IOT BASED AUTOMATED DRIP IRREGATION USING ARDUINO FOR WOLDIA UNIVERSITY

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INTRODUCTION

- Drip irrigation applies small amounts of water directly to plant roots.
- Automated systems offer precise and efficient watering.
- Unlike traditional methods, drip minimizes water wastage and runoff.
- It conserves water and promotes efficient usage.
- Drip systems are unaffected by wind and have high application efficiency.
- In Oklahoma, 11,239 acres were under drip irrigation in 2007, with 81% using SDI.

BACK GROUND

- Woldia, Ethiopia relies heavily on agriculture, with traditional irrigation methods prevalent.
- Automated drip irrigation offers precise water management tailored to crop needs.
- Key components include sensors for monitoring environmental conditions.
- A central control unit processes data to schedule irrigation and control water distribution.
- Servo and pump motors ensure accurate water delivery.
- Future plans aim to enhance remote monitoring and control, reducing farmer effort.
- The system will provide alerts for maintenance and operational issues, ensuring efficient operation.

STATEMENT OF THE PROBLEM

- Global food demand and climate change underscore the need for efficient irrigation.
- Woldia University in Ethiopia faces challenges like water wastage and labor intensity in its manual system.
- Adoption of an advanced automated drip system is sought to optimize water use and adapt to environmental changes.
- The new system aims to overcome issues of uneven water distribution and lack of responsiveness to conditions.
- Enhanced technology promises improved crop yields and sustainability in agricultural practices.

OBJECTIVE

GENERAL OBJECTIVE

- To Design and develop IOT based automated drip irrigation system using Arduino microcontroller for Woldia university

OBJECTIVE

SPECIFIC OBJECTIVES

- To measure and analysis the moisture content of the soil, the humidity and temperature of the surrounding environment, the amount of the water in the tank.
- To detect the rain on the surrounding.
- To design simple step down transformer, ac to dc convertor device and water pump for automatically watering field.
- To measure and analyse the soil PH value.
- Construct schematic diagram and simulate the overall system using proteus Professional.

MOTIVATION

- The motivation come for these project is that, for the drip irrigation that is being done now in woldia university project introduced our role as an electrical student to make new automated drip irrigation is designed to be a learning experience for campus students.

SCOPE

- In LCD the display show the result according to field condition of pump and servo motor by on and off(control) mechanism.
- Expertise in mobile controls by GSM and mobile app for drip systems and simulation on proteus software.
- System design also addresses the individuals who want access the existing drip irrigation infrastructure at Woldia University.

LIMITATIONS

- No backup power source
- Sensors value has fluctuations
- Water requirement of plant vary in growth state but our system is based only sensor values(data).

METHODOLOGY

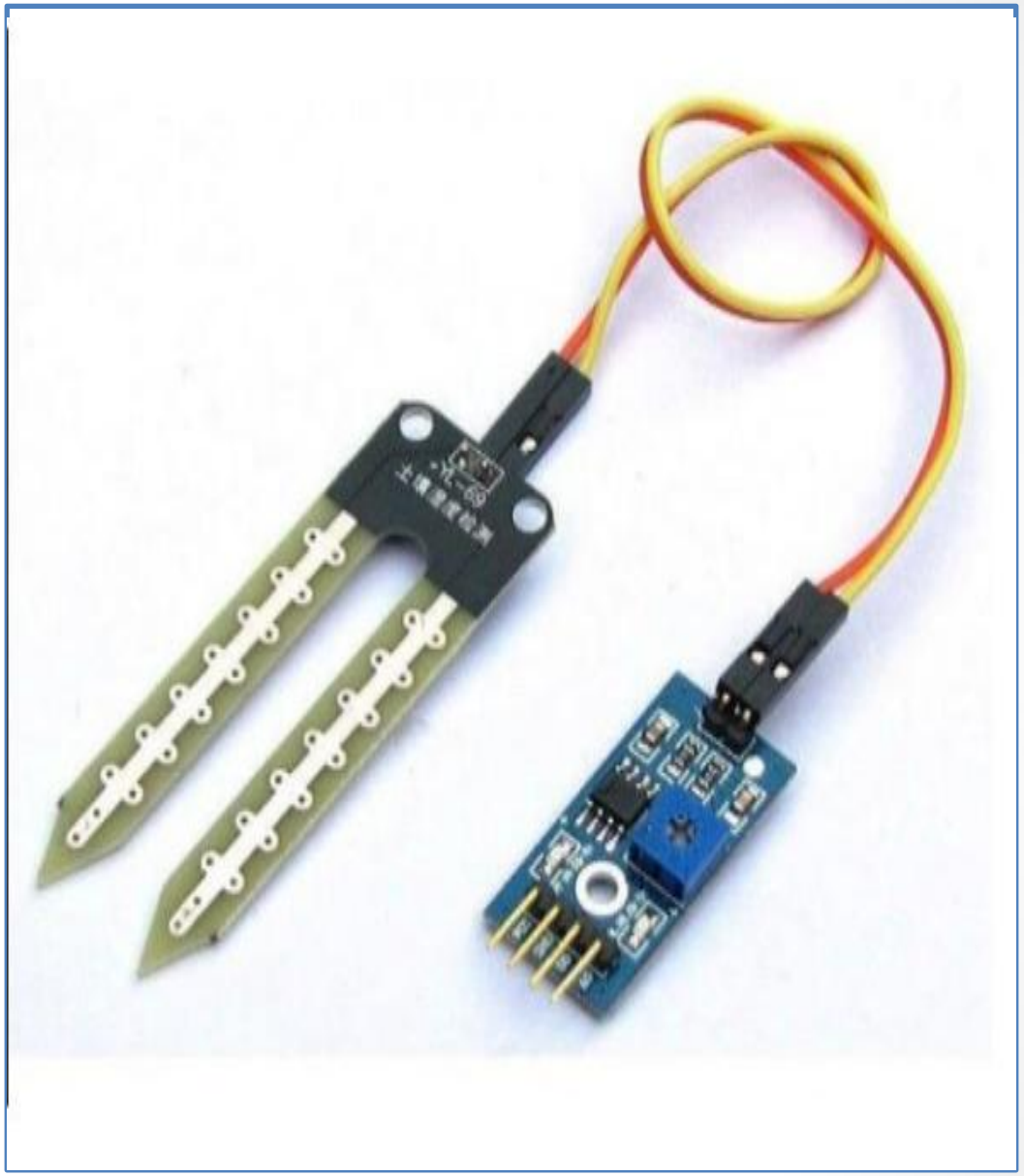
- Data Gathering And Collection
- Data Analysis
- Literature Review
- Identify Components
- System Design
- Simulation

COMPONETS

HARDWARE

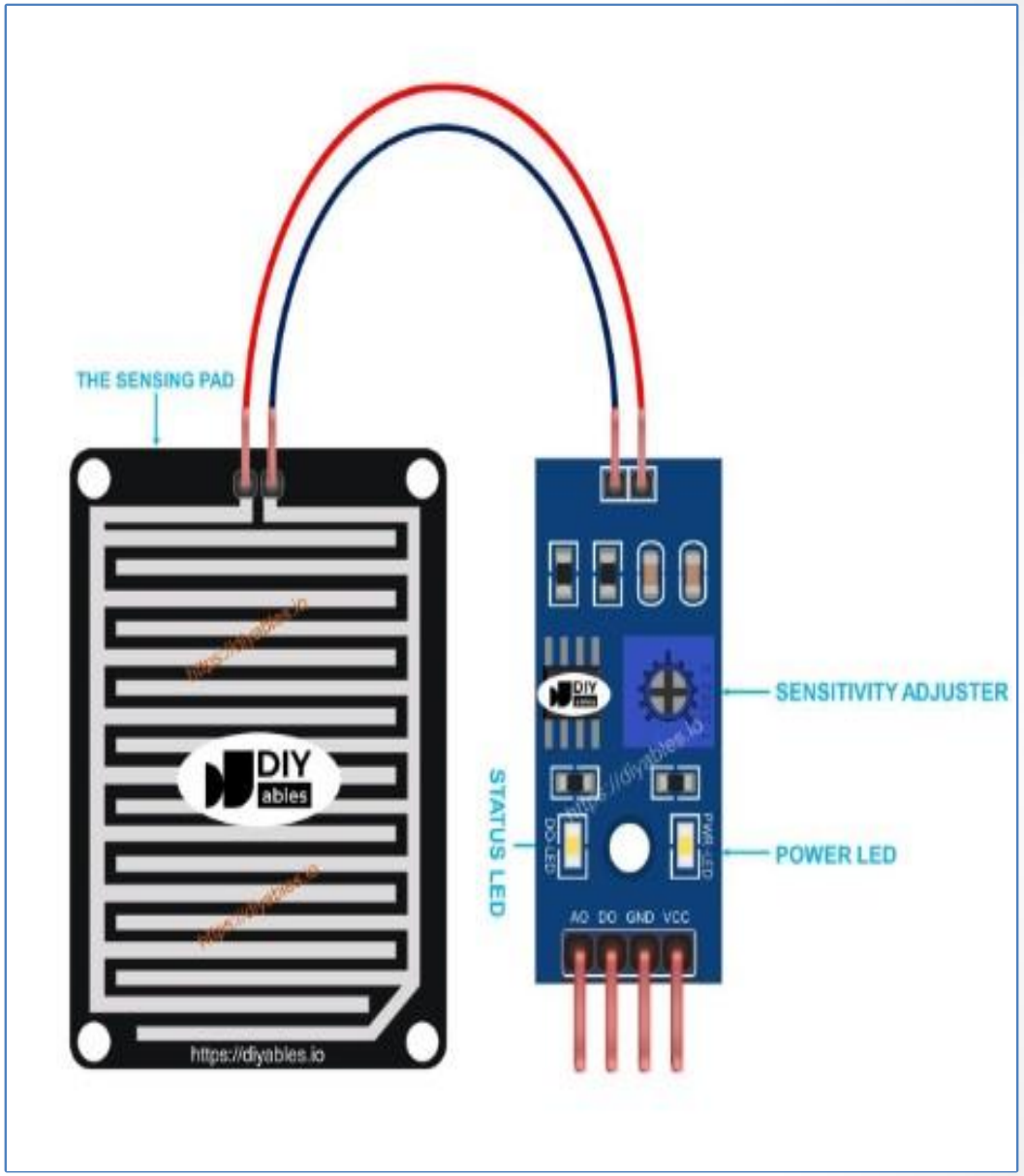
- Soil moisture sensor
- Soil ph sensor
- Rain sensor
- Humidity sensor
- Ultrasonic sensor
- Diode
- Ardiuno uno
- Relay
- LCD
- Servo motor
- Water pump motor
- GSM module

