Autonomous Plant System

APSC 200/293

Electrical and Computer Engineering (ECE)

Section 208

Team 12

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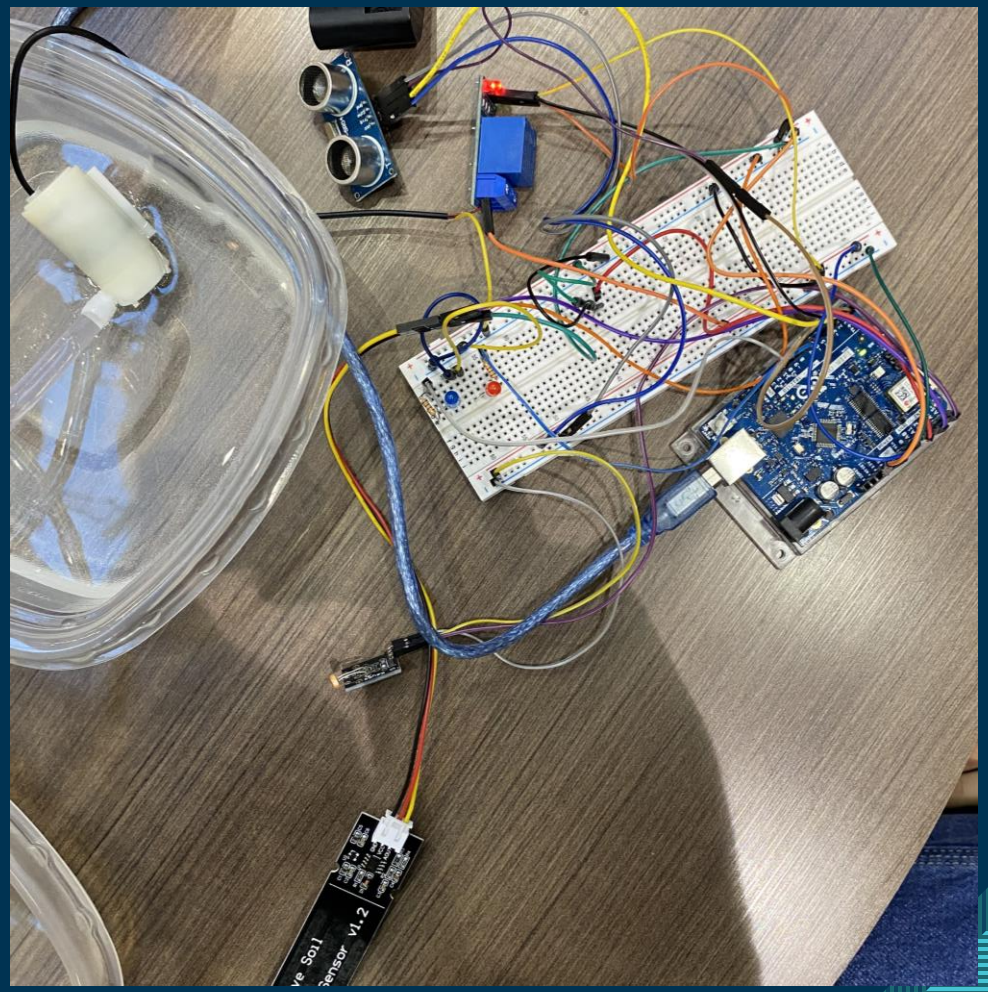
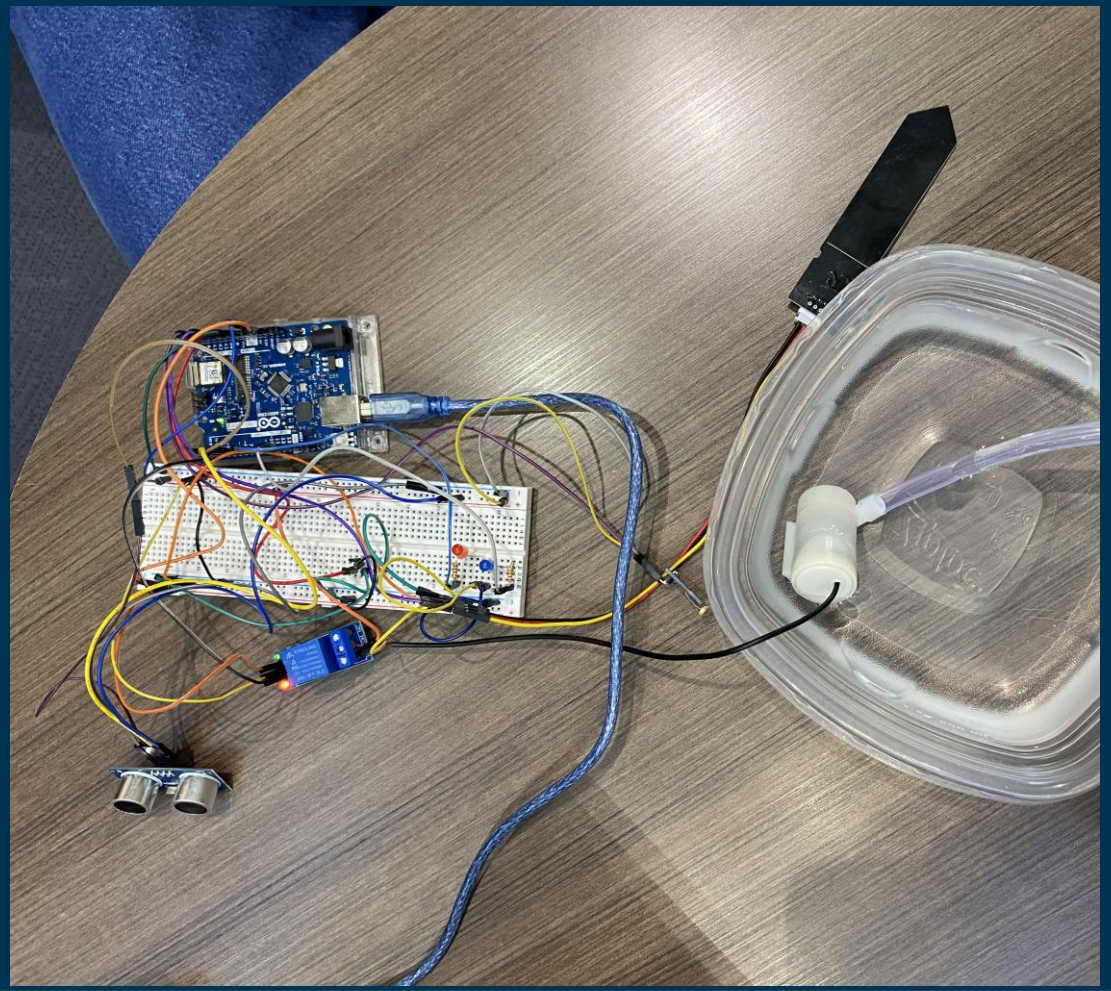
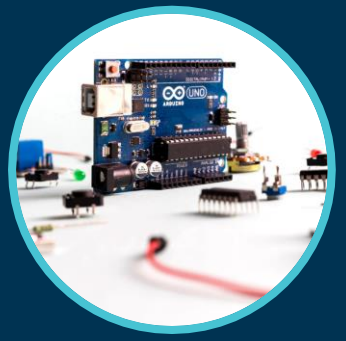


