



**END SEMESTER
ASSESSMENT (ESA) B.TECH.
(CSE)
IV SEMESTER
UE18CS256 - MICROPROCESSOR AND
COMPUTER ARCHITECTURE LABORATORY
PROJECT REPORT ON**

SMART AGRICULTURE SYSTEM

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TABLE OF CONTENTS		
Sl.No	TOPIC	PAGE No
1.	ABSTRACT OF THE PROJECT	3
2.	CIRCUIT DIAGRAM	4
3.	ARDUINO CODE	5
4.	SCREEN SHOTS OF THE OUTPUT	8
	REFERENCES	11

ABSTRACT OF THE PROJECT:

We have built a smart agricultural system using a CO₂ sensor, ultrasonic distance sensor, temperature sensor and a LCD display.

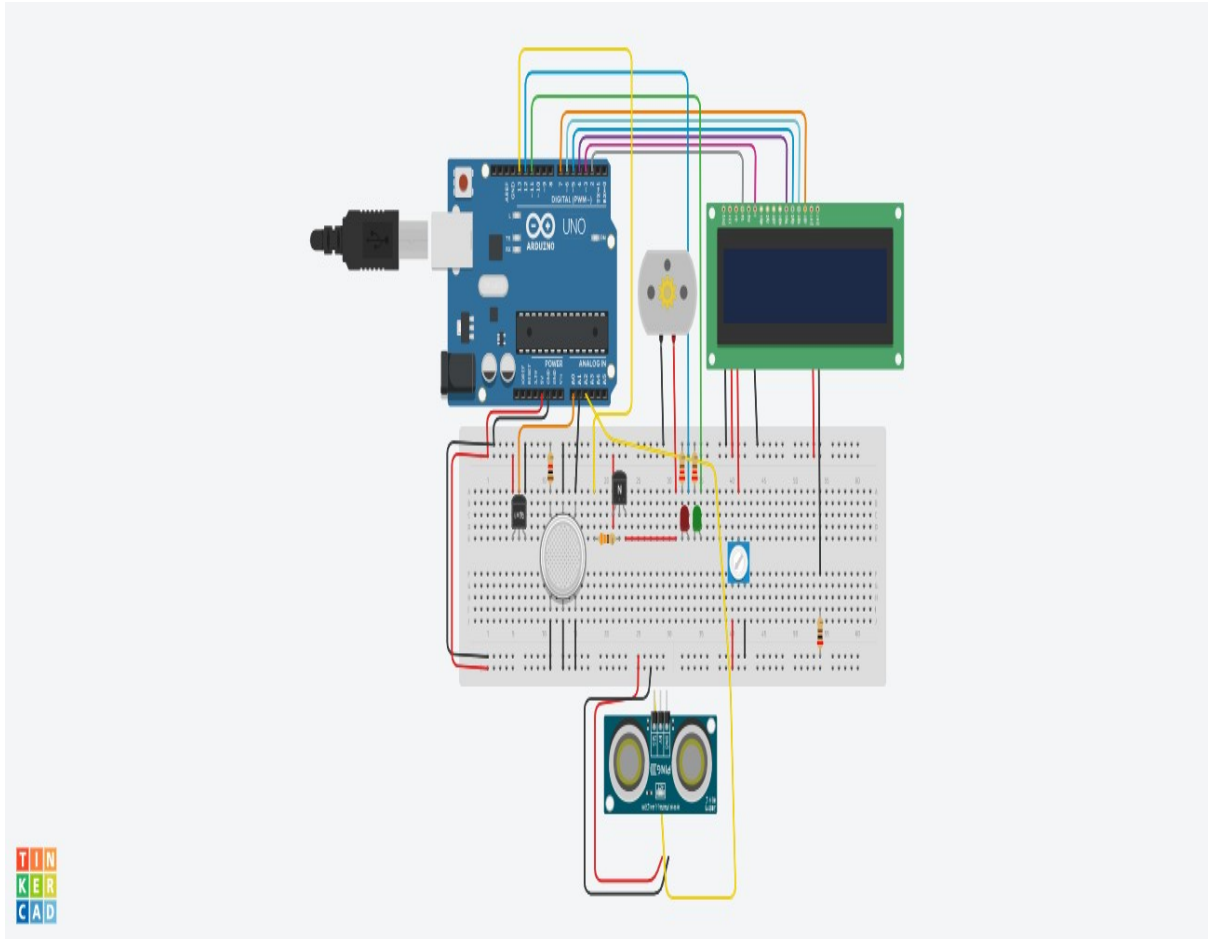
It replicates the measurement of various parameters that generally affect the growth of a plant. Few parameters include gas level, temperature level etc. When temperature exceeds a 45, the motor is automatically turned on and irrigation takes place. When the CO₂ concentration is too high, the a warning is displayed on the LCD. The Ultrasonic distance sensor is used to check the distance from the robot. Beyond a certain distance, the temperature and gas concentration cannot be detected and a warning is displayed.

