MINI PROJECT REPORT

IOT based Smart Irrigation System

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1. TITLE OF THE PROJECT

The current irrigation systems are ineffective and waste water, increasing costs for farmers and raising issues with the environment. Traditional irrigation methods rely on predetermined schedules and manual changes, which can cause crops to receive too much or too little water.
An IoT-based smart irrigation system that makes use of sensors and data analytics to optimize water use and boost crop yield can be created to solve this problem. In order to adapt the irrigation schedule appropriately, the system may offer real-time information on soil moisture, temperature, and other environmental conditions.
The objective of this project is to create a smart irrigation system based on the Internet of Things that can effectively monitor and manage crop watering. The system ought to be capable of:

- Using sensors and IoT devices, track and analyze the moisture content of the soil as well as other environmental factors.
- To maximize water use, automatically modify the watering schedule depending on current data analysis.
- Through a user-friendly interface, give farmers insights and suggestions on crop water requirements and irrigation scheduling.
- Ensure the system's dependability and toughness even in challenging environmental circumstances.
- Improve agricultural output and reduce water waste to increase

farmer income and enhance environmental sustainability.
Overall, the goal of the smart irrigation system is to revolutionize crop irrigation by improving effectiveness, sustainability, and financial viability.

2. INTRODUCTION

In India, agriculture is without a doubt the main source of income. Increasing agricultural production is necessary due to population growth. For increased support due to increased farm production, more fresh water must be used for irrigation. Currently, 83% of the water used in India is used for Agriculture.
One of the major factors affecting agriculture is temperature as it affects the water content of the soil. High temperatures have a significant impact on crops by causing physiological damage like leaf abscission, leaf burning, senescence, and restricted root and shoot growth, which ultimately reduces output.
Agriculture can become intelligent and dynamic through automation of farm tasks, moving from a manual, static state to one that is dynamic and intelligent, resulting in increased production with less human oversight. This research suggests an automated irrigation system that automatically waters plants while monitoring and preserving the desired soil moisture content. Utilizing a microcontroller operating on the Arduino Uno platform, the control unit is developed. To precisely calculate the soil's moisture content, the system takes use of soil moisture sensors. Over and under irrigation can be avoided by using a perfect amount of water. IOT is utilized to inform farmers on the condition of their sprinklers.

3. FEATURES

- Smart irrigation system
- Temperature control system
- Scarecrow system using ultrasonic distance sensor

4. LANGUAGE USED

- C++ in Arduino

5. MINIMUM SYSTEM REQUIREMENTS

- 256MB RAM
- Intel Pentium4 CPU
- 1GB Disc Space

6. COMPONENTS USED

- Arduino Uno
- Ultrasonic Distance Sensor
- Relay
- Buzzer
- Soil Sensor
- LCD
- Breadboard
- Potentiometer
- DC Motor
- LED
- Resistor
- Temperature Sensor

7. METHODOLOGY USED

For analysis, two soil moisture sensors, comparator modules, and temperature sensors were positioned under various soil conditions. Two electrodes make up the sensor. It gauges the amount of moisture in the area. The resistance of the soil to the current as it passes through the electrodes and across it yields information about the moisture content of the soil. More current will flow through the soil if there is greater water content because resistance will be lower. On the other hand, the sensor module produces a significant level of resistance when the soil moisture is low.

The Arduino board receives information from the sensors. The microcontroller on the Arduino board is in charge of managing the on/off switching of the motor to which water sprinklers can be connected. The arduino transmits sensor values to the modem. Values are then communicated over the modem to the IOT section.

By establishing a starting threshold value at which irrigation should start, the water system control was made possible. The sprinklers are turned on when the sensors detect moisture content below the threshold and run until the soil is totally moist.

8. RESULT AND DISCUSSIONS

The sprinklers can be turned on and off by the system using the values collected by the sensors. The farm's irrigation system can be observed remotely by a farmer. As a result, the system helped create a smart farm

9. ARDUINO CODE

```
#include <LiquidCrystal.h>

#include <Adafruit_NeoPixel.h>
#ifdef __AVR__
#include <avr/power.h> // Required for 16 MHz Adafruit Trinket
#endif
#define NUMPIXELS 16
#define DELAYVAL 1
#define echoPin 10
#define trigPin 8
#define PIN 1
Adafruit_NeoPixel pixels(NUMPIXELS, PIN, NEO_GRB + NEO_KHZ800);

const int SMP = A1;
const int TMP = A0;
const int motor = 13;
const int LedRed = 12;
const int LedGreen = 11;
//const int SON = 10;
const int peizo = 9;

LiquidCrystal lcd(2, 3, 4, 5, 6, 7);

void setup() {
  pixels.begin();
  Serial.begin(9600);
  lcd.begin(16, 2);
  lcd.print("Automated Plant");
```

```
  lcd.setCursor(0,1);
  lcd.print("Watering System!");
  delay(1000);
  pinMode(SMP, INPUT);
  pinMode(TMP, INPUT);
  pinMode(10, INPUT);
  pinMode(trigPin,OUTPUT);
  pinMode(echoPin,INPUT);

  //pinMode(pixels, OUTPUT);
  pinMode(motor, OUTPUT);
  pinMode(peizo, OUTPUT);
  pinMode(LedRed, OUTPUT);
  pinMode(LedGreen, OUTPUT);
  lcd.clear();
  lcd.print("Temp= ");
  lcd.setCursor(7,0);
  lcd.print("|");
  lcd.setCursor(8,0);
  lcd.print("MST= ");
  lcd.setCursor(0,1);
  lcd.print("Motor= ");
}
void scarecrow(){
  digitalWrite(trigPin,LOW);
  delayMicroseconds(2);

  digitalWrite(trigPin,HIGH);
  delayMicroseconds(10);

  digitalWrite(trigPin,LOW);

  float duration = pulseIn(echoPin, HIGH);
  float distance = (duration * 0.017);
  Serial.print("distance: ");
  Serial.print(distance);
  Serial.print("cm");
```