Problem Definition



Stakeholders



Manufactures

System User

Construction Industry

Agricultural Industry

Sensor Selection

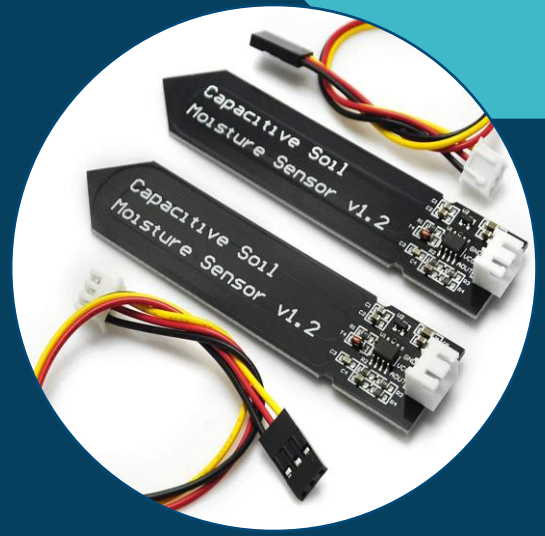
What do plants need? :

- ✓Soil Moisture Levels
- ✓Water Levels
- ✓Sunlight or Appropriate Light Source
- ✓Appropriate Temperature Settings

Temperature and Soil Moisture Sensors

LMT86LPGM
(Thermometer)

- Used to detect temperature
- Turns the heater on or off



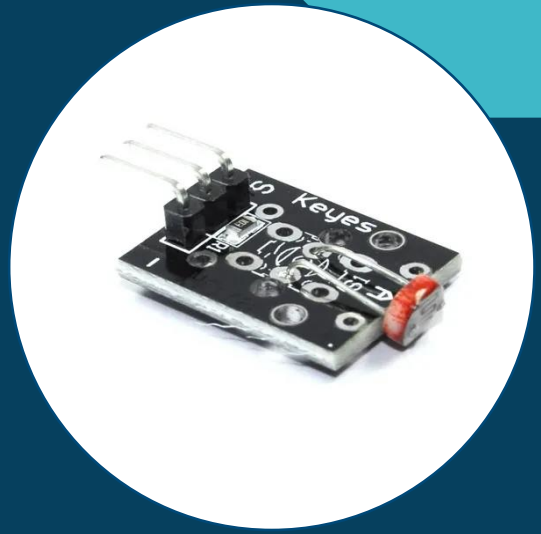
Capacitive Soil Moisture Sensor v1.2
(Hydrometer)

- Used to detect the soil humidity
- Activates water pump to apply water

Ultrasonic and Photo Resistor Sensors

HC-SR04 Ultrasonic Sensor

- Used to sense the capacity of the water storage
- Alerts user if tank is empty or not

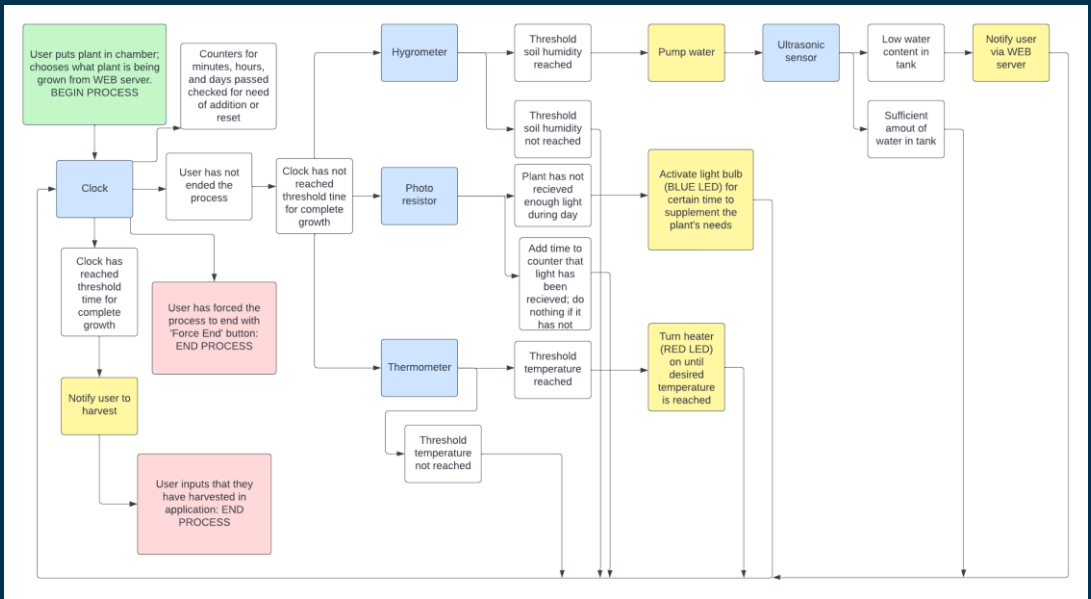


KY-018 Photo Resistor

- Used to determine the amount of light received
- Activates blue LED to turn on or off