SOIL MOISTURE SENSOR



SOIL PH SENSOR

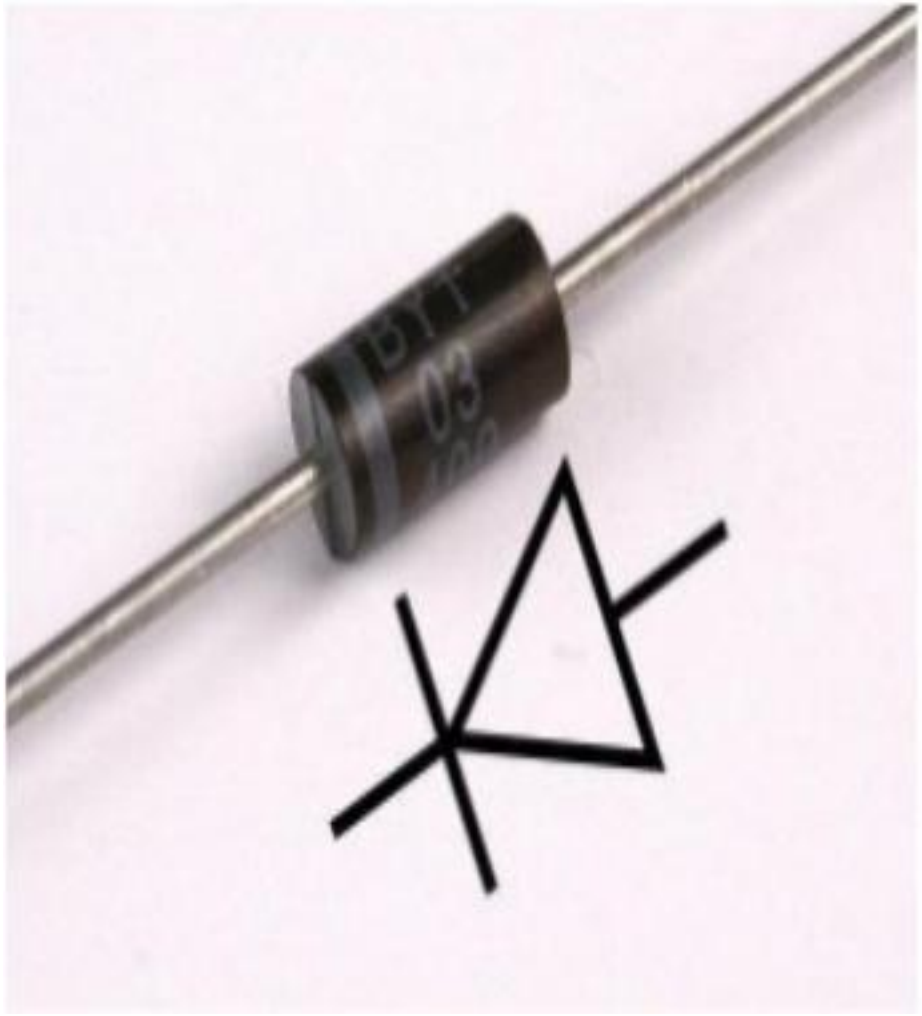
RAIN SENSOR


THE SENSING PAD
SENSITIVITY ADJUSTER
STATUS LED
POWER LED
A0 DO GND VCC
https://diyables.io

