

**USMAN INSTITUTE OF TECHNOLOGY**

Affiliated with NED University of Engineering & Technology, Karachi

**BACHELOR OF SCIENCE (COMPUTER SCIENCE/SOFTWARE ENGINEERING)**

**CS222 DATA COMMUNICATION & COMPUTER NETWORKS**

**PROJECT REPORT**

**TITLE: ROOM AUTOMATION SYSTEM USING PACKET TRACER**

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**Contents**

[ABSTRACT: 3](#_Toc153214057)

[INTRODUCTION: 4](#_Toc153214058)

[FEATURES: 4](#_Toc153214059)

[NETWORK DESIGN: 4](#_Toc153214060)

[IMPLEMENTATION: 5](#_Toc153214061)

[SIMULATION & TESTING 6](#_Toc153214062)

[CONCLUSION 6](#_Toc153214063)

# **ABSTRACT**:

Room automation implemented in Cisco Packet Tracer involves the simulation of an intelligent and interconnected environment where various devices collaborate to enhance user comfort and energy efficiency. The implementation of smart lights, fans, and smart windows in Cisco Packet Tracer exemplifies an intelligent and interconnected room automation system. Leveraging simulated sensors, actuators, and controllers over a virtualized network, this integration employs logic and programming to interpret sensor data and trigger responsive actions. With a simulated user interface for interaction and robust security measures, the abstraction underscores Cisco Packet Tracer's capabilities in modelling and testing room automation scenarios, offering a controlled virtual environment for the evaluation of system performance. the abstraction demonstrates the capabilities of Cisco Packet Tracer in modelling and testing room automation scenarios, allowing for the evaluation of system performance within a controlled virtual environment. in context of smart light, fan , carbon monoxide detector , thermostat , RFID card reader and smart window.

The abstraction provided applies seamlessly to the implementation of smart lights, fans, and smart windows, carbon monoxide detector, RFID card and reader and thermostat in a room automation system in Cisco Packet Tracer. Specifically, the integration of these devices involves simulated sensors, such as temperature sensor, smoke sensor motion sensors and security cameras. Smart lights, fans, and smart windows act as actuators, responding to the interpreted sensor data through programmed logic and automation scripts.

# **INTRODUCTION:**

In the rapidly evolving landscape of modern living, the integration of smart technologies has become essential to enhance our daily experiences. The ability to control and optimize our surroundings effortlessly has redefined the way we interact with our homes and workspaces. With this vision in mind, we are excited to present our proposal for a Room Automation System using Cisco Packet Tracer.

# **FEATURES:**

* Motion-Activated Lights: Motion sensors trigger lights to turn on when someone enters the room and off when the room is vacant and door is closed, conserving energy.
* Smart Locks: Secure doors with smart locks that can be controlled remotely, grant access to specific individuals, and provide entry logs.
* Smart Windows: The feature of automatically opening smart windows when a door is opened can enhance the comfort, energy efficiency, and overall user experience in a smart home.
* Mobile App Access: Control and monitor room automation settings remotely through a user-friendly mobile application, ensuring access from anywhere.
* Thermostats in Packet Tracer can act as temperature sensors, sending data to a central controller like a microcontroller or home gateway. This allows you to build and simulate smart home systems that adjust heating and cooling based on temperature readings.
* RFID Card: RFID cards can be used as employee badges or resident keys to grant access to secure areas like offices, apartment buildings, or gated communities.
* Carbon Monoxide Detector: The CO detector can act as a sensor, detecting CO levels and sending alerts through a network (often wireless) to a central controller or smartphone app. This allows you to build and simulate smart homes that prioritize safety by warning occupants of potential carbon monoxide leaks.

# **NETWORK DESIGN:**

A diagram of a light source

Description automatically generated

Room Automation network design

A screenshot of a computer

Description automatically generated

all devices can be control from smartphone.

A close-up of a text

Description automatically generated

Applying condition to control network.

# **IMPLEMENTATION:**

* Sensors:

Motion sensors and door/window sensors detect changes in the environment and trigger automation events.

* Automation Logic and Rules:

Automation rules are defined based on user preferences and environmental conditions. For example, motion detection in a room can trigger that someone arrived at the door and the door will be unlocked, and when opening of a door can activate the smart window for natural ventilation along with the turning on the lights and fan.

* Home gateway:

home gateways are used to control the devices such as smart window, smart fan, smart garbage and sensor.

* Smart phone

the smartphone simulation allows users to simulate and understand how mobile devices connect to and communicate over a network.

* Carbon Monoxide Detector: The CO detector can act as a sensor, detecting CO levels and sending alerts through a network (often wireless) to a central controller or smartphone app. This allows you to build and simulate smart homes that prioritize safety by warning occupants of potential carbon monoxide leaks.
* Thermostats in Packet Tracer can act as temperature sensors, sending data to a central controller like a microcontroller or home gateway.
* An RFID reader and card to control access to a virtual door within your Packet Tracer simulation. This allows you to explore concepts like user authentication, authorization levels, and logging access events.

# **SIMULATION & TESTING**

* As a person approaches the door, the motion sensor detects their movement, prompting the activation of a camera system. The camera, in turn, verifies the presence of a person at the door. Upon positive verification, the smart system initiates the unlocking of the door, offering a secure and convenient entry experience.
* Upon opening the door, an automated system triggers the activation of both the fan and lights, creating an instant welcoming atmosphere. Simultaneously, the sliding window gracefully opens, allowing natural light and fresh air to fill the space.
* At the front door an RFID is paced thus an RFID reader and card to control access to a virtual door within your Packet Tracer simulation. This allows you to explore concepts like user authentication, authorization levels, and logging access events.
* At the living room the thermostat is being installed which act as a temperature sensor

If a temperature of the living room is below 10C the fan will be turned off and the sliding window will close whereas the temperature which is above 10C the fan will be turned on and the sliding window will be open.

* When equipped with smart technology, your home devices can be seamlessly controlled through a smartphone. For instance, with a smartphone, you gain the ability to fine-tune the speed of your fan to create the perfect level of comfort. Additionally, you can effortlessly adjust the brightness of your lights to suit different scenarios.
* At the garage the carbon monoxide detector is installed thus if the detector detect the smoke greater than 0.05 then the siren will be turned on and the garage door will be open whereas if the detector detects smoke less than 0.05 then the garage door will not be open and the siren will remain turned off.

# **CONCLUSION**

In conclusion, the Room Automation System represents a pinnacle achievement in modern home technology, seamlessly blending innovation with practicality. By integrating a diverse range of smart devices, sensors, and automation logic, the system not only enhances the efficiency and comfort of the living space but also underscores the potential for transformative advancements in residential automation**.**