a general-purpose system as it depends on the crop and its native ideal cultivating and harvesting conditions.

The project aims at integrating traditional farming and modern techniques to reduce the manual monitoring of soil testing and irrigation and help farmers in increasing the agricultural production. The main purpose of this system is to increase the agricultural yield and reduces the investments in soil monitoring and irrigation. With developments, this system can support farmers on a large scale and can improve the quality and productivity of agricultural products.

ACKNOWLEDGEMENT

We the group members of this project, would like to sincerely thank Dr. Gayathri Sivakumar ma'am for giving us this opportunity and encouraging us to do this project. It was a great privilege and honor for us to complete the course under her guidance. It was also a great learning experience for all of us involved in this project, as we learnt a lot about the working of various sensors and how to integrate them to form a system, in such a way that people could benefit from them.

S.No	Name	Register Number	Signature
1.	Nitesh Kumar	20BRS1172	Nithesh.K
2.	Abraham Kuriakose	20BRS1119	
3.	Sai Teja Bandaru	20BRS1129	
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CHAPTER 1
INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

1.2 PROBLEM STATEMENT AND OBJECTIVES

Our project aims to modern solutions for agriculture and promote sustainable development.

Arduino built a microcontroller control system that includes soil moisture sensor, temperature sensor and humidity sensor. The purpose is to optimize the water flow so that plants are irrigated depending on their water needs. This is very useful in the summer season when the water is scarce.

Using a Ph sensor which can be used to measure the Ph of soil and water which informs the farmer how alkaline and acidic the soil or water.

These sensors collect the present soil moisture, soil pH and temperature of the surrounding. The project aims at integrating traditional farming and modern techniques to reduce the manual monitoring of soil testing and irrigation and help farmers in increasing agricultural production. The main purpose of this system is to increase the agricultural yield and reduce the investments in soil monitoring and irrigation.

CHAPTER 2

2.1 PROPOSED/IMPLEMENTED METHOD

In this Proposed System, both the sensor temperature sensor and soil moisture sensors are connected to the input pins of Arduino Uno, microcontroller board. The Analog values produced from the sensors are converted to a digital output value by the Arduino Uno R3 microcontroller. The sensed values are displayed in the LCD display. The water motor gets switched-off automatically based on the sensed value with respect to an already fixed threshold value.

2.2 ADVANTAGES

1) WATER SAVING TECHNOLOGY:

The primary objective of automated sprinkler irrigation is to supply a minimum amount of irrigation water throughout the fields. Sensor-based irrigation has a significant potentiation to save water and increase economic efficiencies. The main advantage of this system is to reduce the input cost or to increase the yield for the same input. With this irrigation technology, human intervention must be minimized. With the automated technology of irrigation, human intervention can be reduced.

2) SYSTEM COST:

The system cost is dependent on the planning area.

The estimated price is 100$ for 100 square meters.

3) PROFIT AND YIELD:

With proper monitoring of temperature and Ph of water and soil can help in reducing losses to a large extent. Farmers can maintain their fields based on their traditional information without worrying about soil moisture levels, soil quality, crop water requirements, and weather forecasting. They can also decide on how much fertilizer or manure is required based on the pH reading.

2.3 CHALLENGES FACED

Compiling all the components together in a single Arduino UNO was a difficult task.

Due to the unavailability of many components in the online simulation site TINKERCAD a new software had to be identified to do the project, Proteus.

2.4 CODE

```
#include <LiquidCrystal.h> //LCD Library

#define NOTE_C4 262
#define NOTE_D4 294
#define NOTE_E4 330
#define NOTE_F4 349
#define NOTE_G4 392
#define NOTE_A4 440
#define NOTE_B4 494
#define NOTE_C5 523

int temp;
int T_Sensor = A3;
int M_Sensor = A0;
int W_led = 7;
int P_led = 13;
int Speaker = 9;
int val;
int cel;
```

```
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);


void setup()
 {
    lcd.begin(16, 2);
    lcd.clear();
    pinMode(13,OUTPUT);
    pinMode(7,INPUT);
    pinMode(9,OUTPUT);


    val = analogRead(T_Sensor); //Read Temperature sensor value
    int mv = ( val/1024.0)*5000;
    cel = mv/10;




    lcd.setCursor(0,0);
    lcd.print("Project By");
    lcd.setCursor(0,1);
    lcd.print("SK GROUPS ");
    delay(1000);

}
```

```
void loop()
{

  lcd.clear();
  int Moisture = analogRead(M_Sensor); //Read Moisture Sensor Value

  lcd.setCursor(0,0);
  lcd.print("TEMP:");
  lcd.setCursor(5,0);
  lcd.print(cel);
  lcd.setCursor(7,0);
  lcd.print("*C");

 if (Moisture> 700)   // for dry soil
  {
       lcd.setCursor(11,0);
       lcd.print("DRY");
       lcd.setCursor(11,1);
       lcd.print("SOIL");
      if (digitalRead(W_led)==1) //test the availability of water in storage
      {
        digitalWrite(13, HIGH);
        lcd.setCursor(0,1);
        lcd.print("PUMP:ON");
      }
```

```
  else
  {
   digitalWrite(13, LOW);
   lcd.setCursor(0,1);
   lcd.print("PUMP:OFF");

     tone(Speaker, NOTE_C4, 500);
     delay(500);
     tone(Speaker, NOTE_D4, 500);
     delay(500);
     tone(Speaker, NOTE_E4, 500);
     delay(500);
     tone(Speaker, NOTE_F4, 500);
     delay(500);
     tone(Speaker, NOTE_G4, 500);
     delay(500);
  }
}

 if (Moisture>= 300 && Moisture<=700) //for Moist Soil
{
  lcd.setCursor(11,0);
 lcd.print("MOIST");
 lcd.setCursor(11,1);
 lcd.print("SOIL");
```