HUMIDITY SENSOR

ULTRASONIC SENSOR

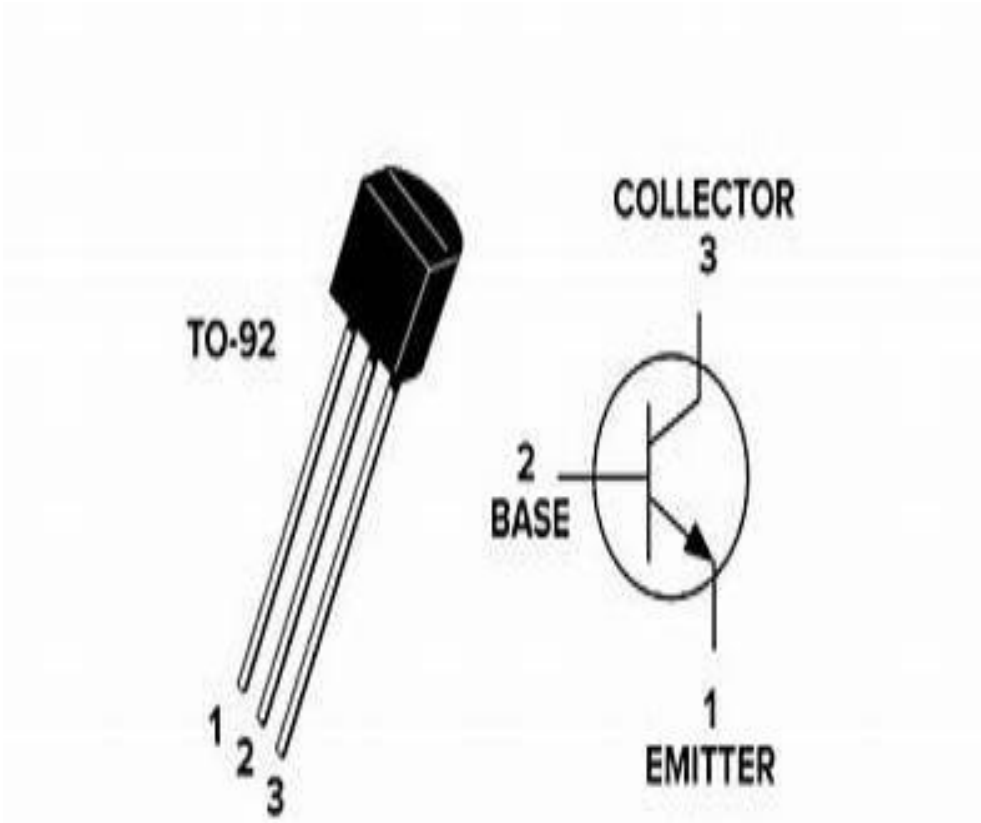
DIODE



ARDUINO UNO

RELAY

TRANSISTOR

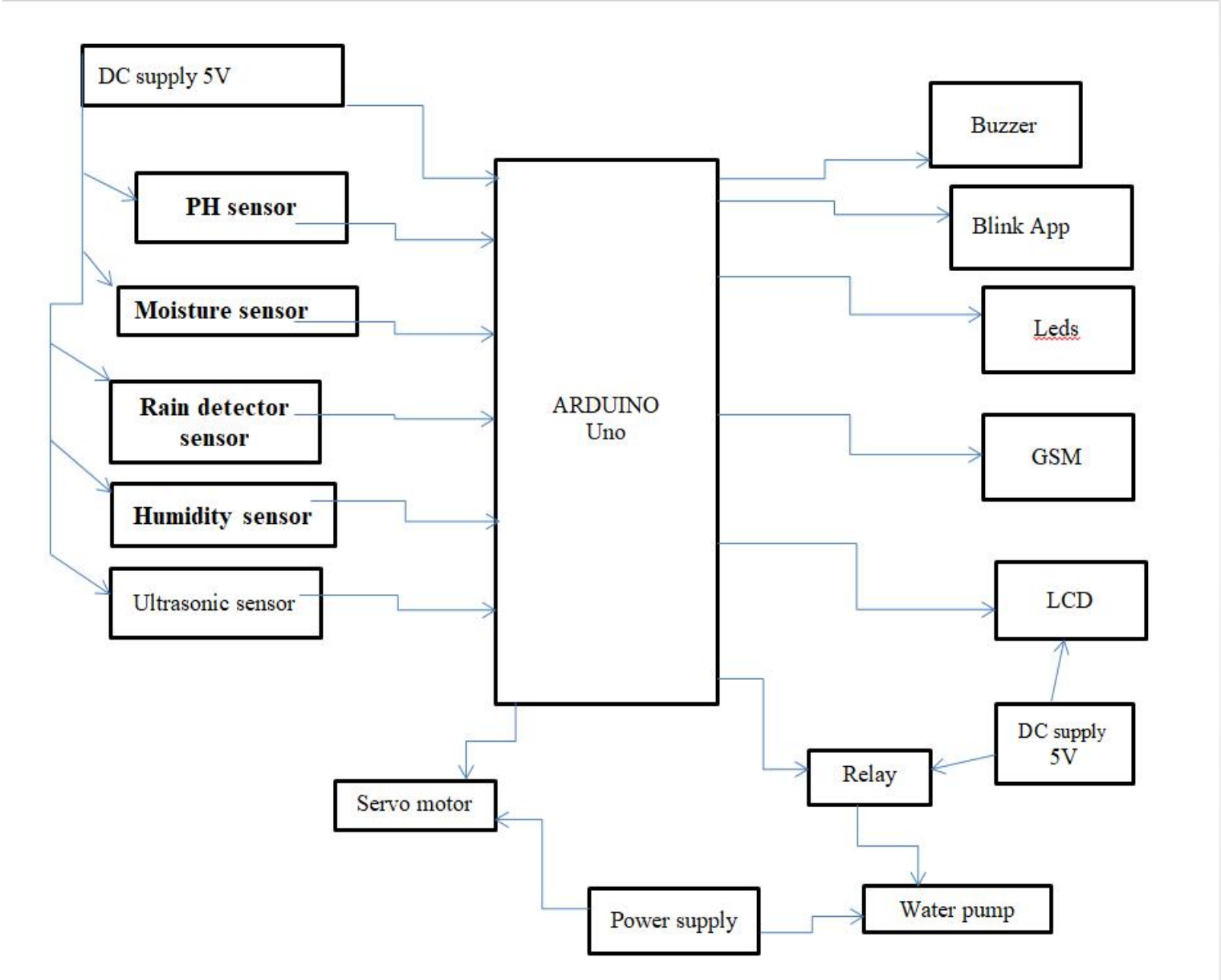


COMPONETS

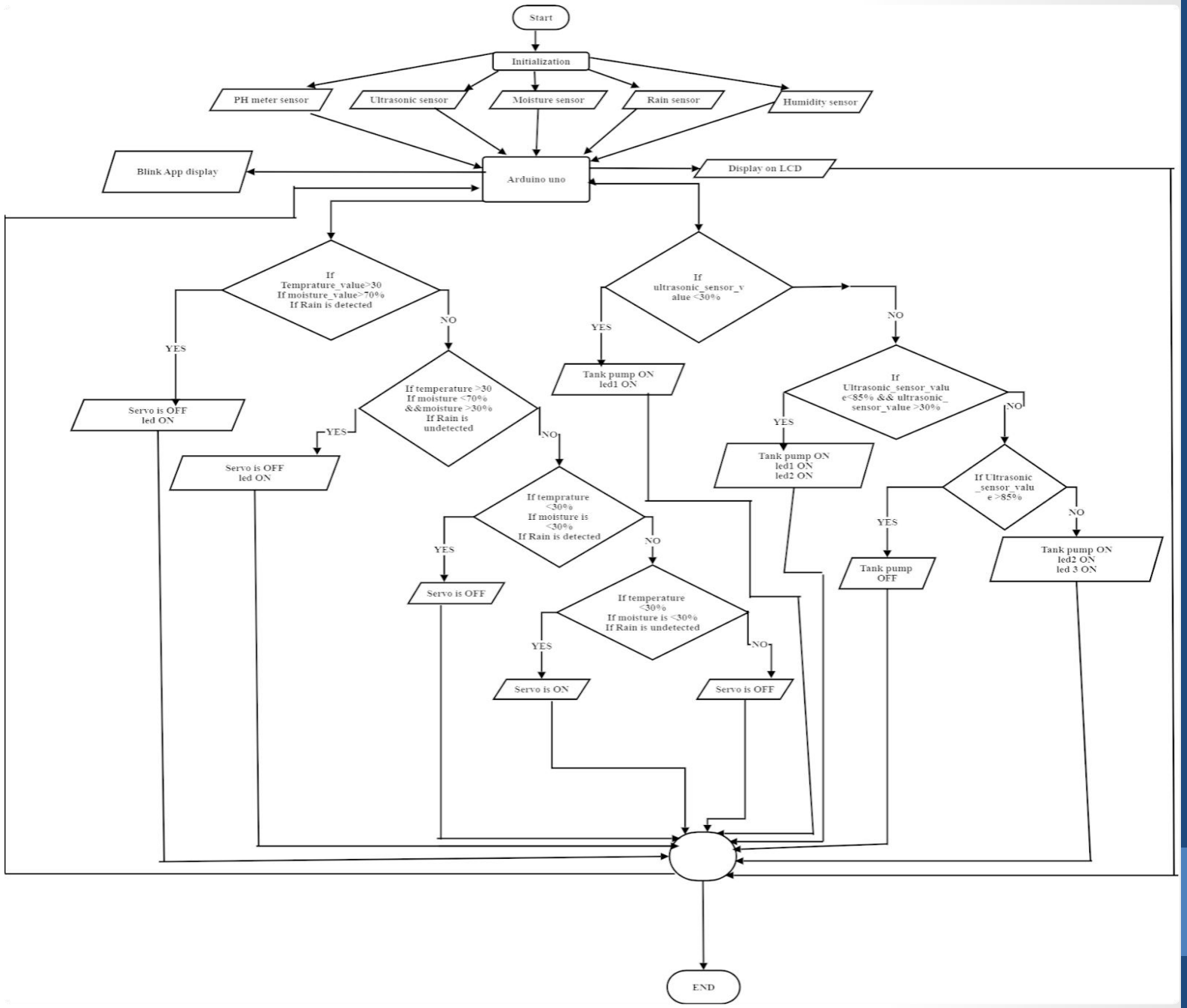
SOFTWARE

- Proutes
- Arduino IDE
- Blynk cloud Application

SYSTEM BLOCK DIAGRAM

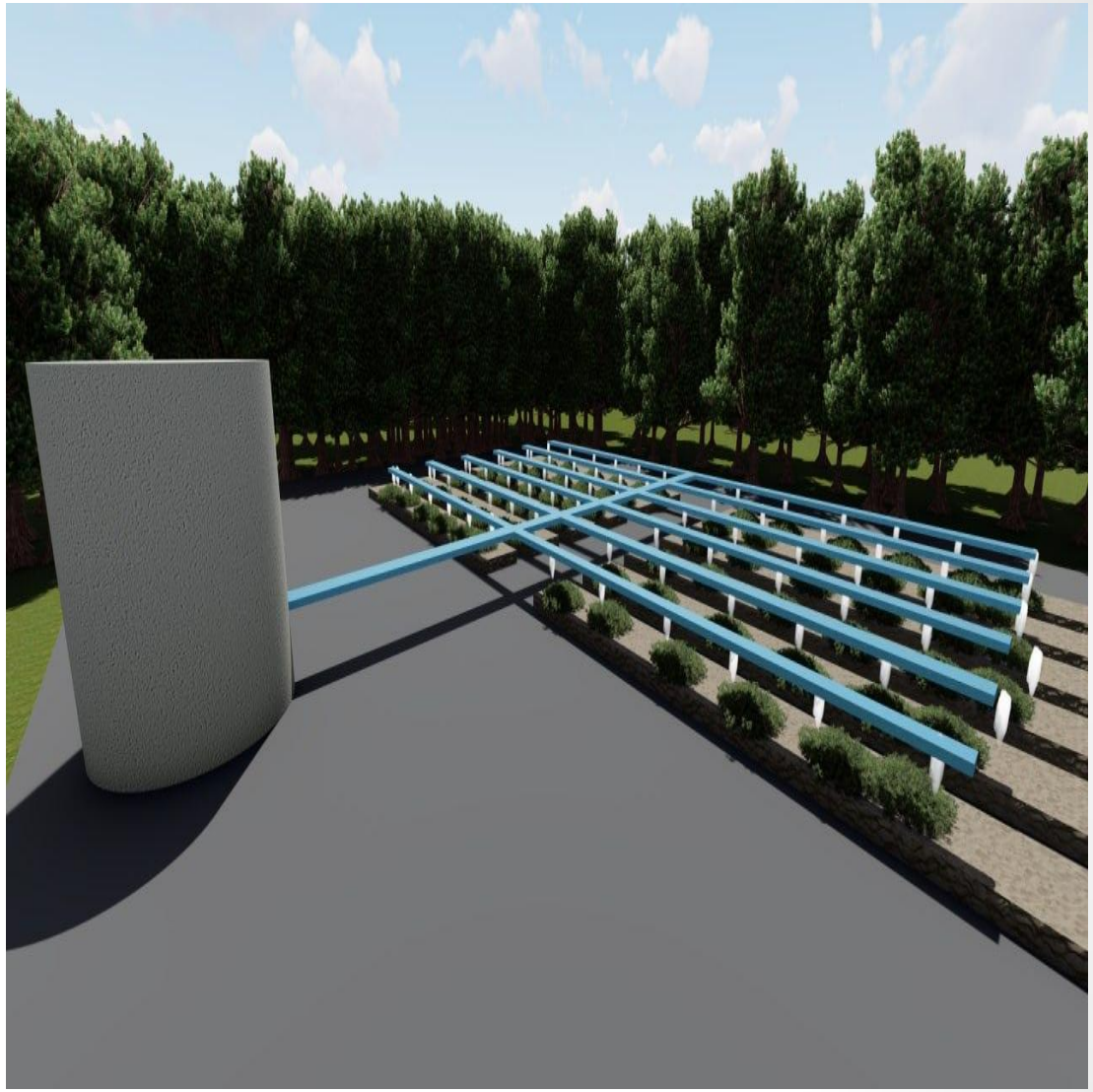


PROGRAM FLOW CHART



