



Industrial Internet of Things (IIOT)

Project Report on

Smart Irrigation System to optimize water usage in agricultural fields.

Submitted partial fulfillment of the requirements for the degree of

BACHELOR OF TECHNOLOGY

in

Mechanical Engineering

By

Venkatesh Raghavendra Shanbhag - 2361437

Amit Shivanand Sakhare - 2361439

R. Anto Oshon - 2361440

Ryan Xavier Gomes - 2362146

Jofi Jaison - 2362816

1. Aim

To design and simulate an automated irrigation system using Cisco Packet Tracer (CPT) that monitors soil moisture and environmental conditions, and triggers irrigation only when necessary—thereby optimizing water usage in agricultural fields.

2. Problem Statement

Conventional irrigation systems typically water fields on fixed schedules without considering real-time soil moisture or environmental conditions. This often leads to:

- Over-watering or under-watering
- Wastage of precious water resources
- Inefficient labor and resource use

The goal is to overcome these limitations through a smart, sensor-driven system that enables real-time, adaptive, and efficient irrigation.

3. Scope of the Solution

- Connectivity & Monitoring: Simulate a network of IoT devices (sensors and actuators) connected to a home gateway, delivering real-time data to a user interface (Smart Phone) for remote control and monitoring within Cisco Packet Tracer.
- Automation Logic: Use microcontroller logic to trigger sprinklers when soil moisture drops below a defined threshold and stop irrigation when sufficient moisture is detected.
- Extensibility: Can be expanded with additional sensors (e.g., humidity, temperature, CO₂) and features like alerts or notifications.

4. Required Components

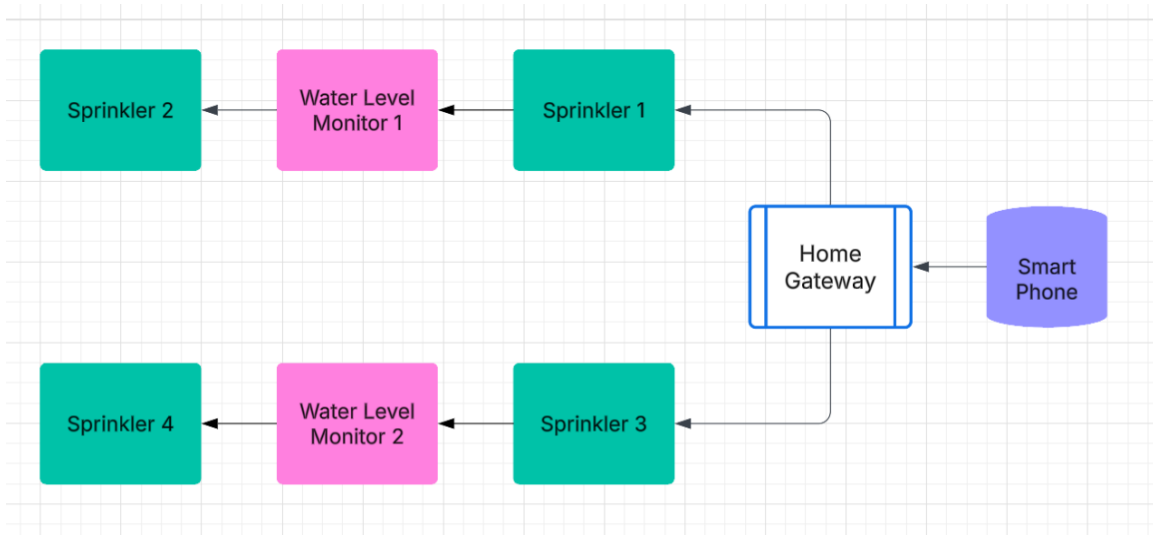
Software:

- Cisco Packet Tracer (latest version, e.g., 7.x) – for IoT simulation and automation logic.

