HOLY ANGEL UNIVERSITY

SCHOOL OF ENGINEERING AND ARCHITECTURE

COMPUTER ENGINEERING

SMART PLANT WATERING SYSTEM

A FINAL REQUIREMENT IN COMPUTER DRAFTING AND DESIGN

Submitted by:

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(CPE-301)

Submitted to:

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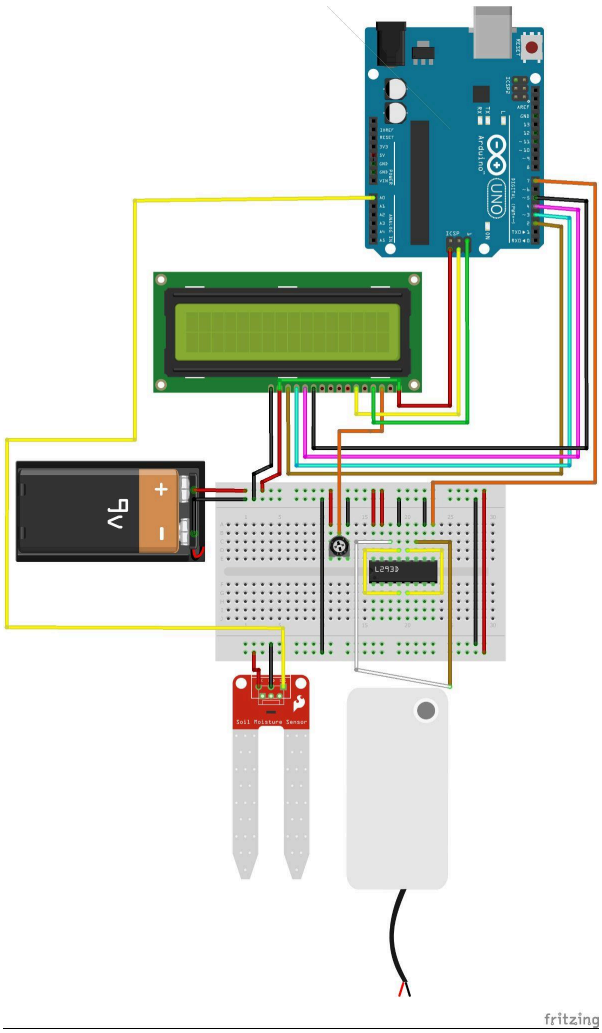
OVERVIEW

The Smart Plant Watering System works with the aid of a transparent vessel enclosed in a black polyethylene bag to capture the amount of water taken up by the plants and switches on a water pump once the level of water evaporated is detected to be low. The system involves use of an Soil Moisture Sensor to determine the level of moisture in the soil and an Arduino to help in computing the data to enable it to regulate the water pump. If the moisture level detected is low, the system switches on the pump that waters the plants to the right level.

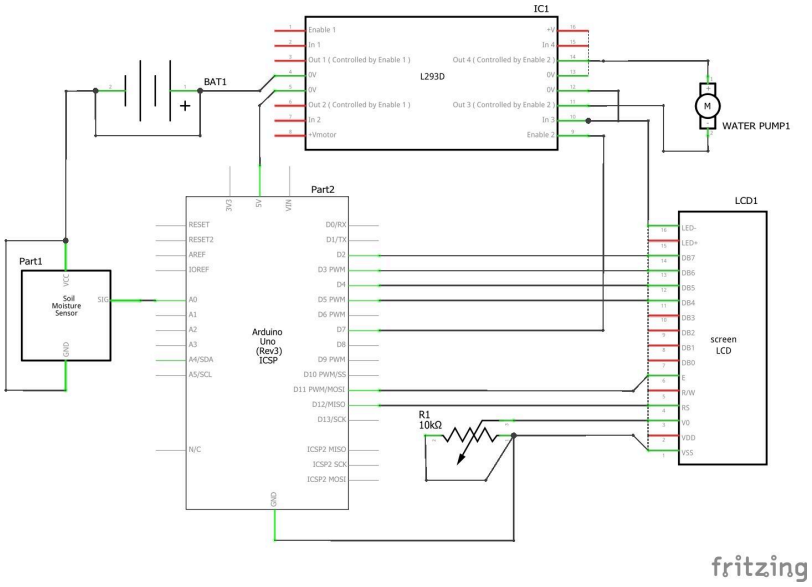
For the wiring connections, Fritzing application was used, and Breadboard, schematic and PCB layouts were done. This setup keeps the system efficient and stable so it will automatically manage the plant health and won't require much attention from people.