It basically performs various actions based on the level of these parameters, to alert us if any of the parameters reach a level that is undesirable for the healthy growth of a plant. Hence it replicates the idea of monitoring the parameters that affect the growth of a plant.

Components used:

Name	Quantity	Component
UArduino Uno	1	Arduino Uno R3
MDC motor	1	DC Motor
TT-NPN (BJT)	1	NPN Transistor (BJT)
R2, R3	2	Resistor 220 ohm
DLED2	1	LED Green
ULCD1	1	LCD 16 x 2
RPotenciometer1	1	Potentiometer 10k
DLED1	1	LED Red
R1	1	330 Ω Resistor
R5	1	200 Ω Resistor
USensor LM35	1	Temperature Sensor [LM35]
GAS1	1	Gas Sensor
R4	1	1 kΩ Resistor
PING1	1	Ultrasonic Distance Sensor

CIRCUIT DIAGRAM:



ARDUINO CODE:

```
#include <LiquidCrystal.h>
#include <Servo.h>

const int LM35 = A0;
const int motor = 13;
const int LedRed = 12;
const int LedGreen = 11;
float sensorValue;
//float distance,duration;
//const int echoPin = A2;

int cm = 0;

long readUltrasonicDistance(int triggerPin,
int echoPin)
{
    pinMode(triggerPin, OUTPUT);  // Clear the
trigger
    digitalWrite(triggerPin, LOW);
    delayMicroseconds(2);
    // Sets the trigger pin to HIGH state for
10 microseconds
    digitalWrite(triggerPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(triggerPin, LOW);
    pinMode(echoPin, INPUT);
    // Reads the echo pin, and returns the
sound wave travel time in microseconds
    return pulseIn(echoPin, HIGH);
}

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

void setup()
{
    Serial.begin(9600);
    lcd.begin(16, 2);
```

```

    lcd.print("SMART PLANT");
    lcd.setCursor(0,1);
    lcd.print("MONITOR SYSTEM !");
    //pinMode(echoPin, INPUT);
    pinMode(motor, OUTPUT);
    pinMode(LedRed, OUTPUT);
    pinMode(LedGreen, OUTPUT);
    delay(2000);
    lcd.clear();
    /*lcd.print("Temp= ");
    lcd.setCursor(0,1);
    lcd.print("WaterPump= ");*/
}

void loop()
{
    //duration = pulseIn(echoPin, HIGH);
    //distance = (duration*.0343)/2;
    int value = analogRead(LM35);
    float Temperature = value * 500.0 / 1023.0;
    //lcd.setCursor(6,0);
    //lcd.print(Temperature);
    //lcd.setCursor(11,1);
    // measure the ping time in cm
    cm = 0.01723 * readUltrasonicDistance(A2,
A2);
    Serial.print(cm);
    Serial.println("cm");
    //delay(100); // Wait for 100
millisecond(s)
    //Serial.print("Distance: ");
    //Serial.println(distance);
    //delay(100);
    lcd.clear();
    if(cm < 250)
    {
        //lcd.clear();
        lcd.print("T=");
        lcd.setCursor(0,1);
        lcd.print("WP=");
        lcd.setCursor(2,0);
    }
}

