END ASSESSMENT PROJECT REPORT

**Applied Industrial Internet of Things: Room Automation System using Cisco Packet Tracer**

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**Abstract**

This project presents the design and simulation of an IoT-based Room Automation System using the Cisco Packet Tracer software. The primary objective is to address the common problem of energy wastage and inconvenience in managing household appliances by developing a system for remote monitoring and control.

The system comprises a lamp and a ceiling fan as IoT devices, a Home Gateway as the central controller, and a smartphone as the user interface. By connecting all devices to a wireless network, the simulation successfully demonstrates how a user can access a web-based portal on their smartphone to turn the appliances on or off in real-time.

The result is a fully functional simulation that serves as a proof-of-concept for modern smart home technology, showcasing the practical application of IoT principles in a simple and effective manner.

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# 1. Introduction

## 1.1. Background

The Internet of Things (IoT) is a rapidly growing network of interconnected physical devices that collect and exchange data. In the industrial and domestic sectors, IoT is revolutionizing automation and control. Smart home automation, a subset of IoT, focuses on making homes more efficient, secure, and convenient by allowing residents to control various appliances remotely.

### 1.2. Problem Statement

In a typical room environment, lights and fans are often left on even when the room is unoccupied, leading to significant energy wastage. Furthermore, the manual operation of these appliances lacks convenience. This project aims to solve this by creating a simulated smart system that allows a user to monitor and control room appliances remotely.

### 1.3. Aim and Objectives

The main aim of this project is to design and simulate a basic IoT-based room automation system using Cisco Packet Tracer for remotely controlling a lamp and a ceiling fan.

The key objectives are:

- To create a wireless network connecting smart devices.

- To enable remote access and control of these devices via a web interface.

- To demonstrate the functionality within a simulated environment.

### 1.4. Scope of the Solution

This project is confined to a simulation within Cisco Packet Tracer. The system allows a user to turn a lamp and fan on or off remotely from a smartphone connected to the same network. It does not include advanced features like sensor-based automation (e.g., motion detection) or internet-based cloud control.

### 2. System Design and Components

### 2.1. Methodology

The project is implemented using a simulation-based approach. Cisco Packet Tracer is used to create a virtual network of IoT devices. The inherent IoT capabilities of the software, such as the Home Gateway and smart devices, are leveraged to build the system without any physical hardware.

### 2.2. Software Requirements

- **Cisco Packet Tracer (Version 8.0 or newer):** A network simulation tool with comprehensive support for IoT devices and protocols.

### 2.3. Simulated Hardware Components

- **Home Gateway:** Acts as the central wireless router and IoT registration server. It hosts the web interface for controlling the connected devices.

- **Lamp (IoT Device):** A smart lamp that can be wirelessly connected and controlled.

- **Ceiling Fan (IoT Device):** A smart fan with multiple speed settings (Off, Low, High) that can be controlled remotely.

- **Smartphone:** The end-user device used to access the web browser and control the other devices.

## 3. Implementation Steps

### 3.1. Setting up the Network Topology

The first step was to place all the required components onto the Cisco Packet Tracer workspace. A Home Gateway was added, followed by a Lamp, a Ceiling Fan, and a Smartphone. The devices automatically established a wireless connection with the gateway.

*[Insert Screenshot of the complete Cisco Packet Tracer workspace with all devices and wireless connections here]*

### 3.2. Configuring the IoT Devices

For the Home Gateway to recognize and control the lamp and fan, each device had to be registered. This was done by clicking on each device, navigating to the Config tab, and setting the IoT Server option to Home Gateway.

### 3.3. Remote Control via Smartphone

To control the system, the web browser on the simulated smartphone was used.

1. The IP address of the Home Gateway (192.168.25.1) was entered into the browser's URL bar.

2. The default login credentials (admin / admin) were used to access the control panel.

3. The web interface displayed a list of registered devices (Lamp, Fan) with options to control their state.

## 4. Results and Demonstration

### 4.1. System Functionality

The system performed as expected. Actions performed on the smartphone's web interface were reflected instantly in the simulation. Turning the lamp on caused its icon to illuminate, and turning the fan on caused its blades to animate, providing clear visual feedback.

*[Insert Screenshot of the smartphone's web browser interface showing the list of devices and controls here]*

### 4.2. Final Outcome

The project successfully resulted in a functional, simulated room automation system. The final outcome confirms that even with basic components, a reliable remote monitoring and control system can be established using IoT principles. The system is stable, responsive, and effectively meets the project's objectives.

## 5. Conclusion and Future Scope

### 5.1. Conclusion

This project successfully demonstrated the design and implementation of an IoT-based room automation system using Cisco Packet Tracer. The aim of remotely controlling a lamp and fan was achieved, providing a practical understanding of how smart devices communicate and are managed within an IoT network. The project serves as an excellent foundation for understanding more complex IoT applications.

### 5.2. Future Scope

This basic system can be expanded in several ways:

- **Adding Sensors:** Incorporate motion sensors to automatically turn lights on/off or temperature sensors to regulate the fan.

- **Creating Automated Rules:** Use the "Conditions" tab in the Home Gateway to create rules, such as "If the temperature is above 28°C, turn the fan to High."

- **Cloud Integration:** Connect the Home Gateway to a remote server to allow control of the devices over the internet, not just the local network.

- **Enhanced Security:** Implement more robust security measures for accessing the control panel.