NEHRU ARTS AND SCIENCE COLLEGE

PROJECT

BATCH – 14

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SMART IRRIGATION SYSTEM USING CISCO PACKET TRACER

AIM

The aim of the Smart Irrigation System using Cisco Packet Tracer in IoT is to optimize water usage by automating irrigation based on real-time sensor data. It ensures precise watering by monitoring soil moisture, temperature, and humidity. The system simulates a reliable network infrastructure for seamless communication among sensors, controllers, and actuators. This approach supports remote monitoring and control, promoting sustainable and cost-effective agricultural practices.

PROBLEM STATEMENT

Agricultural irrigation systems often lead to excessive water usage due to inefficient manual control, resulting in water wastage, increased costs, and soil degradation. Traditional irrigation methods do not adapt to varying soil moisture levels, leading to overwatering or underwatering, which affects crop growth and yield.To address this issue, a Smart Irrigation System is needed to automate irrigation based on real-time soil moisture data. This system should use IoT sensors to monitor moisture levels and trigger irrigation only when necessary, ensuring optimal water usage, reducing waste, and improving agricultural efficiency. Cisco Packet Tracer will be used to simulate and implement this IoT-based solution.

Cisco packet tracer simulation software. It uses the statistical data from the sensors and the information stored in a cloud. An automated system for irrigation is developed by analyzing the moisture level of the ground. This system makes use of two microcontrollers, Raspberry pi and Arduino respectively. The system represented in a smart home system using cisco packet tracer that uses the IoT technology to automate various activities of the house. The theme in aims for a high-level monitoring and controlling of the data for agriculture monitoring system which monitors the real-time data from the crop-field using Raspberry pi and cloud-based IoT systems. The use of automation systems in wireless technology has several advantages that wired systems cannot provide. The wireless systems reduce the installation costs since the hardware requirement is low and no cabling is necessary. Wireless systems are scalable and

expandable. Internet connectivity is another factor that plays crucial role in order to control devices from all around the world. For controlling the sensors, a Microcontroller (MCU-PT) and Home Gateway is used which provides programming environment for controlling devices that are connected to the home gateway.