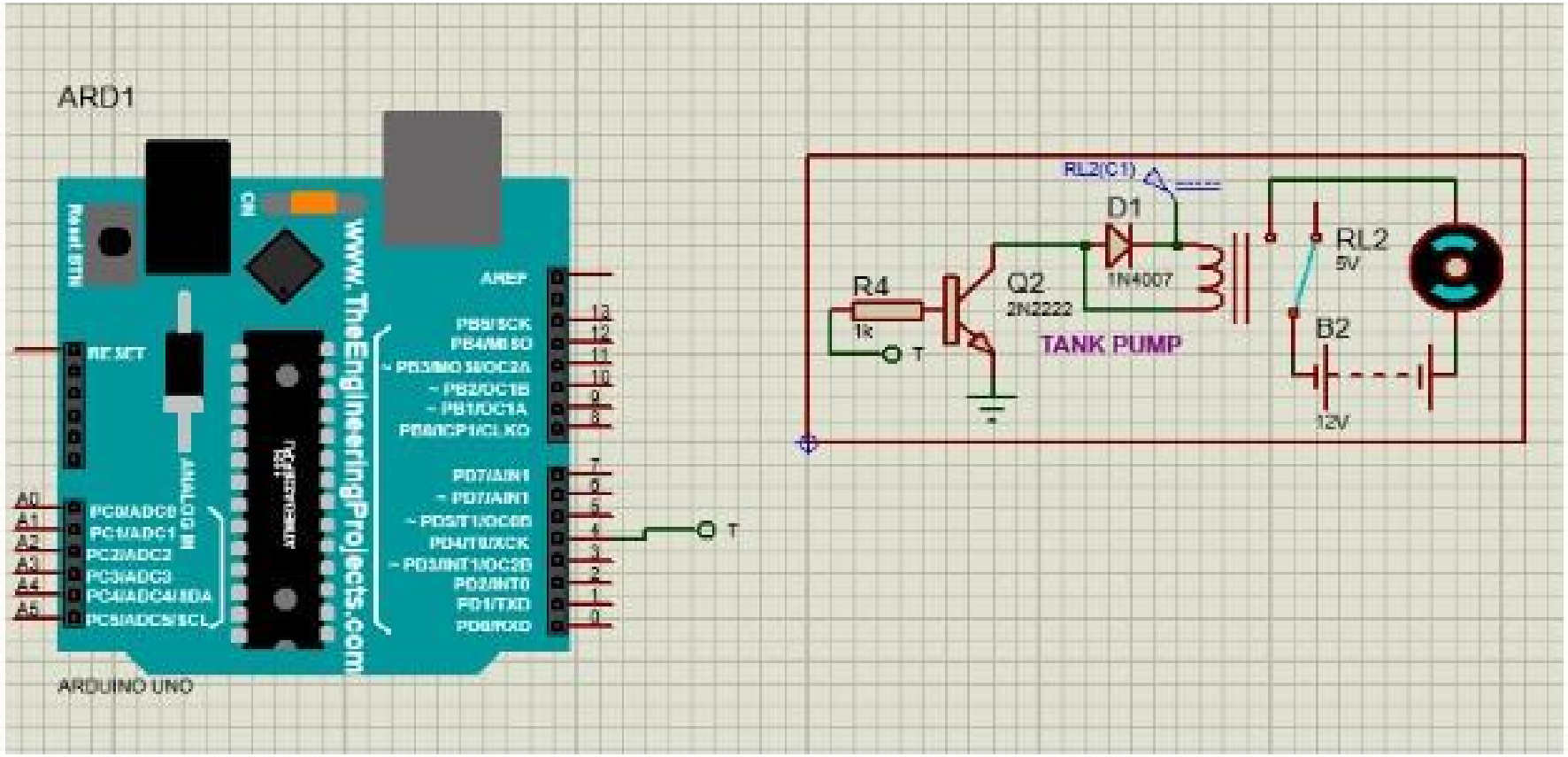
Drip design

- Not all areas are irrigated. In design, therefore, the area irrigated is only the accounted area.
- In 1 lateral contains 14 tree
- Total Head for Pump = Manifold Pressure
- The pump must deliver 2.03 L/s at a head of about 36 m
- 1.95 hp or we can approximate to the highest power 2hp