```

```

        lcd.print(Temperature);
        lcd.setCursor(3,1);

        if (Temperature > 50)
        {
            digitalWrite(motor, HIGH);
            digitalWrite(LedRed, HIGH);
            digitalWrite(LedGreen, LOW);
            lcd.print("ON ");
        }
        else
        {
            digitalWrite(motor, LOW);
            digitalWrite(LedRed, LOW);
            digitalWrite(LedGreen, HIGH);
            lcd.print("OFF");
        }
        delay(1000);
        sensorValue = analogRead(A1); // read
analog input pin 0
        if(sensorValue >= 100)
        {
            //digitalWrite(LED,LOW);
            Serial.print(sensorValue);
            Serial.println(" | SMOKE DETECTED");
            lcd.setCursor(7,1);
            lcd.print("GAS DETCD");
        }
        else
        {
            //digitalWrite(LED,HIGH);
            Serial.println("Sensor Value: ");
            Serial.println(sensorValue);
            lcd.setCursor(7,1);
            lcd.print("GAS=");
            lcd.print(sensorValue);

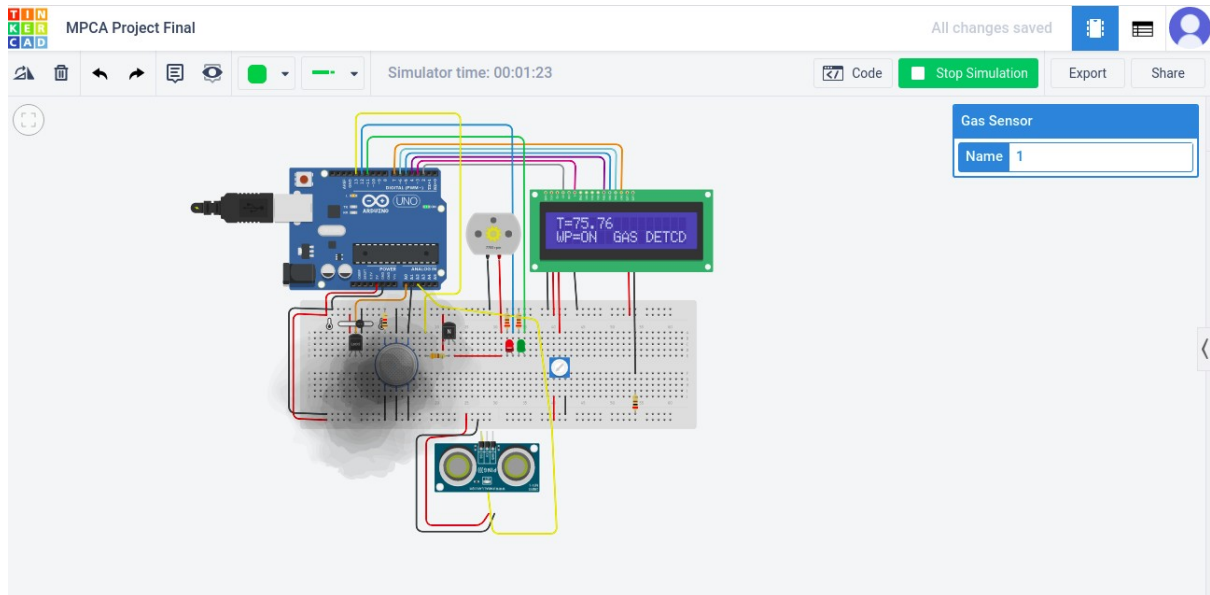
        }
        delay(1500);
    }
    else