Hardware (Simulated in Cisco Packet Tracer):

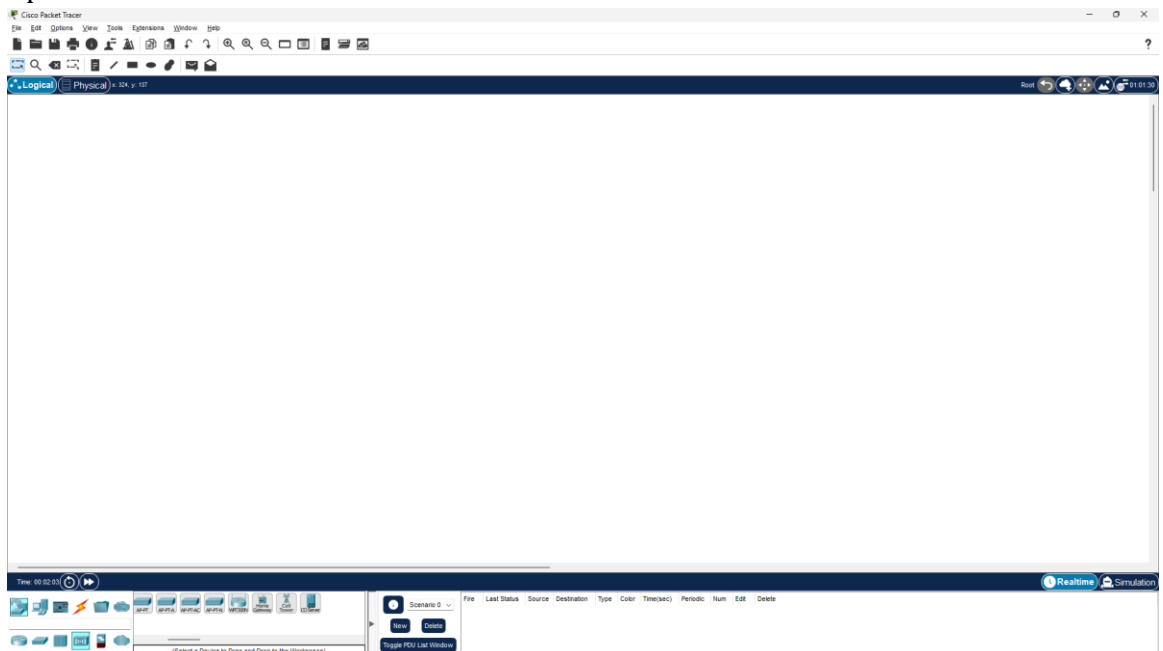
- Soil Moisture Sensor – monitors soil water levels.
- Lawn Sprinkler – actuator to irrigate fields.
- Home Gateway – central hub connecting IoT devices.
- Smart Phone– for monitoring and manual control, Block Diagram