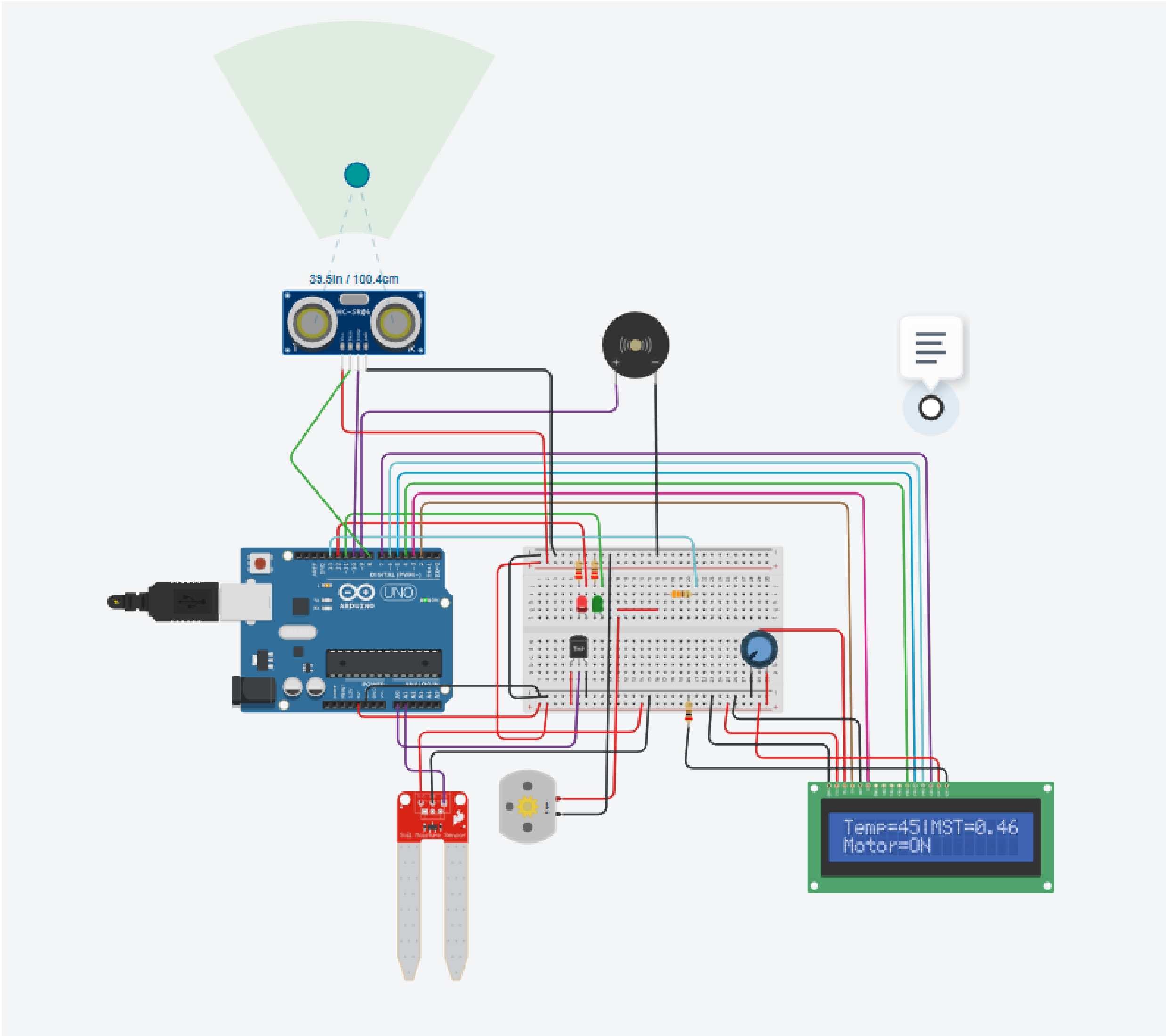
```
  Serial.println("");
  delay(100);

  if (distance > 32 && distance <322){
    digitalWrite(9, HIGH);
    tone(peizo,294);

  }
  else {
    noTone(peizo);
  }
}
void Neoboard(){
  int value1 = analogRead(SMP);
  float Moisture = value1 * 1/8.75 ;
  if (Moisture < 10){
    for (int i = 0; i < NUMPIXELS; i++) {
      pixels.setPixelColor(i, 255, 0, 0); }
    for (int j = 255; j > 0; j=j-2){
      pixels.setBrightness(j);
      pixels.show();
      //delay(0.1);
    }
  }
  else if (Moisture > 10 && Moisture < 20){
    for (int i = 0; i < NUMPIXELS; i++) {
      pixels.setPixelColor(i, 255, 125, 5); }
    for (int j = 255; j > 0; j=j-2){
      pixels.setBrightness(j);
      pixels.show();
      //delay(0.1);
    }
  }
  else if (Moisture > 20 && Moisture < 30){
    for (int i = 0; i < NUMPIXELS; i++) {
      pixels.setPixelColor(i, 255, 255, 0); }
    for (int j = 255; j > 0; j=j-2){
```

```
    pixels.setBrightness(j);
    pixels.show();
    //delay(0.1);
  }
}
else if (Moisture > 30 && Moisture < 50){
  for (int i = 0; i < NUMPIXELS; i++) {
    pixels.setPixelColor(i, 0, 255, 0); }
  for (int j = 255; j > 0; j=j-2){
    pixels.setBrightness(j);
    pixels.show();
    //delay(0.1);
  }
}
else if (Moisture > 50 && Moisture < 60){
  for (int i = 0; i < NUMPIXELS; i++) {
    pixels.setPixelColor(i, 130, 200, 250); }
  for (int j = 255; j > 0; j=j-2){
    pixels.setBrightness(j);
    pixels.show();
    //delay(0.1);
  }
}
else if (Moisture > 60 && Moisture < 75){
  for (int i = 0; i < NUMPIXELS; i++) {
    pixels.setPixelColor(i, 31, 70, 220); }
  for (int j = 255; j > 0; j=j-2){
    pixels.setBrightness(j);
    pixels.show();
    //delay(0.1);
  }
}
else if (Moisture > 75){
  for (int i = 0; i < NUMPIXELS; i++) {
    pixels.setPixelColor(i, 20, 30, 250); }
  for (int j = 255; j > 0; j=j-2){
    pixels.setBrightness(j);
```

```
    pixels.show();
    //delay(0.1);
   }
  }
}

void loop() {

  int value = analogRead(TMP);
  int Temperature = value * 3/10;