```

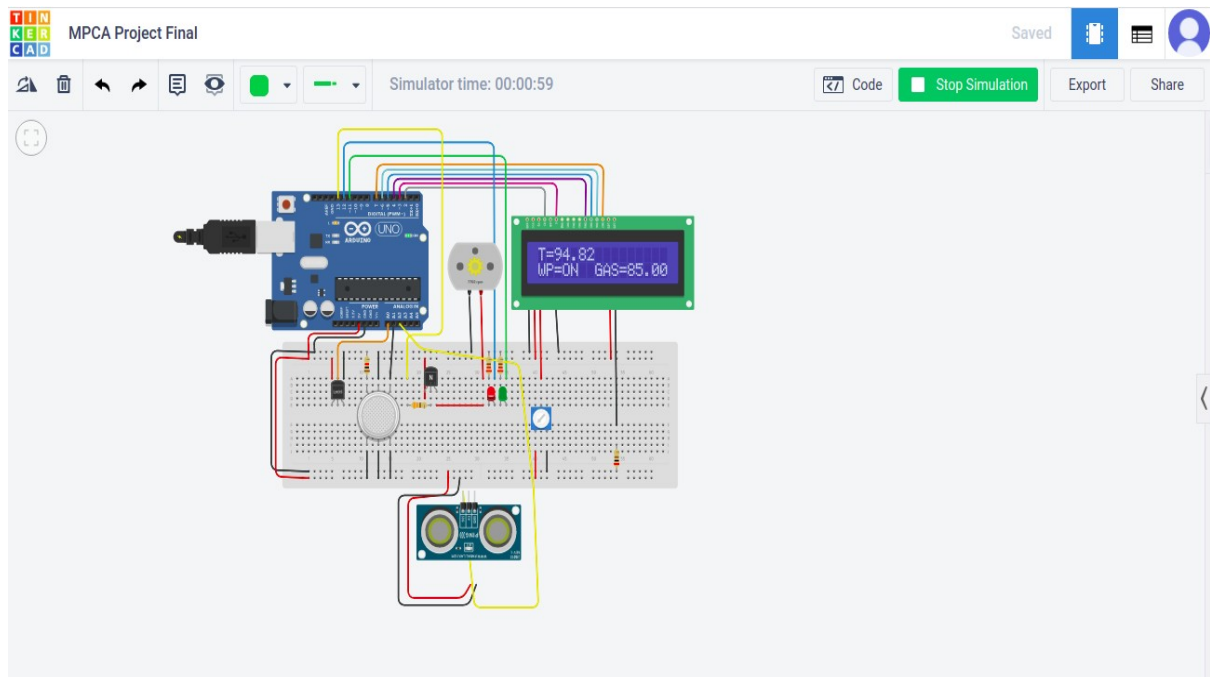
```
    {  
        lcd.clear();  
        lcd.print("Out of Range");  
        delay(1000);  
    }  
}
```


SCREEN SHOTS OF THE OUTPUT:

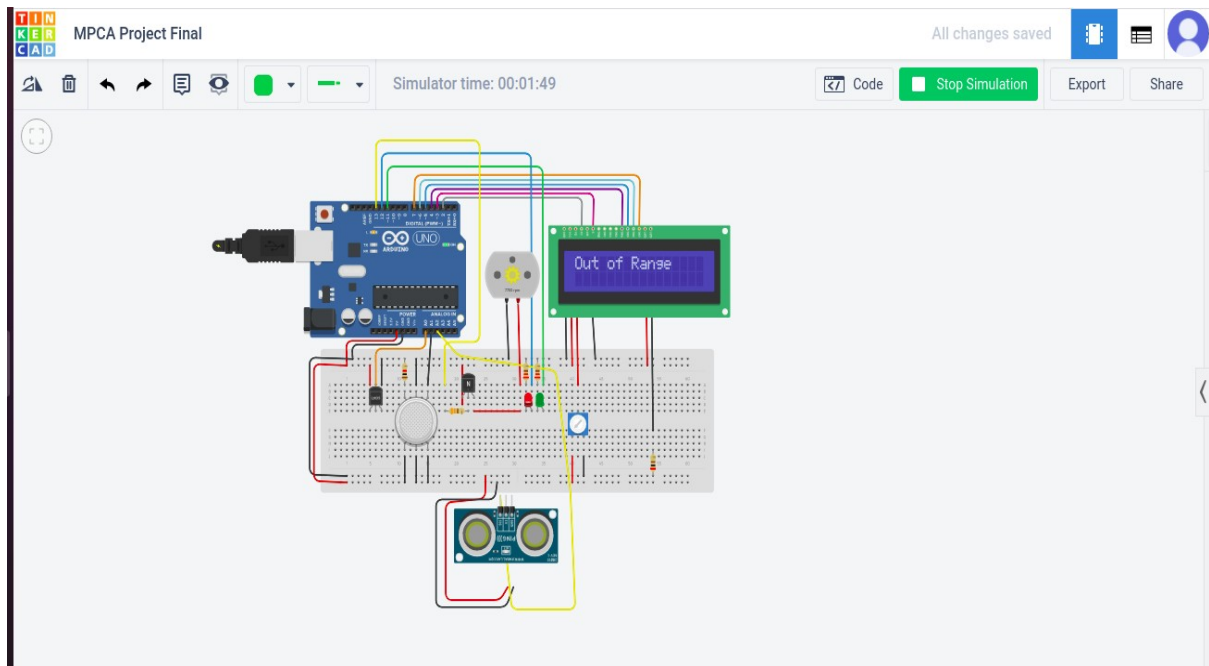
1) HIGH GAS CONCENTRATION (WARNING ON LCD)



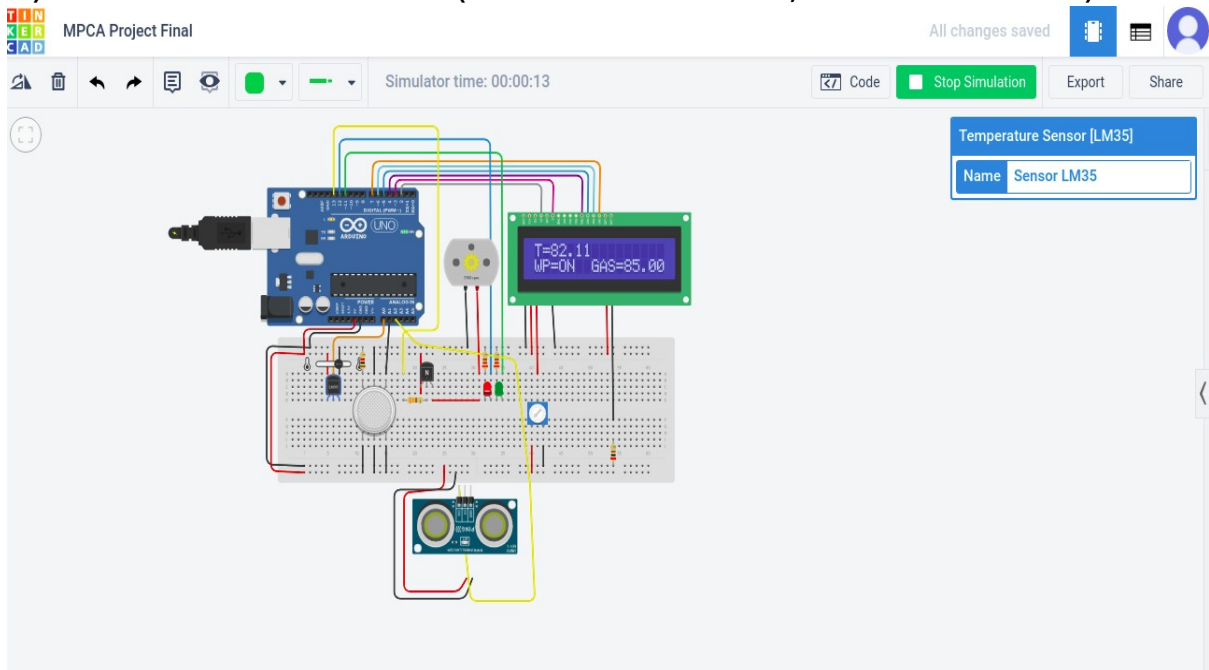
2) NORMAL LEVEL OF GAS CONCENTRATION,BUT HIGH TEMPERATURE (WATER PUMP ON, RED LIGHT ON)