Program

Block chart of the program used

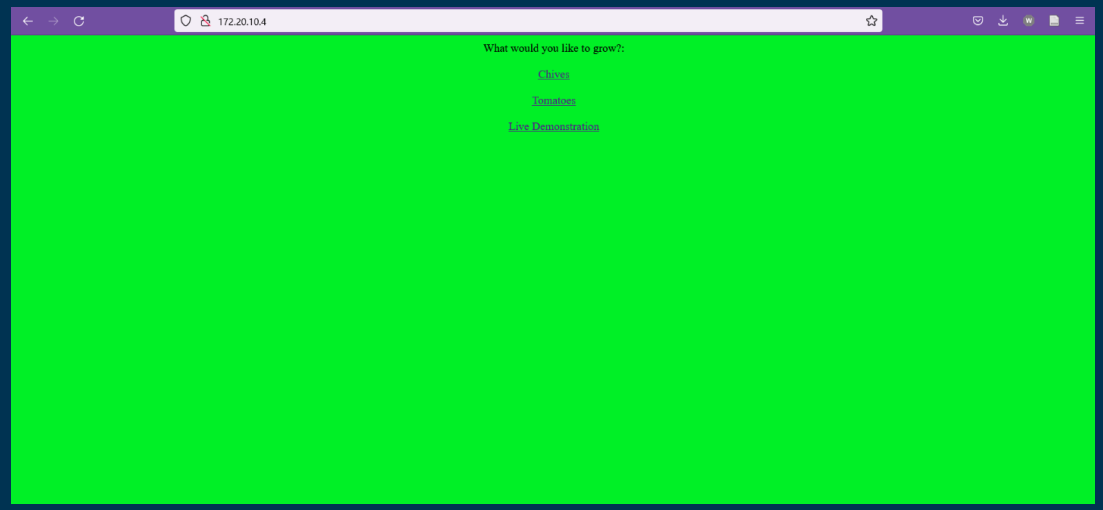


Sample code of sensor inputs

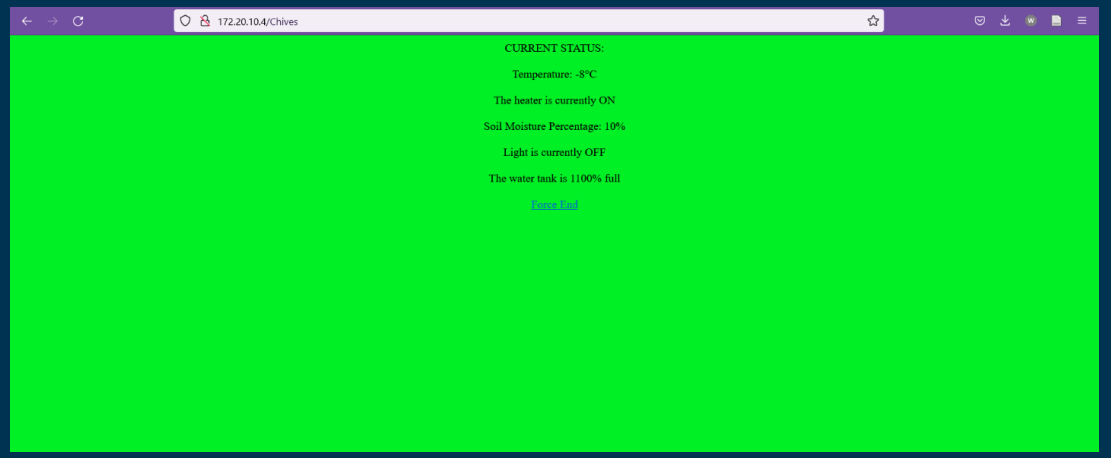
```
441  int getTemp(){
442    A0_Read = analogRead(LMT86);
443    // Serial.println(A0_Read);
444    Temperature = (426-A0_Read) / 2.14;
445    Serial.print("Temperature: ");
446    Serial.print(Temperature, 1);
447    Serial.println(" C");
448    printTemp = (int)Temperature;
449    delay(250);
450    return (int)round(Temperature);
451  }
452  //function that reads and calculates the soil moisture percent, stores it and prints to the terminal
453  int getMoisture(){
454    soilMoistureValue = analogRead(A2);  //put Sensor insert into soil
455    Serial.print("Soil Moisture: ");
456    // Serial.println(soilMoistureValue);
457    soilmoisturepercent = map(soilMoistureValue, AirValue, WaterValue, 0, 100);
458    if(soilmoisturepercent >= 100)
459    {
460      soilmoisturepercent = 100;
461      Serial.println("100 %");
462    }
463    else if(soilmoisturepercent <=0)
464    {
465      soilmoisturepercent = 0;
466      Serial.println("0 %");
467    }
468    else if(soilmoisturepercent >0 && soilmoisturepercent < 100)
469    {
470      Serial.print(soilmoisturepercent);
471      Serial.println("%");
472    }
473    printMoisture = soilmoisturepercent;
474    delay(250);
475    return soilmoisturepercent;
476  }
```