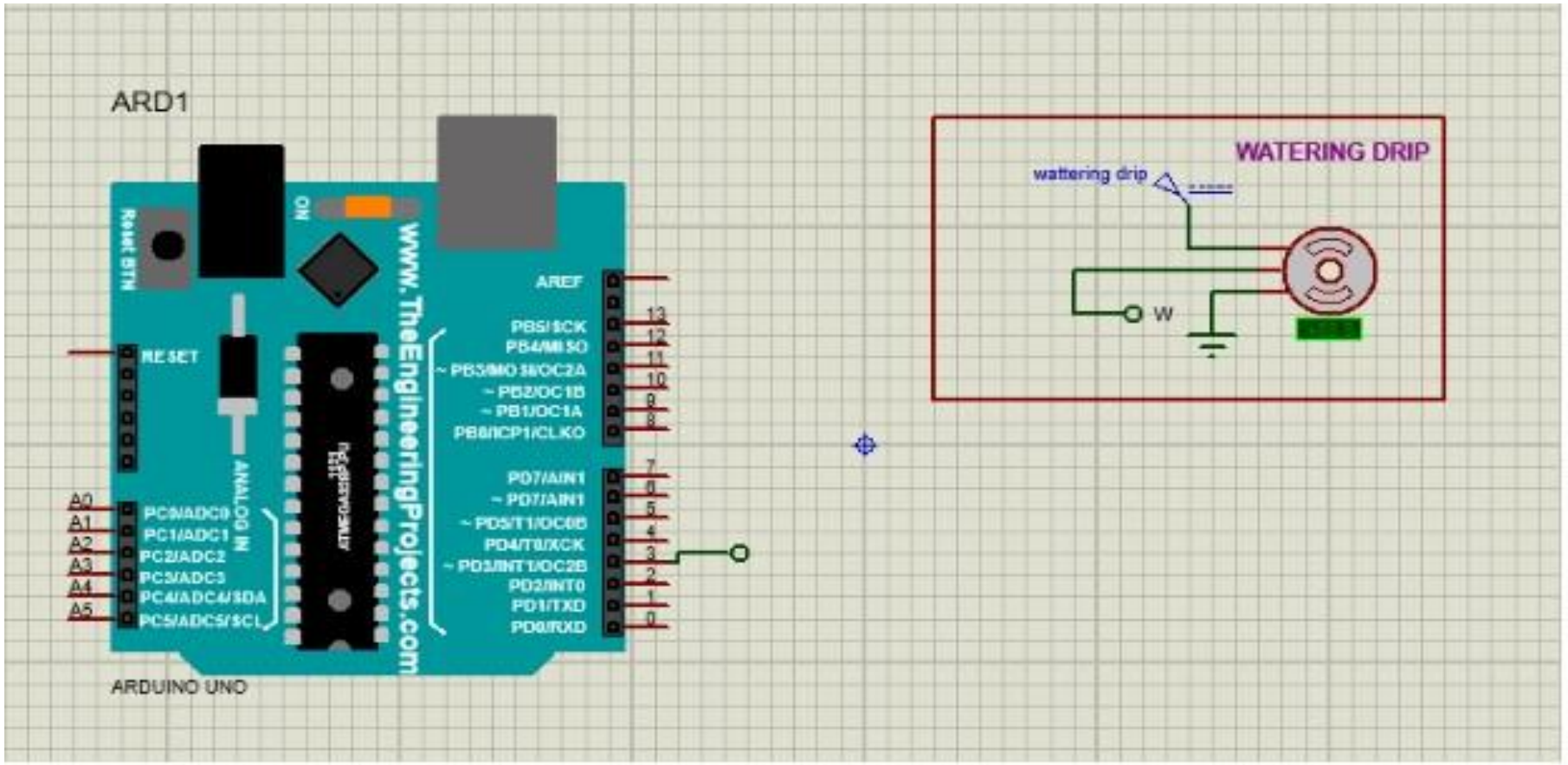


SYSTEM DESIGN

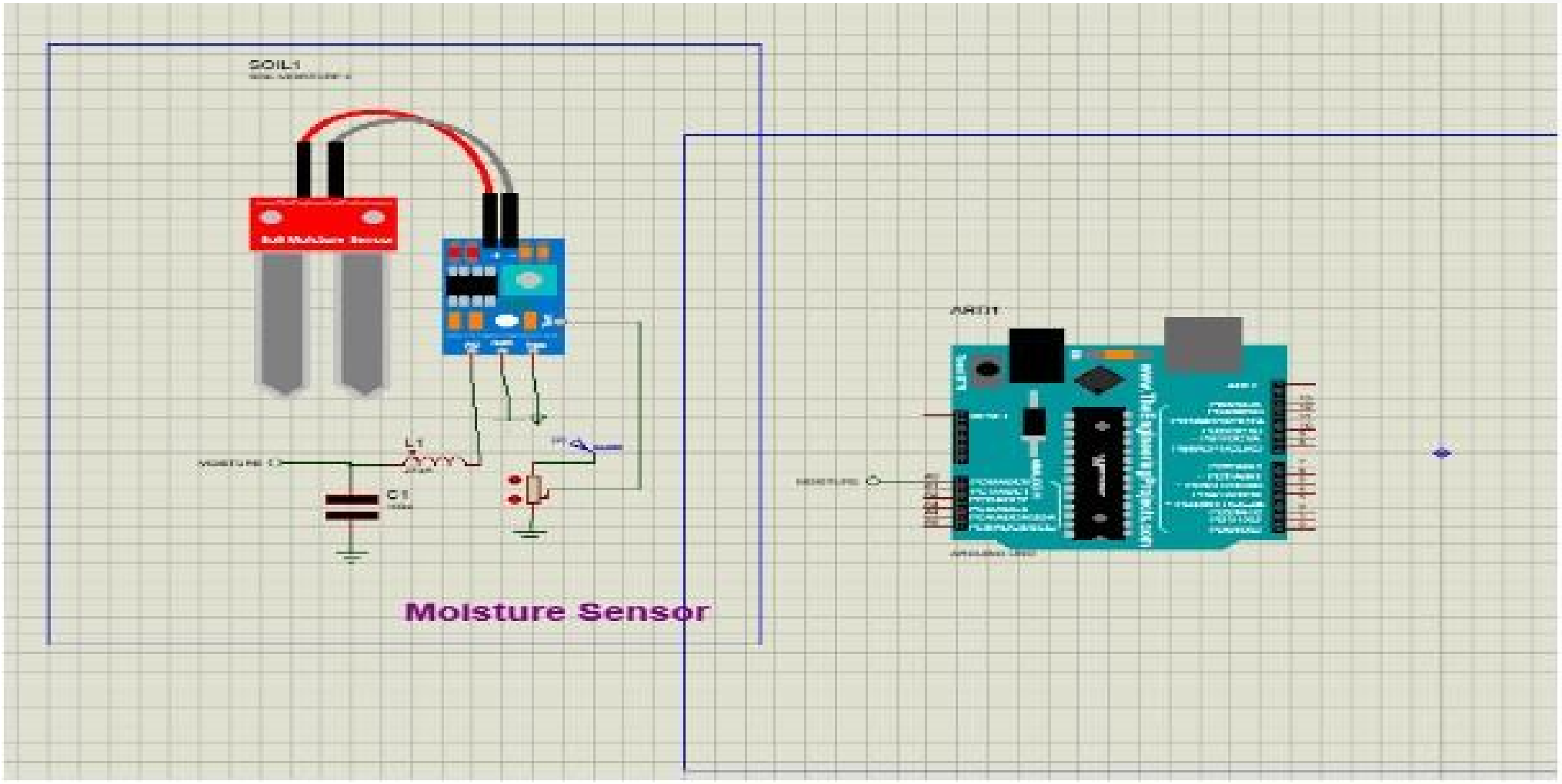
Water Pump Connection To The Arduino



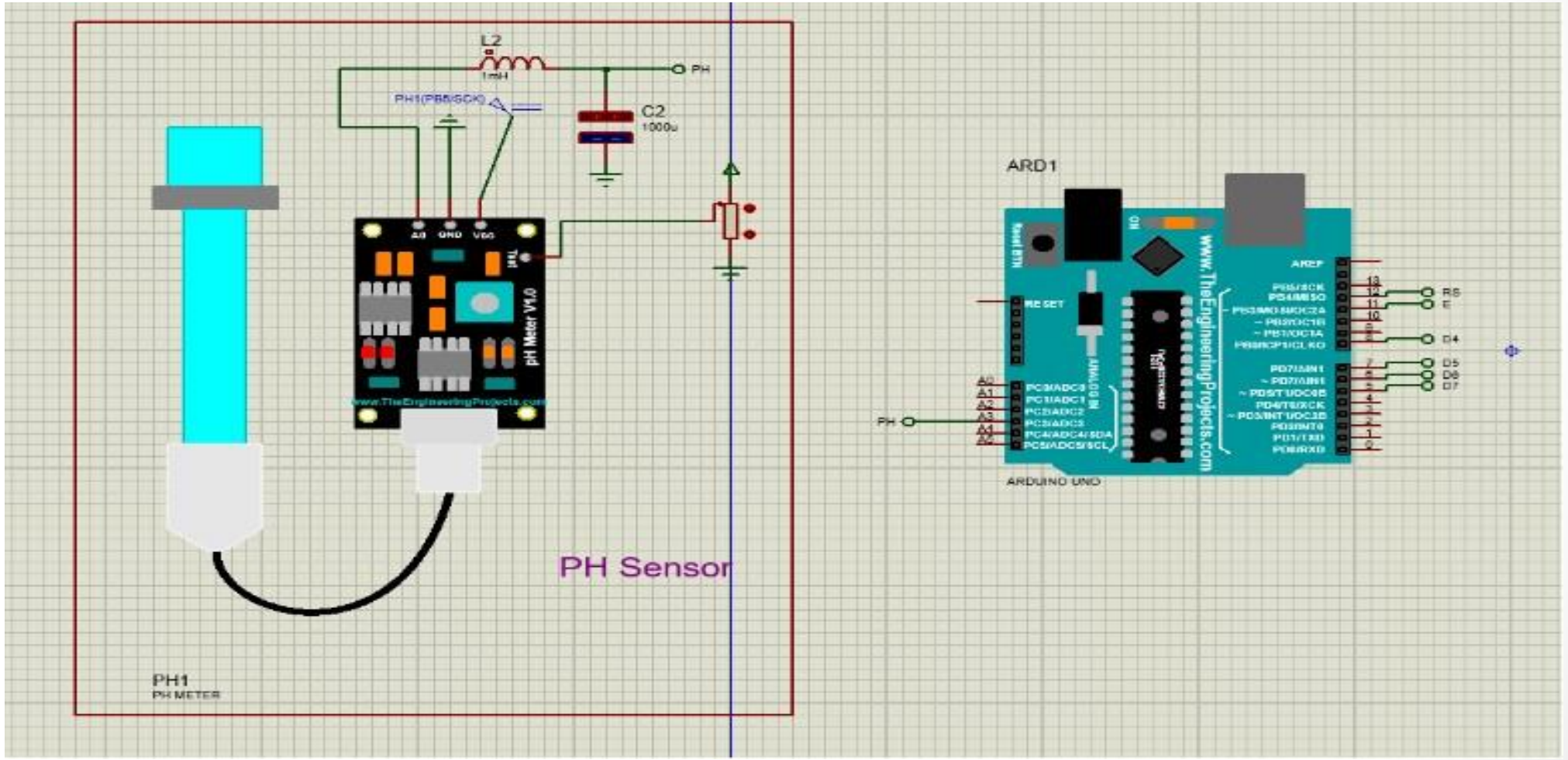
Servo Motor Connection To The Arduino