BREADBOARD

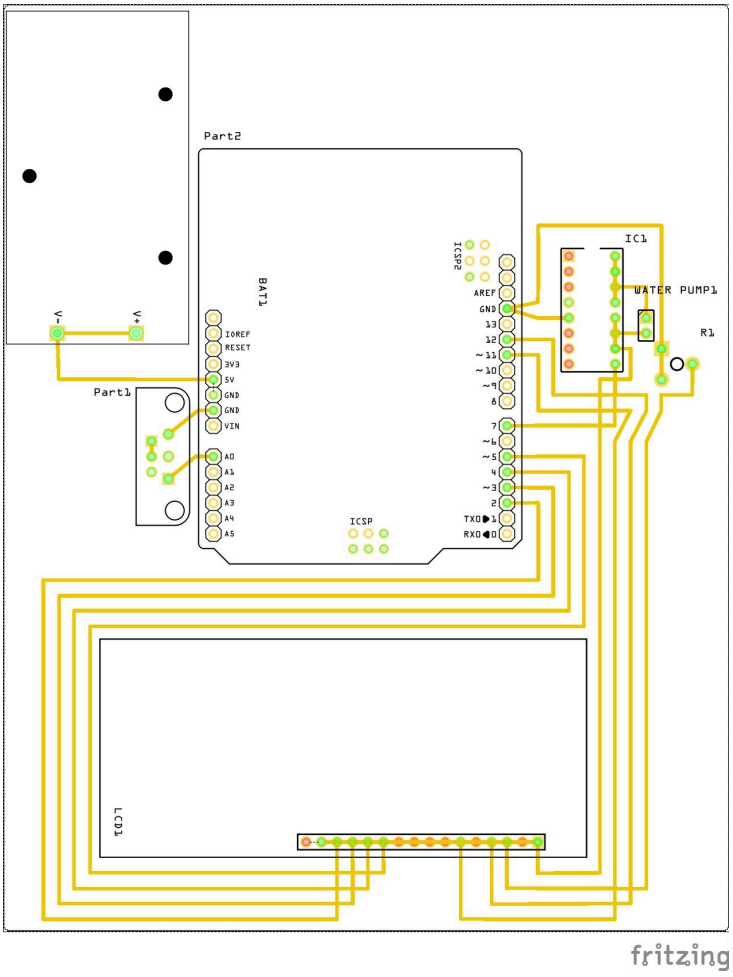


```
#include <LiquidCrystal.h>
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

const int moistureSensorPin = A0;
const int motorPin = 9;
const int moistureThreshold = 500;

void setup() {
  lcd.begin(16, 2);
  pinMode(motorPin, OUTPUT);
  pinMode(moistureSensorPin, INPUT);
  lcd.print("Soil Moisture:");
}

void loop() {
  int moistureLevel = analogRead(moistureSensorPin);
  lcd.setCursor(0, 1);
  lcd.print(moistureLevel);

  if (moistureLevel < moistureThreshold) {
    lcd.print(" Watering...");
    digitalWrite(motorPin, HIGH);
  } else {
    lcd.print(" Soil is wet ");
    digitalWrite(motorPin, LOW);
  }

  delay(1000);

}
```

SCHEMATIC



PCB



BRIEF DISCUSSION ON HOW I HAVE COME UP WITH THE DESIGN

Several issues had to be addressed in the process of the Smart Plant Watering Systems' design, specifically, wiring and the general arrangement of the components. One of the first challenges met was the absence of an available water pump element in the Fritzing application, which required importing of the properly compatible pump. This made the whole designing process complex in some way.

Since the routing of the wires is very complex as we cannot overlap the wires in the Breadboard, Schematic as well as PCB layouts, the best way I could manage was to minimize the chances of their occurrence. However, this was not completely erased since elimination of the overlap in the two topics partly was cardinal to the problem in achieving clarity and structural simplicity in the design.

Subsequently, following some spelling corrections on the Breadboard layout by my professor, I was able to further improve on the Breadboard structure by rearranging components. Consequently, to enhance the understanding of the connections between the wires on the Breadboard, I purposely coded the wires to different colors in order to differentiate them and enhance the comprehensibility of the layout.

While designing the PCB, it was very essential to reduce the size of the circuit and thus I ensured that I optimized for space. This decision, however, led to longer wire paths than planned at the beginning of the design process. Nonetheless, the final design of the PCB is the cleanest and most orderly of designs possible with the area constraints involved while maintaining the functionality and looks.