Program

User view upon startup



User view when a plant is growing

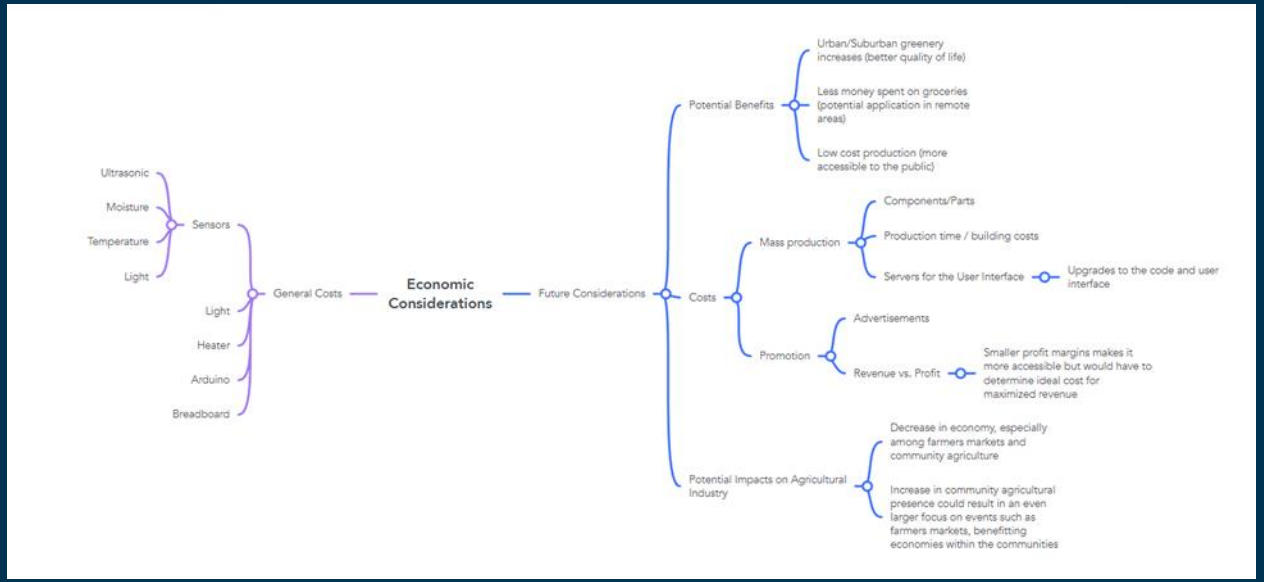


Costs

#	Description/name of part	Total Quantity	Est total cost
1	KY-018 Photo Resistor	1	5.49
2	Capacitive Soil Moisture Sensor v1.2 (Hygrometer)	2	9.88
3	Thermometer	3	5.56
4	LED Grow Lights	1	5.29
5	HC-SR04 Ultrasonic Sensor	1	11.99
6	Heater	1	35.54
7	Water Pump	3	15.65
8	Wall socket	1	2.64
9	Bulb socket	1	5.79
10	Tube	1	2.97

Economic Considerations

- Buying components
  - In bulk ← → Reduced manufacture cost
- System Production Costs:
  - Production Factory
  - Certifications/Licenses
  - Shipping/Storage
- Marketing



Recommendations

Testing of system

- Fix any unseen errors
- Improve overall efficiency

Scaling of system

- Can become more cost effective
- Allows for more customization

Improvement of website

- Change of colour and fonts
- Re arrangement of the website

Thank You!