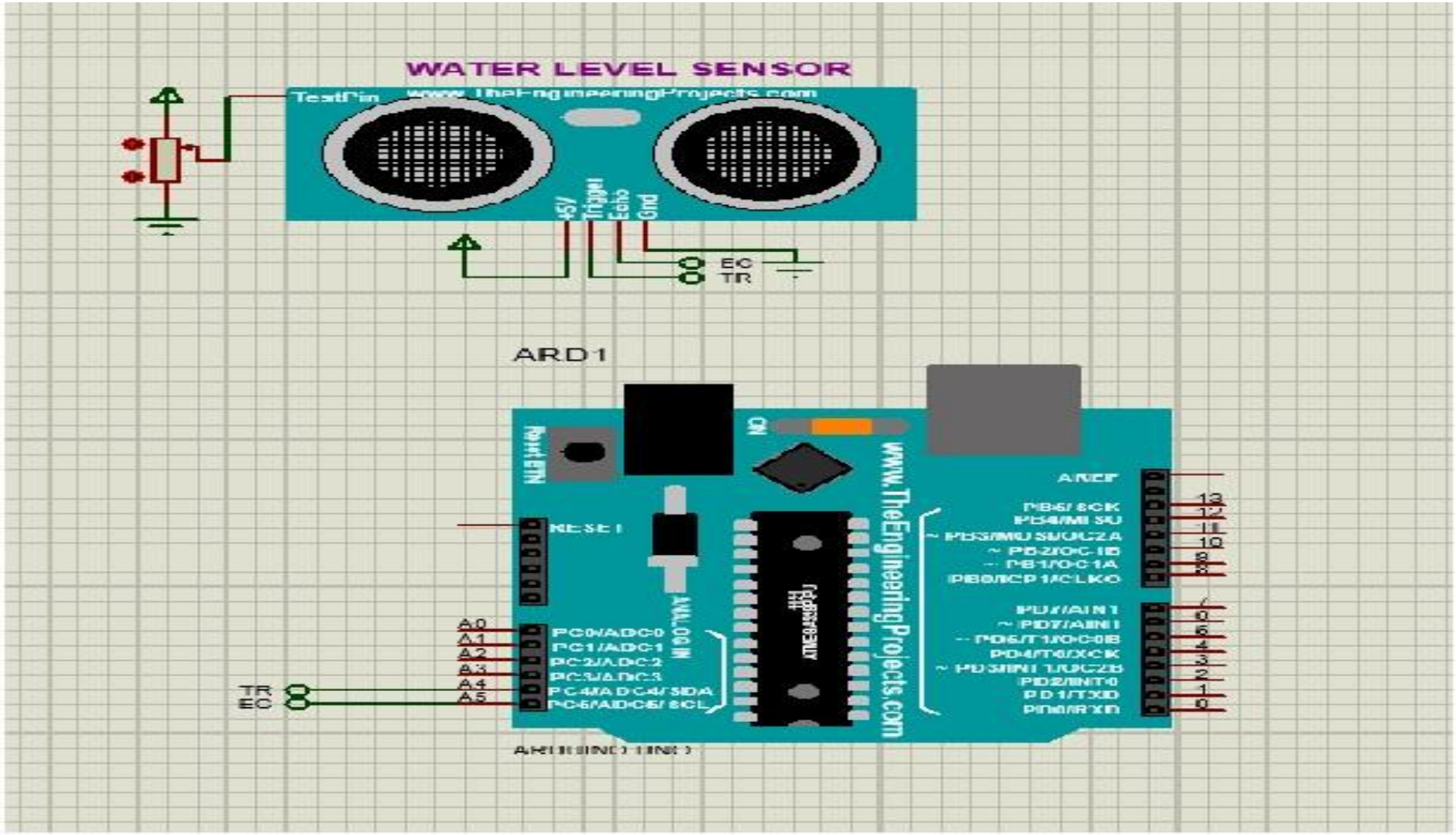
Moisture Sensor Interface With Arduino



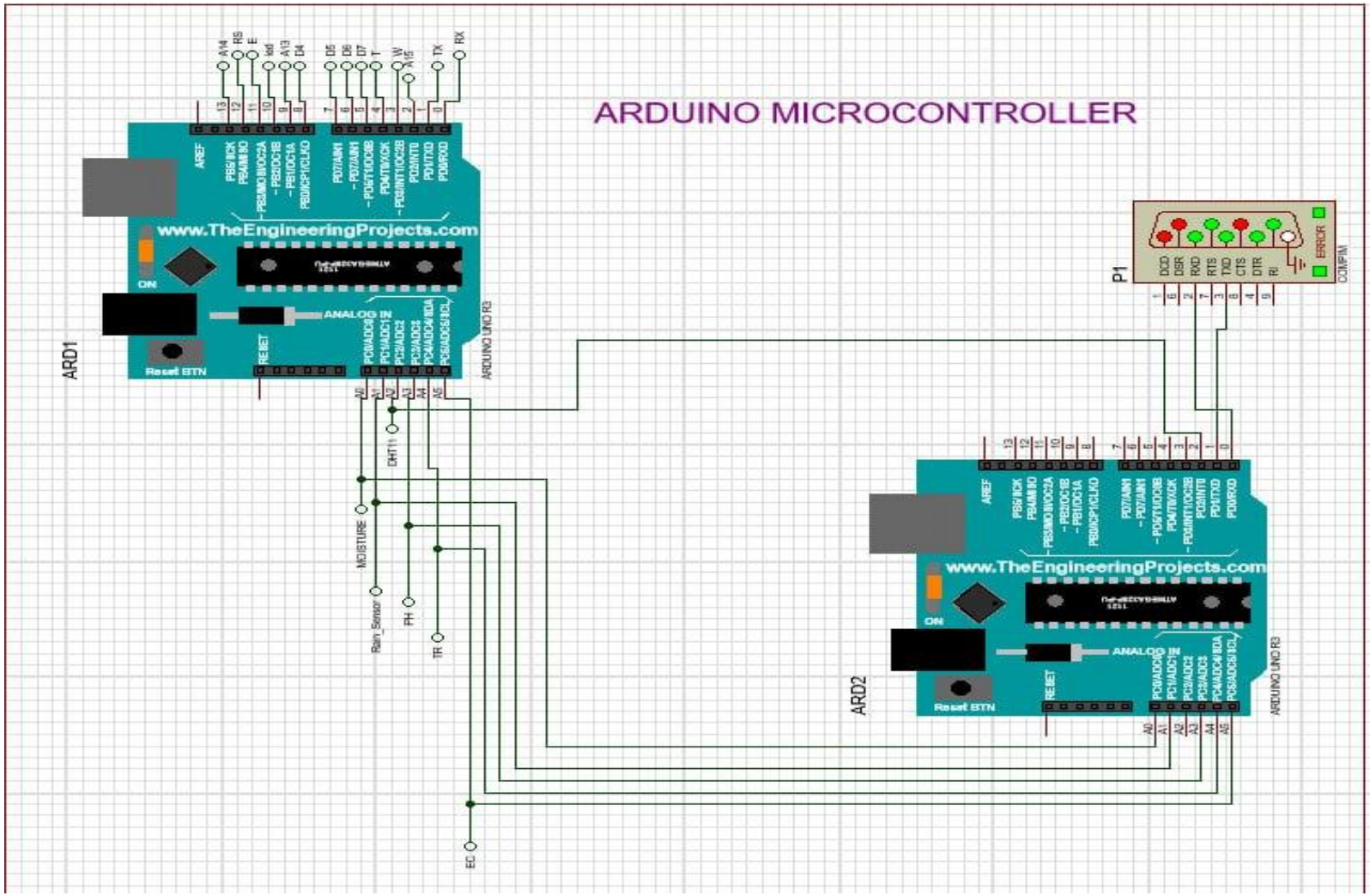
PH Meter Sensor Interface With Arduino



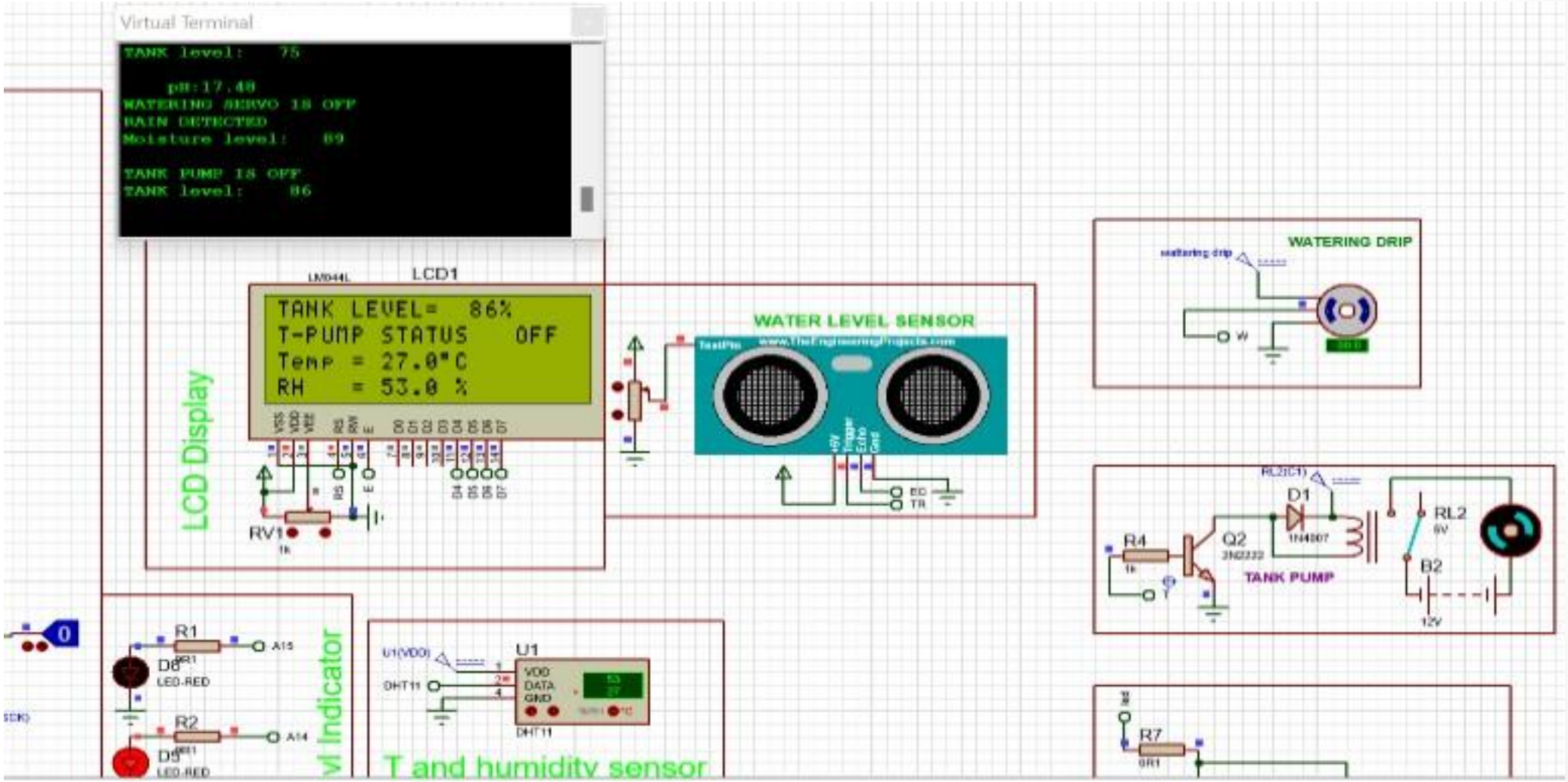
Ultrasonic With Arduino Interfacing