DOCUMENTATION

PROGRESS REPORT 1

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PROGRESS REPORT

Project: Smart Plant Watering System: Automated Watering.

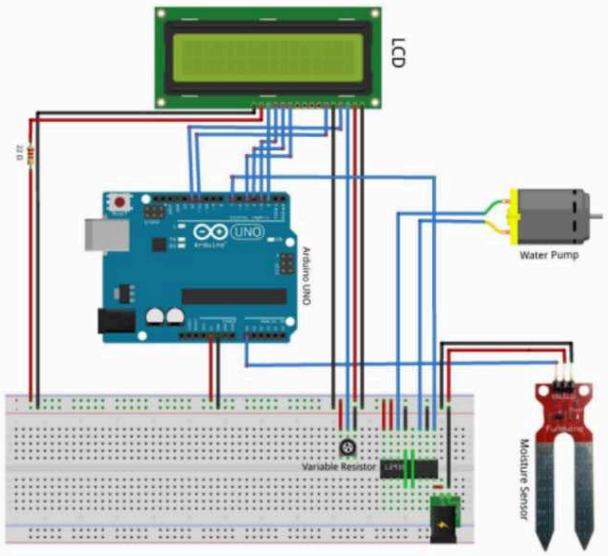
Objective: To create an automated plant watering system using moisture sensors.

Parts:

1. Arduino UNO Module
2. L293D Motor Driver
3. Water Pump
4. Soil Moisture Sensor
5. LCD Display
6. Solar Panel

Progress:

Using the parts listed above, the circuit will be built using the Fritzing Application. An Arduino Module is needed since it will provide the circuit's logic, the Motor Driver to power the water pump, and the soil moisture sensor will be used to initiate the watering process. The LCD is used to mainly display the moisture data collected by the sensors. For the future improvement of the referenced project, a solar energy source will be used as a power supply to provide power to the circuit.



Reference:

Hashan, A. M., & Haidari, A. (2020). Automatic water controlling system based on soil moisture. *International Journal Of Scientific & Technology Research*, *9*(12), 141-144.

PROGRESS REPORT 2

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PROGRESS REPORT: Smart Plant Watering System

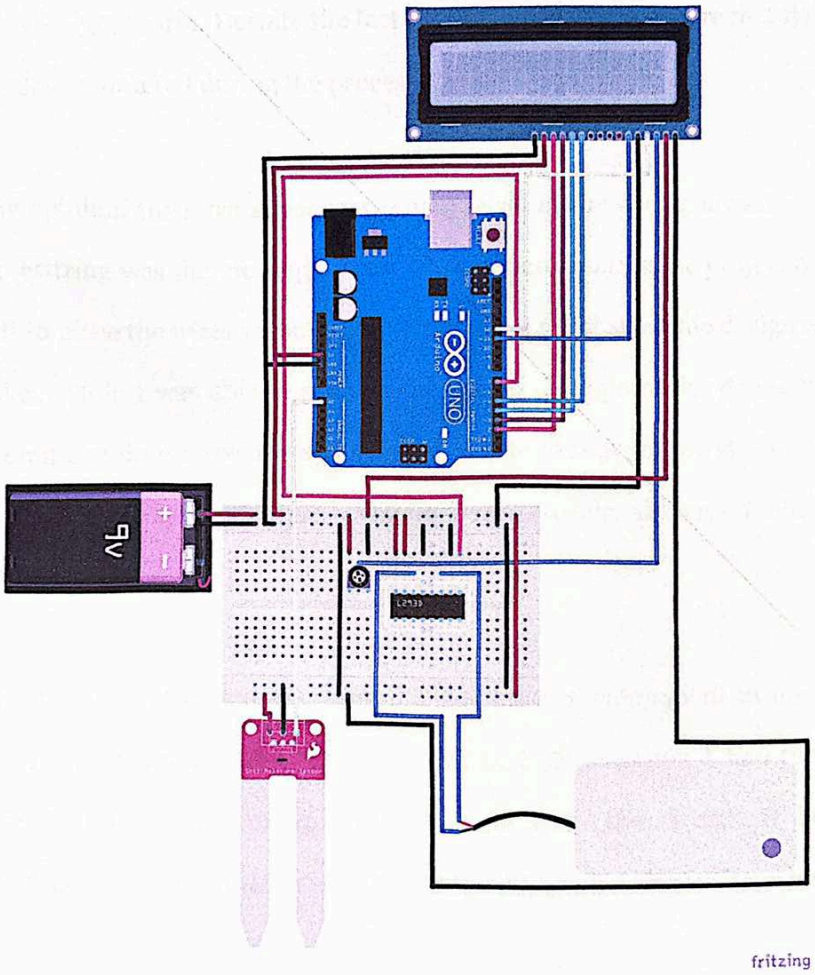
In this stage of my project, I was able to accomplish the circuit designing through the help of Fritzing. This was a major breakthrough because it helped me to compile my circuit idea in a digital form. Despite the fact that most of the goals were met there were some concerns encountered during the process.