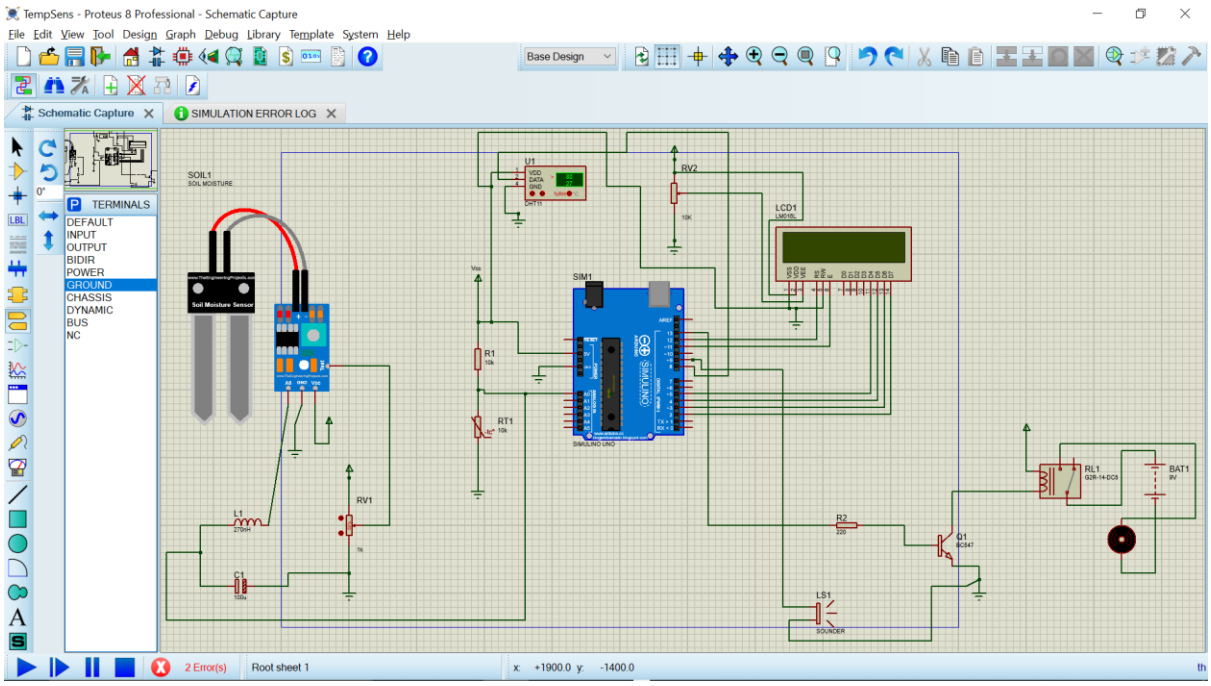
```
    digitalWrite(13,LOW);
    lcd.setCursor(0,1);
    lcd.print("PUMP:OFF");
  }

 if (Moisture < 300)  // For Soggy soil
 {
   lcd.setCursor(11,0);
    lcd.print("SOGGY");
    lcd.setCursor(11,1);
    lcd.print("SOIL");
    digitalWrite(13,LOW);
    lcd.setCursor(0,1);
    lcd.print("PUMP:OFF");
  }
 delay(1000);
}
```

CHAPTER 3

3.1 MAIN RESULTS

The end of the project was a highly successfully working Farming integrated sensor system which can calculate the pH, temperature and soil moisture and can take necessary actions accordingly.



CHAPTER 4

CONCLUSION AND RECOMMENDATION FOR FUTURE WORK

4.1 CONCLUSION & FUTURE ENHANCEMENT

This system is cost-effective for enhancing the techniques to preserve water resources and to optimize them for agriculture production. This system helps the farmer by working automatically and smartly. With placing multiple sensors in the soil, water can be only provided to the required piece of land. This system requires less maintenance so it is easily affordable by all farmers. This system helps to reduce water consumption. This system also helps in monitoring the pH and the temperature.

As per future perspective, this system can be the more intelligent system which predicts user actions, nutrient level of the plants, time to harvest, etc. With using Machine Learning algorithms more advancements can be made in the future which will help farmers a lot and water consumption can also be reduced in agriculture. GSM Module can be used to send and store messages. It can also send notifications to the user of any specific data. It is handy and can be carried anywhere easily.

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Drive Video link

https://drive.google.com/file/d/1-auHYCFeCKigPZfP0Nq0t6fl6z99zl3K/view?usp=sharing