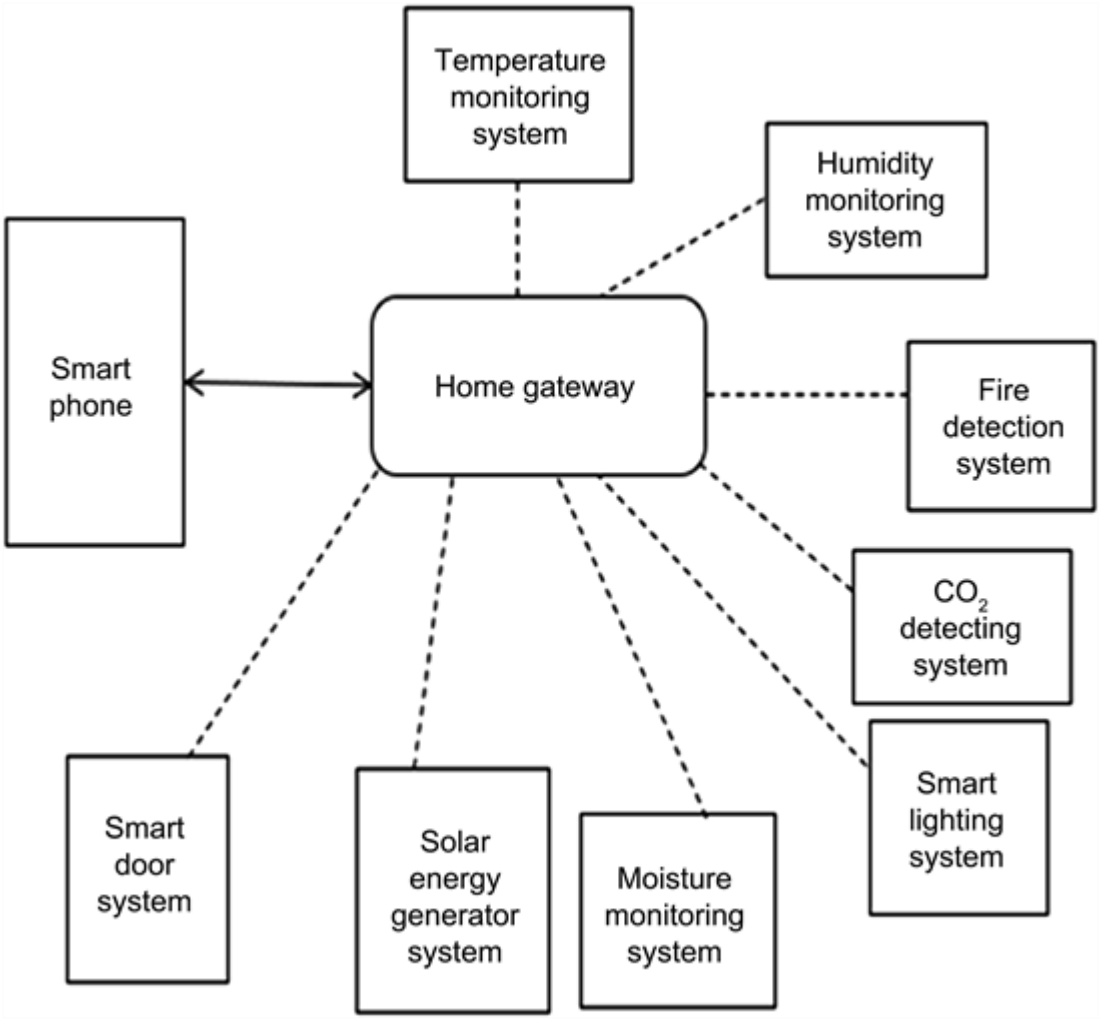
SCOPE OF THE SOLUTION

The scope of the solution for a Smart Irrigation System using Cisco Packet Tracer includes real-time monitoring, automation, and optimization of water usage using IoT sensors, smart valves, and network communication. It ensures efficient irrigation management through automated decision-making based on soil moisture levels and weather data, reducing manual labor and water wastage. The system is scalable, applicable to agriculture, urban landscaping, and home gardens, and enhances productivity and sustainability. With secure data transmission, remote access, and analytics, it offers a cost-effective and smart irrigation solution.

OVERVIEW ARCHITECTURE OF THE SOLUTION

The solution architecture consists of multiple layers working together for efficient and automated irrigation.The Sensing Layer collects real-time data using soil moisture, temperature, humidity, and rain sensors. The Communication Layer transmits data via Wi-Fi, LoRa, GSM, or IoT protocols like MQTT and HTTP. The Processing Layer analyzes data using microcontrollers, edge computing, and AI/ML algorithms to optimize irrigation schedules. The Cloud Layer stores data, enables remote access, and provides advanced analytics. Finally, the Actuation Layer controls pumps and valves for automated irrigation, ensuring efficient water usage and improved crop yield.

MINDMAP



Shows the block diagram of the Smart Irrigation system, which is implemented using the Cisco Packet Tracer. The block diagram contains an Automatic sprinkler system, humidity monitoring system, Temperature monitor, Pressure monitoring, Motion detector system, Humiture monitor, Wind detector, Carbon monoxide detector, and Carbon dioxide detector. All these smart IoT systems and devices are connected to the internet by using a home gateway and can be controlled using a Tablet. Table 1 shows the devices used and their function.

REQUIRED COMPONENTS TO DEVELOP SOLUTIONS

Humidity Sensor – Tracks air humidity levels to optimize irrigation schedules based on weather conditions.

Water Level Sensor – Detects water levels in tanks or reservoirs to prevent overflows or shortages.

LED - An LED (Light Emitting Diode) in IoT (Internet of Things) is a small electronic component that emits light when an electric current passes through it. In IoT applications, LEDs are commonly used as indicators for device status, alerts, and notifications.Water Level Sensor – Detects water levels in tanks or reservoirs to prevent overflows or shortages.

Smartphone - A smartphone in IoT (Internet of Things) acts as a central control device that allows users to monitor, manage, and interact with connected IoT devices remotely. It connects to IoT networks through Wi-Fi, Bluetooth, NFC, or cellular data, enabling real-time communication with smart devices.