Block Diagram

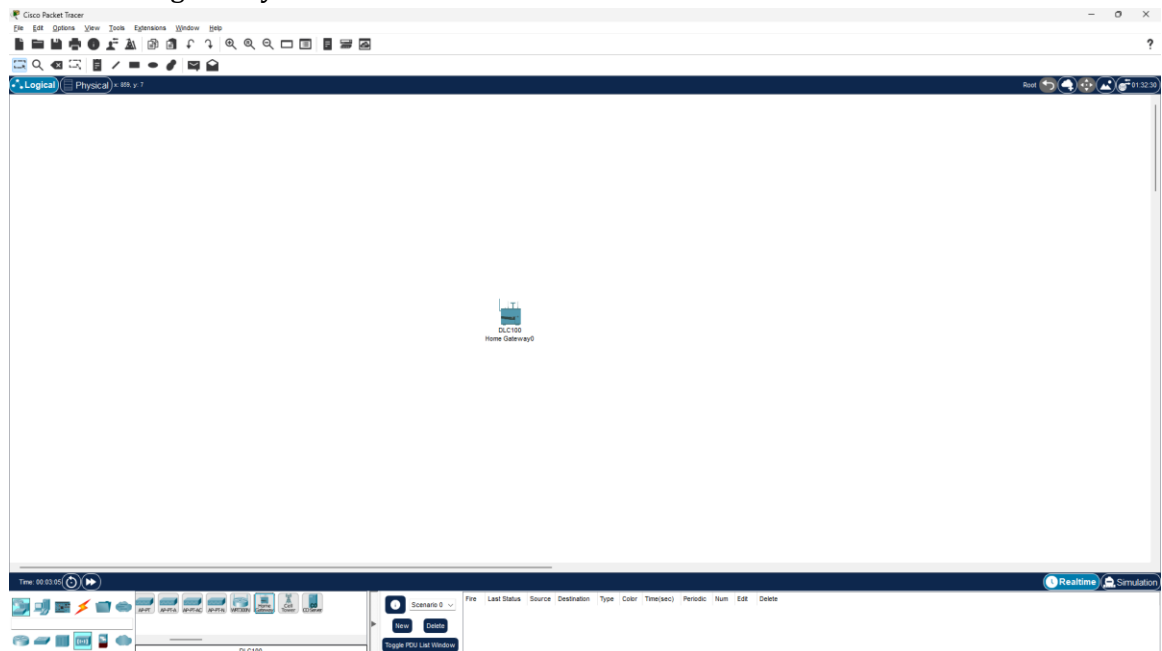


Demo on Cisco Packet Tracer

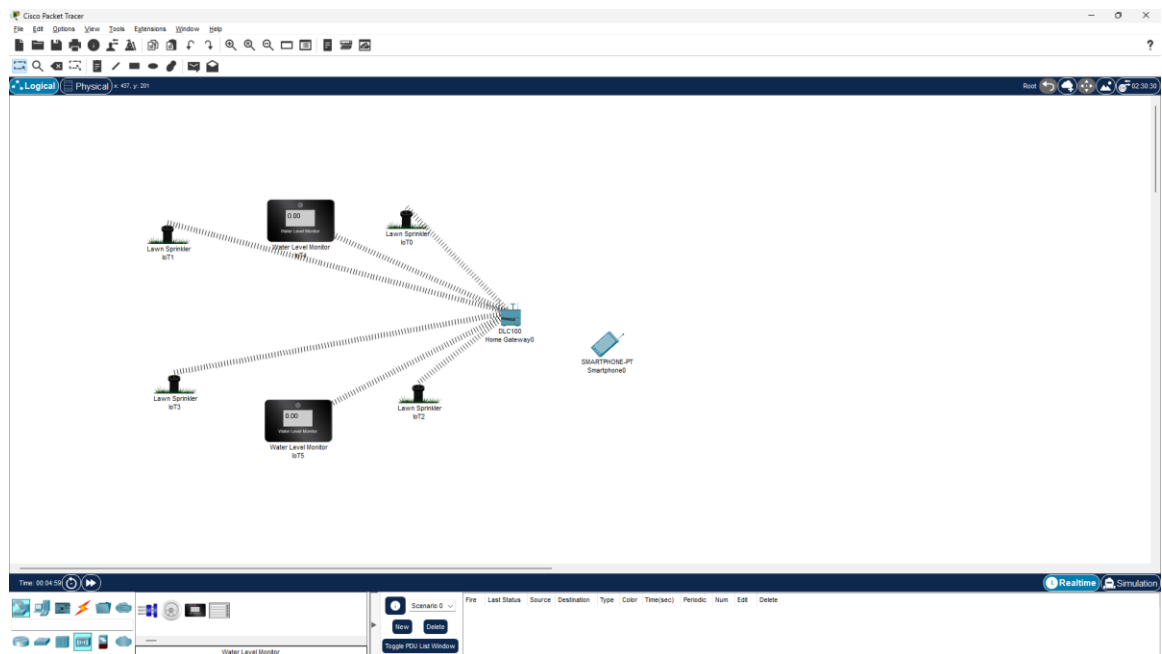
1. Open Cisco Packet tracer