COM port interface with arduino

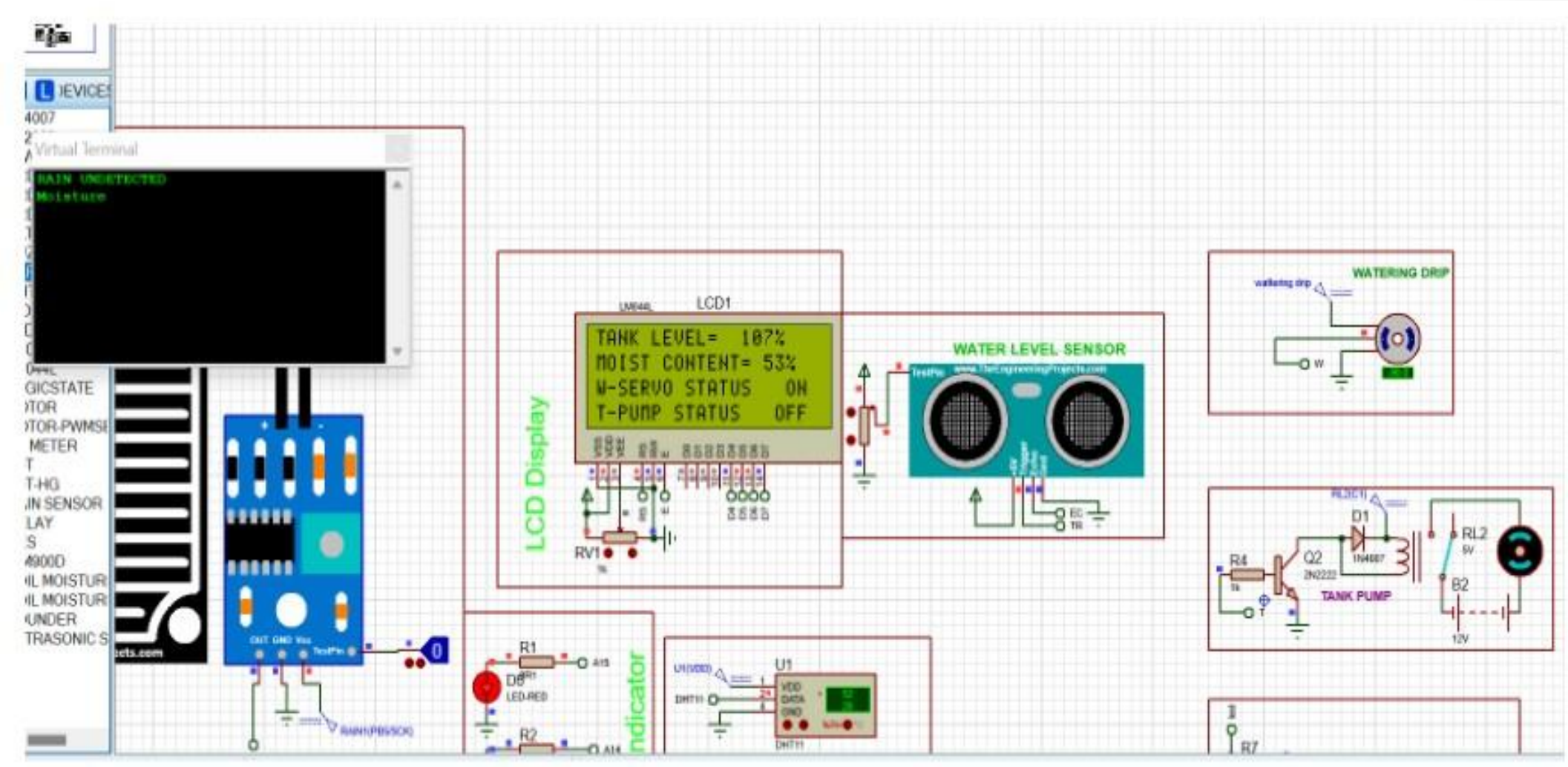


Simulation Result For At Normal Content Condition



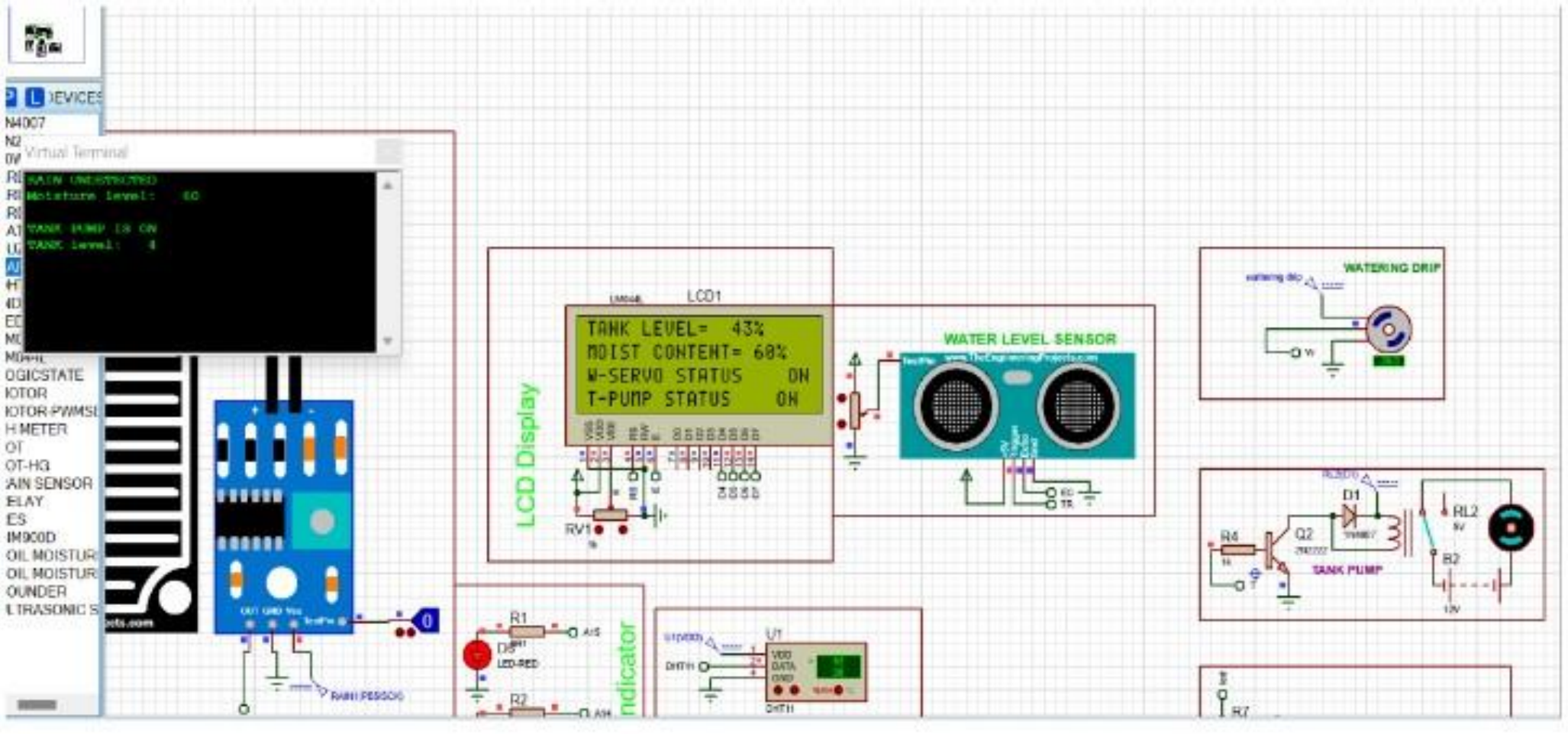
Blink simulation for the above condition