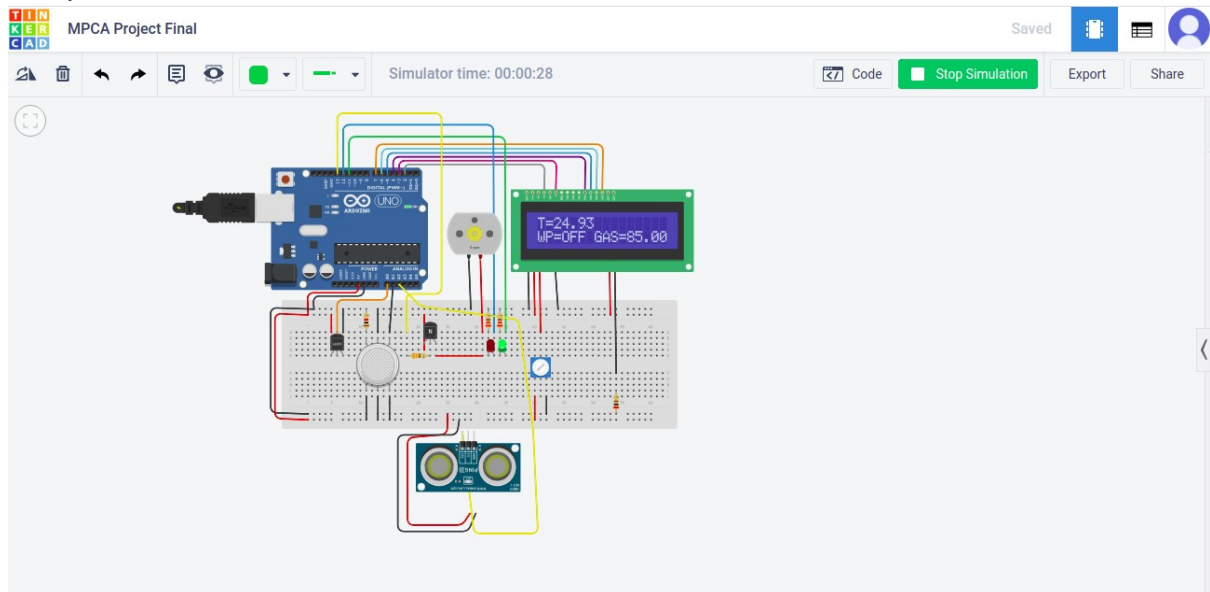
3) OUT OF RANGE (LARGE DISTANCE, ROBOT CANNOT DETECT TEMPERATURE AND GAS CONCENTRATION)



4) HIGH TEMPERATURE (WATER PUMP ON, RED LIGHT ON)



5) NORMAL TEMPERATURE (WATER PUMP OFF, GREEN LIGHT ON)



REFERENCES

- 1) Youtube lectures and tutorials on arduino basics
- 2) <https://www.tutorialspoint.com/arduino/index.htm>

OUR PROJECT LINK:

<https://www.tinkercad.com/things/2KgpKqaoCUz-mpca-project-smart-agriculture-system>