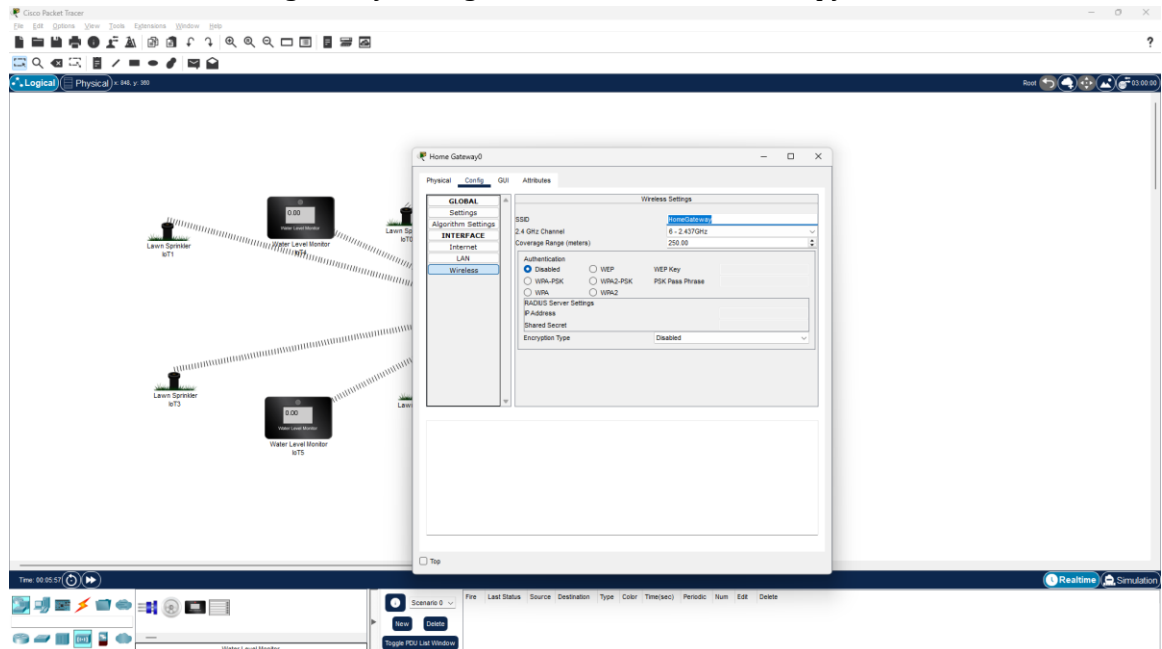
2. Select Home gateway



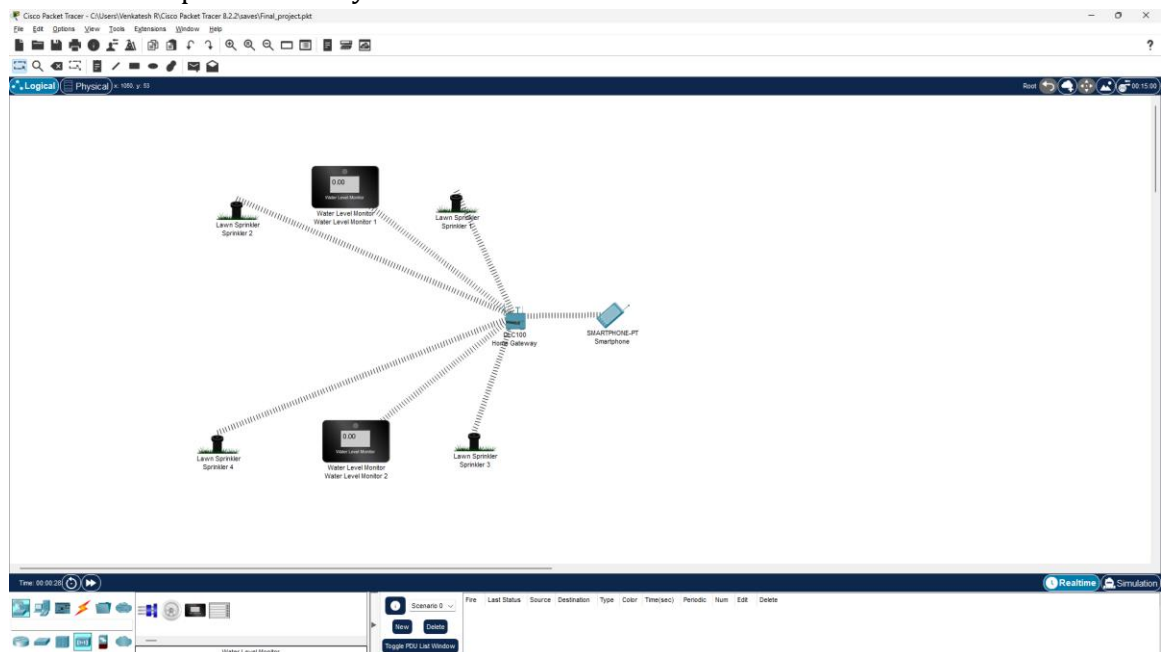
3. Select Various equipment like Lawn Sprinklers, Water Level Monitor and Smart Phone