Simulation Result At Soil Dry And Tanker Full Condition



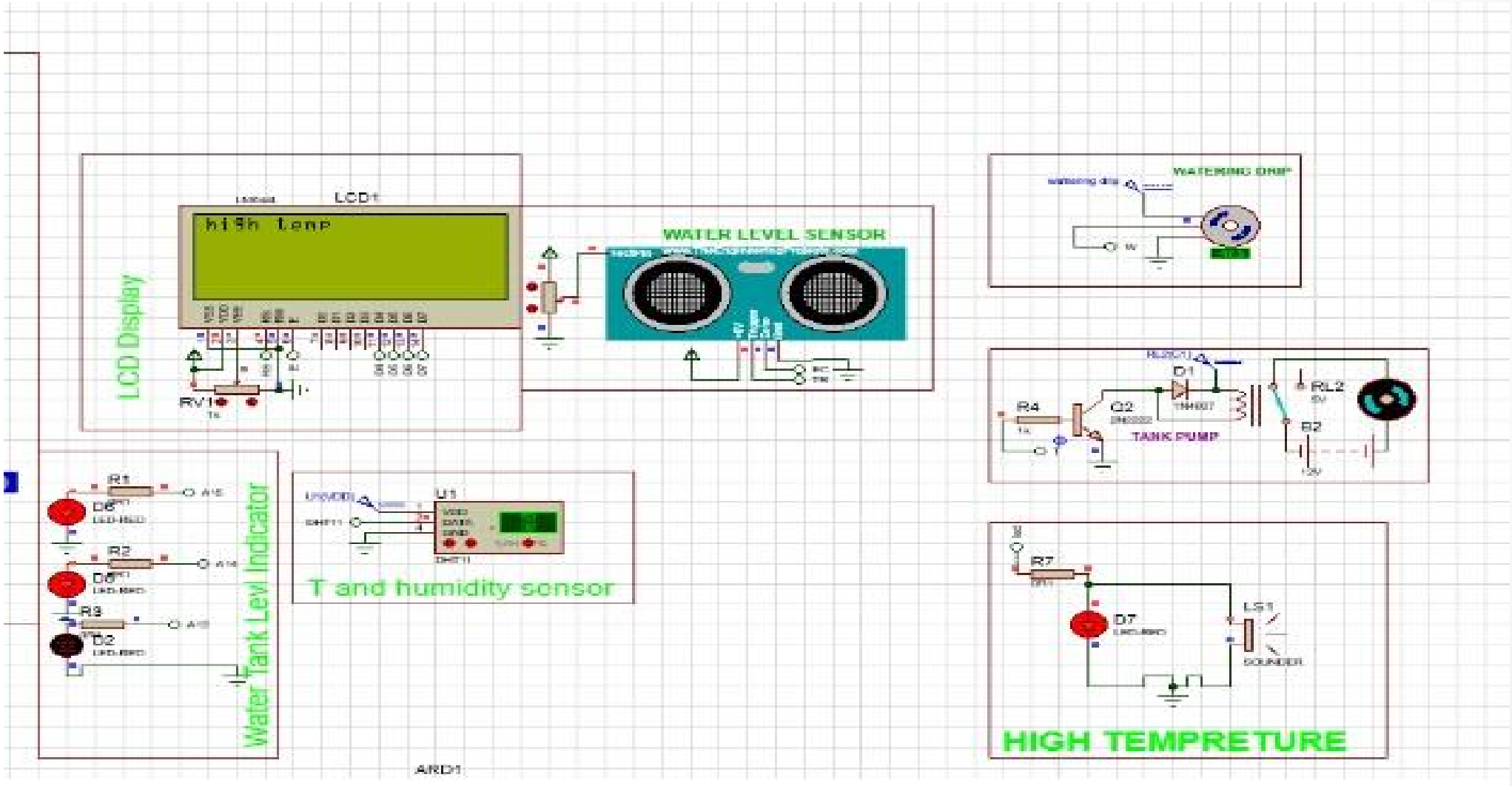
Blink Simulation Result At Soil Dry And Tanker Full Condition

Simulation Result At Soil Is Dry And Tanker Empty Condition

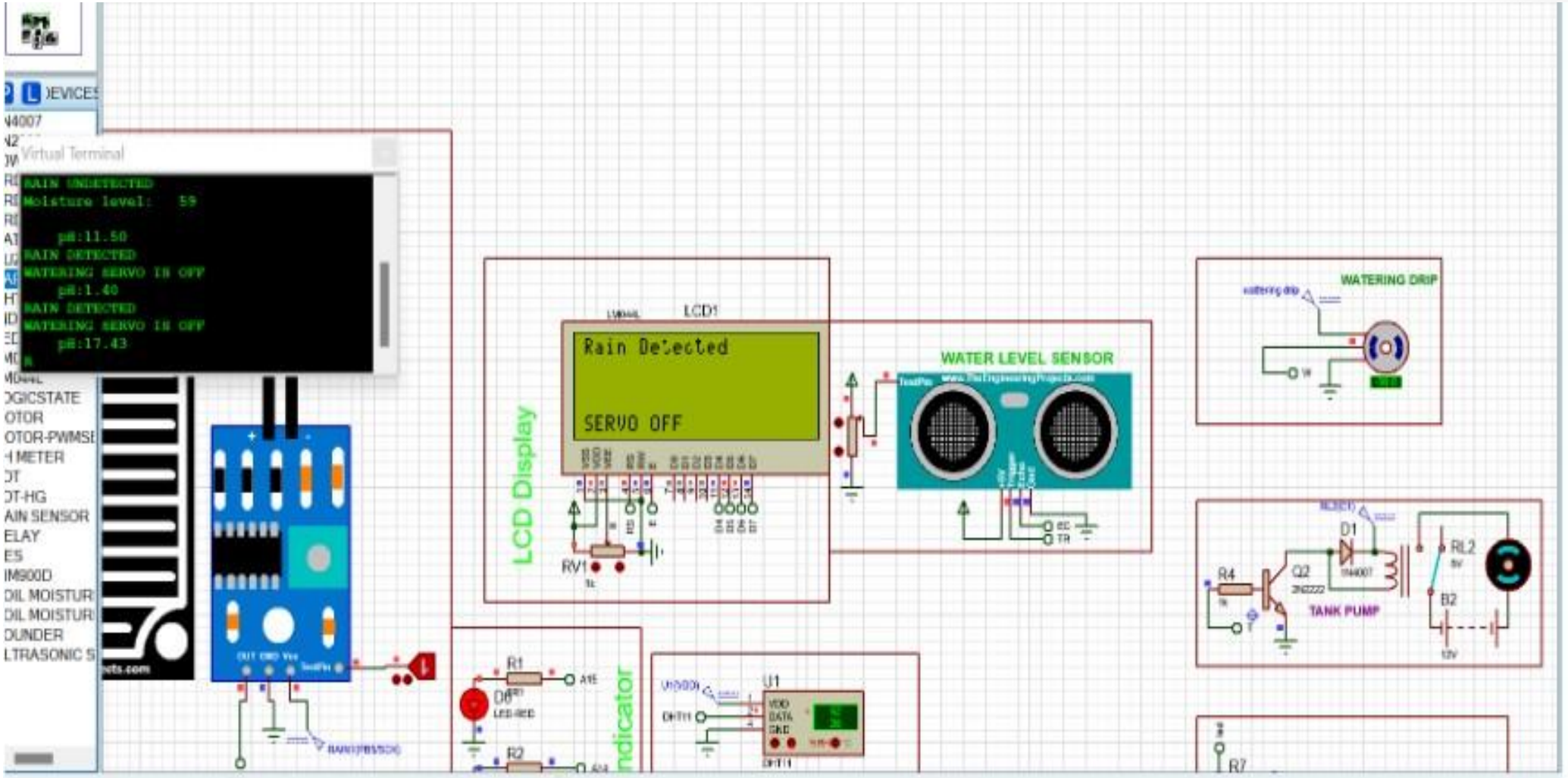


Blink simulation at soil is dry and tanker empty condition

When Temperature Is High



When The Rain Is Detected



CONCLUSION

- The simulated IOT-based automatic drip irrigation system maximizes crop yield by optimizing water usage, with real-time monitoring and remote access via the Blink application, revolutionizing agriculture.
- This advancement minimizes manual labour, reduces costs, and promotes sustainability in agriculture,
- promising improved efficiency and productivity for agricultural operations.

RECOMMENDATIONS

- Woldia University should supply tangible hardware components for implementation.
- Prioritizing fertilizer management, particularly by assessing pH levels and flow alongside water, is crucial for future irrigation success.
- Exploring and implementing renewable energy sources like solar, wind, or hydropower will make irrigation systems more sustainable, cost-effective, and environmentally friendly, ensuring long-term viability and efficiency.

THANK YOU