  int value1 = analogRead(SMP);
  float Moisture = value1 * 1/8.75 ;
  lcd.setCursor(5,0);
  lcd.print(Temperature);
  lcd.setCursor(12,0);
  lcd.print(Moisture);
  lcd.setCursor(6,1);
  //pixels.clear();
  pixels.setBrightness(100);

  if (Moisture < 25){
   if(Temperature > 45){
   digitalWrite(motor, HIGH);
   digitalWrite(LedRed, HIGH);
   digitalWrite(LedGreen, LOW);
   lcd.print("ON");
    delay(100);
   }
   else{
   digitalWrite(LedRed, HIGH);
   digitalWrite(LedGreen, LOW);
   digitalWrite(motor, HIGH);
   lcd.print("ON ");
    delay(100);
   }
  }
  else if(Moisture > 25 && Moisture < 75){
```

```
    if(Temperature > 45){
    digitalWrite(LedRed, HIGH);
    digitalWrite(LedGreen, LOW);
    digitalWrite(motor, HIGH);
    lcd.print("ON ");
    delay(100);
    }
    else{
    digitalWrite(motor, LOW);
    digitalWrite(LedRed, LOW);
    digitalWrite(LedGreen, HIGH);
    lcd.print("OFF");
    delay(100);
    }
  }
  else if (Moisture > 75){
    digitalWrite(motor, LOW);
    digitalWrite(LedRed, LOW);
    digitalWrite(LedGreen, HIGH);
    lcd.print("OFF");
    delay(100);
  }
  else {
  exit(0);}
  Neoboard();
  scarecrow();
  delay(100);
}
```

10. CIRCUIT DIAGRAM



TinkerCad Circuit:-
https://www.tinkercad.com/things/lAgalfk7Xmd-automatic-irrigation-system-eiot-mini-project/editel?sharecode=wdmGt_pndk-74B0ZvI39YfG_eb8ORtflgbRa_WlcDUk

11. CONCLUSION

The project gave the opportunity to examine the existing methods, their advantages and disadvantages, and the design of a system to monitor soil moisture levels. The irrigation process, one of the most time-consuming tasks in farming, can be automated by using the proposed method to turn on and

off the water sprinkler in accordance with soil moisture levels.
Through this experiment, it may be inferred that automation and the Internet of Things can significantly advance farming. By allowing for the efficient use of water resources, the system is thus potentially a solution to the issues associated with the current manual and laborious irrigation procedure.