In my opinion, the most significant issue I faced in the wiring layout was rather challenging. Fritzing was therefore quite easy to use when creating the project but it was very difficult to place the wires without crossing at some point since the design used was quite complex. While I was able to arrange the connections properly, it was not quite possible to omit certain wire overlaps all together due to the current conditions. I do not think the wiring layout has been done in the best way possible, although I will improve on that as time goes on.

Another issue was a complete lack of a water pump component in the Fritzing element library as it can be seen below. To bypass this limitation I had to have an external model of the water pump and assimilate it to the circuit. It helps me incorporate all associated parts and proceed with the design, hearing no large hold-up.

Summing up, all the situations connected with wiring and component availability concerning my project can be mentioned as: Though, I managed to cope with all difficulties and build the circuit in Fritzing. The wiring layout can still be further optimized, and these improvements will still be made to provide an even more pleasing aesthetic to the design.

BREADBOARD SCHEMATIC (via FRITZING)



PROGRESS REPORT 3

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PROGRESS REPORT: Smart Plant Watering System

This week, I made substantial progress on the Smart Plant Watering System, specifically in advancing the circuit design. I successfully completed the schematic using Fritzing, which is a significant step towards the system's overall functionality. The schematic now provides a clear blueprint of the circuit, allowing me to move forward with confidence in the design's structure and components.

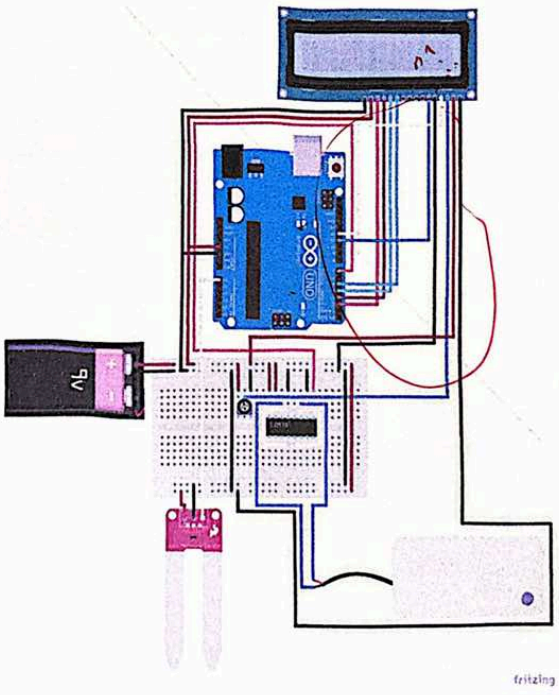
One of the key challenges I encountered was managing overlapping wires in both the schematic and breadboard designs. Due to the complexity of the layout, it has been difficult to arrange the connections without some wires crossing. Although this does not impact the circuit's functionality, it affects the clarity and organization of the design. Improving the wire layout remains a priority as I aim to optimize both the visual and functional aspects of the system.

In addition, I faced some limitations with Fritzing's component library, particularly with the absence of a built-in water pump model. To address this, I imported an external model to incorporate the pump into my design. This workaround has allowed me to maintain momentum without any major setbacks. Integrating the water pump was critical, as it is a central component of the system, responsible for delivering water to the plants based on the sensor readings.

Looking forward, my next steps include refining the wiring layout to enhance the design's efficiency and appearance. I also plan to move from the breadboard prototype to creating a printed circuit board (PCB) version of the design in Fritzing, which will further solidify the project. Additionally, I will start working on the Arduino code that will bring the system to life by controlling the sensor readings, pump operation, and water delivery.

In conclusion, while there were some challenges with wire management and component availability, this week marked significant progress with the completion of the circuit schematic. I am confident that with continued refinement, the Smart Plant Watering System will move closer to its final implementation.

CIRCUIT BREADBOARD (via FRITZING)



CIRCUIT SCHEMATIC (via FRITZING)