MCU-PT - MCU-PT (Microcontroller Unit - Packet Tracer) is a virtual microcontroller in Cisco Packet Tracer that acts as the processing unit for IoT devices. It is responsible for reading sensor inputs, processing data, and controlling actuators in an IoT network.

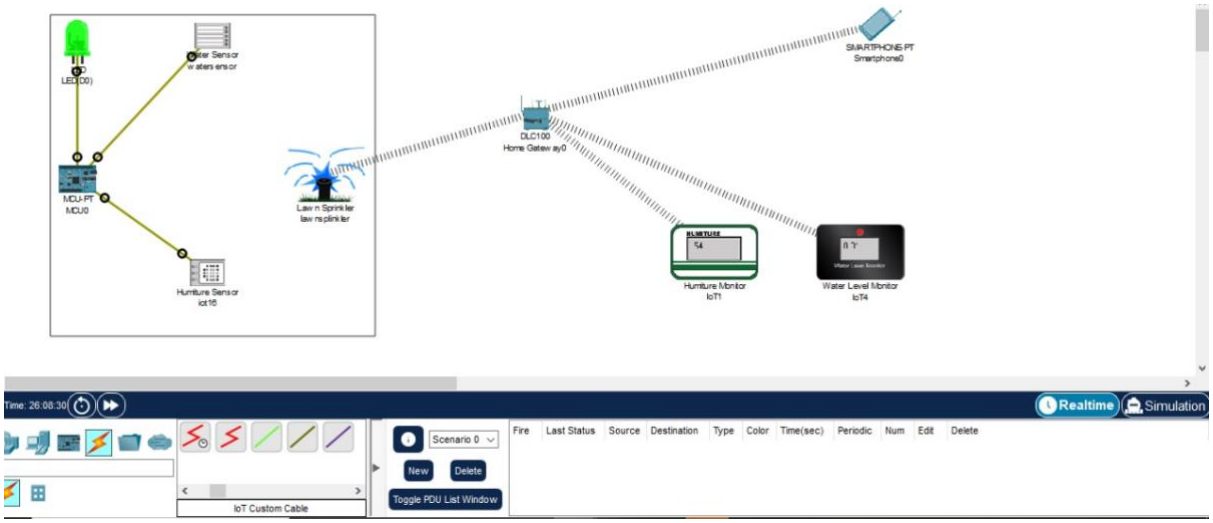
Lawn sprinkler - A lawn sprinkler is a watering device designed to distribute water evenly over a lawn, garden, or agricultural field. It helps maintain proper soil moisture levels for plant growth and is commonly used in residential, commercial, and agricultural irrigation systems.

DLC100 - DLC100 (Device Layer Controller 100) is a home gateway device used in Cisco Packet Tracer to connect and manage IoT devices within a network. It acts as a bridge between sensors, actuators, and the internet, enabling communication and remote control of smart devices.

Humilture Moniter - A Humilture Monitor in Cisco Packet Tracer is an IoT device used to measure and display humidity and temperature levels in a network. It is commonly used in smart environments like smart homes, agriculture, and industrial monitoring to track climate conditions in real time.

Warer Level Moniter - A Water Level Monitor in Cisco Packet Tracer is an IoT device that measures and displays the water level in tanks, reservoirs, or irrigation systems. It helps in smart water management by ensuring that water levels remain within safe limits and triggering automated actions when needed.

SIMULATED CIRCUIT



EXECUTION VIDEO OF THE DEMO

GIHUB LINK : https://github.com/Thirisha-R-06/L-T-project

CONCLUSION:

The smart irrigation system designed using Cisco Packet Tracer successfully optimizes water usage in agricultural fields by integrating IoT-based monitoring and automation. The system continuously tracks soil moisture levels through sensors and triggers irrigation only when necessary, reducing water wastage and improving crop health. By leveraging Cisco Packet Tracer's network simulation capabilities, the system effectively demonstrates real-time data collection, decisionmaking, and automated control of irrigation mechanisms.This project highlights the potential of IoT in precision agriculture, enabling resource efficiency, cost savings, and sustainable farming practices. Future enhancements could include weather-based predictive analytics, remote user control, and AI-driven irrigation scheduling to further improve system performance.