4. Double click on home gateway, config, wireless and check and copy SSID name.

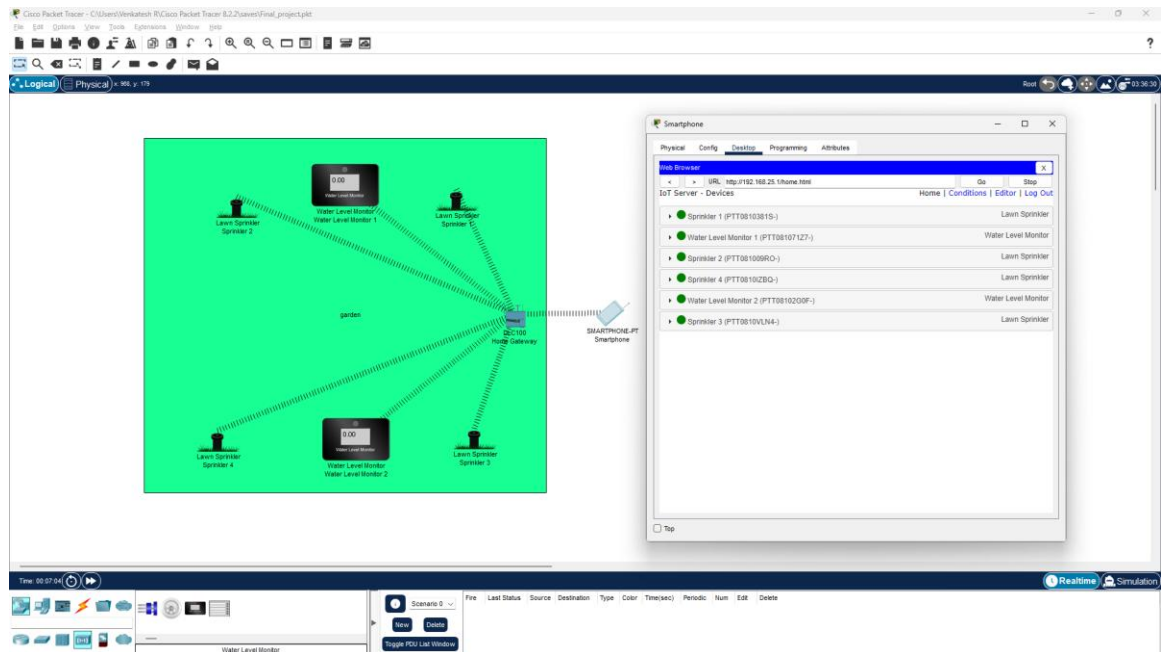


5. Check all components if they have been allotted with IP address.

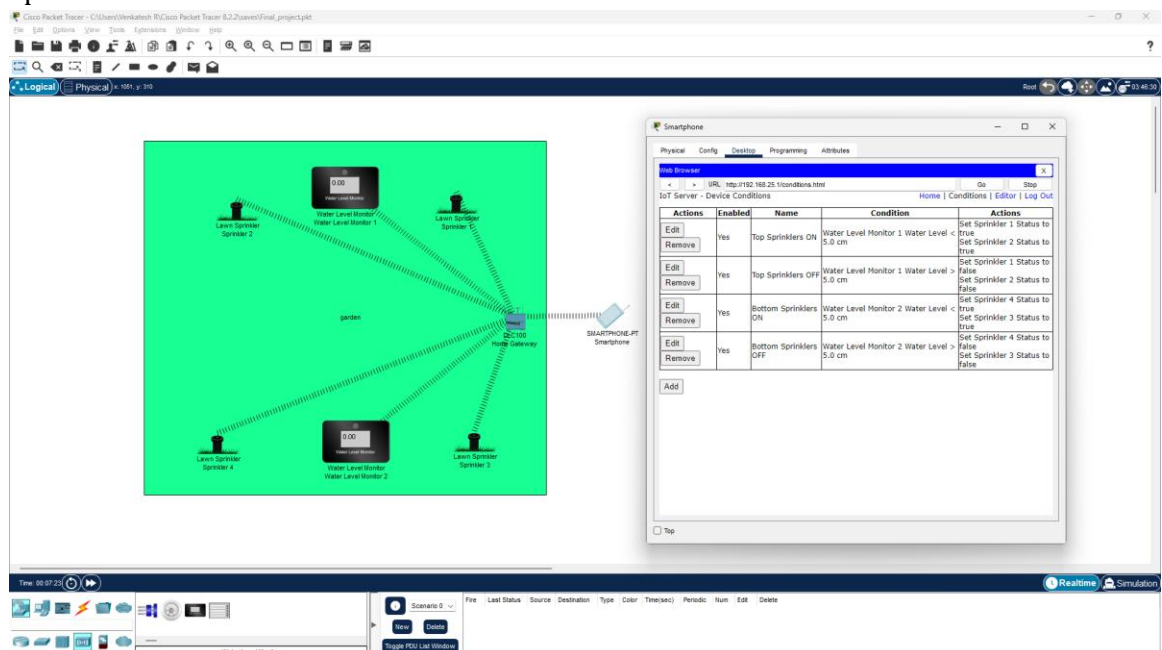


6. Change the names of all devices Click on each device, go to config, then in IoT server (down), click on Home Gateway
7. Click on tablet, go to desktop, click on IoT monitor and Login. Check whether all the components added.

8. Now let us have 4 conditions for smart irrigation as Top Sprinklers and bottom Sprinklers
9. For Top Sprinklers let us say, the water level is <5 cm. Top Sprinklers turn ON and same for the second water level monitor.



10. For this go to conditions, Add, give name as Top Sprinklers ON, in match make Top Sprinkler ON like above said conditions in Action.



11. For Sprinklers OFF conditions, Add, give name as sprinklers OFF, we must have water level > 10 cm.

5. Simulated Circuit (via Cisco Packet Tracer)

The irrigation system circuit was simulated using Cisco Packet Tracer with the following setup:

- Sensors (Soil moisture and Humiture) provide inputs to Home gateway.
- Home gateway is connected to the Lawn Sprinkler actuator.
- Devices are linked wirelessly to the Home Gateway, which connects to a server and monitoring devices (Smart Phone).
- When soil moisture falls below the threshold, the Home gateway triggers the sprinkler ON.
- When moisture exceeds the defined threshold, the sprinkler is turned OFF.

6. Results

The simulation demonstrated that the system successfully monitors soil moisture and controls irrigation:

- Sprinkler activates when soil moisture falls below the threshold (e.g., < 5 cm water level).
- Sprinkler deactivates when soil moisture rises above the threshold (e.g., > 10 cm water level).
- Real-time monitoring via Smart Phone interface was achieved.
- The system ensured reduced water wastage and efficient irrigation in the simulation environment.

7. Summary Table

Aim	Automate irrigation using IoT in CPT to save water.
Problem Statement	Manual irrigation wastes water; smart control ensures efficiency.
Scope	Sensor-actuator system, remote monitoring and automation.
Software	Cisco Packet Tracer.
Hardware	Soil moisture sensor, sprinkler, gateway, server, UI devices.
Simulated Circuit	Sensors → Gateway → Server/Tablet; threshold-based control.
Results	Efficient irrigation achieved, water conservation ensured.