

Class: SBTEE

Batch Number: 7

Members: Wariz Resul, Herbert ES, Utsav Kumar, Sowjanya R

Aim

The aim is to design a **smart irrigation system** that optimizes water usage in agricultural fields. The system monitors water levels (analogous to soil moisture) and automatically triggers irrigation based on predefined conditions to ensure efficient watering and conserve water resources.

Problem Statement

The problem addressed is the overuse or inefficient use of water in irrigation, which leads to wastage and increased costs. The goal is to create an automated system that can continuously monitor soil moisture (water level) and control multiple lawn sprinklers accordingly, turning them on or off based on real-time water level data using IoT concepts simulated in Cisco Packet Tracer.

Scope of the Solution

- Automates irrigation for agricultural fields or lawns based on water level sensors.
- Reduces unnecessary water consumption by activating sprinklers only when water levels fall below a threshold (e.g., 5 cm).
- Wireless connectivity of devices (sprinklers, water level monitors) to a central home gateway to enable remote monitoring and control.
- Control and monitoring via a smartphone interface connected to the home gateway.
- Condition-based automation using simple logic rules to switch sprinklers on/off depending on sensor inputs.
- Flexible expansion by adding more components such as additional sprinklers or sensors for a larger area.

Required Components (Software and Hardware in Simulation)

- Cisco Packet Tracer software for simulation.
- Wireless devices in Packet Tracer: Home Gateway (wireless router), Smartphones.
- End devices: Lawn Sprinklers (4 units chosen in the demo).
- Water Level Monitors (2 units simulate soil moisture sensors).
- IoT Server configuration within Packet Tracer to connect and configure devices wirelessly.
- Programming interface inside Packet Tracer to set automation conditions based on sensor values.
- Web browser access on the smartphone device to monitor overall system status via the gateway IP (e.g., 192.168.25.1).

Simulated Circuit in Cisco Packet Tracer

- Wireless Home Gateway configured with SSID and password for secure communication.
- Four lawn sprinklers and two water level monitors are connected wirelessly to the home gateway.

- A smartphone device is connected to the same gateway to serve as a monitoring and control terminal.
- The irrigation land is visually represented by a colored rectangle (green) serving as a garden or field.
- Automation conditions are created so that:
 - If water level monitor 1 reads < 5 cm, sprinklers 1 and 2 turn ON, otherwise OFF.
 - If water level monitor 2 reads < 5 cm, sprinklers 3 and 4 turn ON, otherwise OFF.
- Water level monitors are triggered by environmental object interaction to start sensing.

Result

- The system successfully demonstrates **automated control of sprinklers** based on sensor inputs simulated in Packet Tracer.
- When water levels drop below the threshold, corresponding sprinklers automatically switch on, and they switch off when water levels rise above the threshold.
- The smartphone interface provides real-time monitoring and control of all connected components.
- This simple IoT-based irrigation simulation illustrates how water usage can be optimized in an agricultural context using wireless sensor networks and automation logic.
- The user can expand or modify the circuit to add more sensors or sprinklers for different field zones.

This simulation provides a practical example of applying IoT concepts for sustainable agriculture and smart water management using Cisco Packet Tracer.