Smart Hotel Automation System

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Abstract

As technology continues to advance, automation in hotels and restaurants are gradually increasing. Smart hotels and restaurants improve the comfort and security by implementing automatic controlling of equipment and appliances using sensors. It helps to save energy, monitor and control the hotels remotely and avoid some accidents. It improves the overall operation of the hotels and restaurants. In this paper, we propose a smart hotel automation system using cisco packet tracer in which various sensors are deployed to automate the operation of the hotel and prevent the accidents happening in the hotels due gas leakages etc. Since the cisco packet tracer is a suitable platform to simulate the real IoT devices and visualisation, we simulate the smart hotel automation system using cisco packet tracer. The smartphone, gateway and IoT server are used to remotely control the IoT devices. The simulation provides higher security because all the IoT devices are registered and authenticated by the administrator.

Keywords: Internet of Things, Packet Tracer, Sensors, Automation, Smart Hotel

1 Introduction

Internet of things became popular last decades and provides high impacts in local and remote automations. It is utilized in many fields like agriculture, healthcare, industries, transports, smart cities, smart homes, smart car etc. It provides comfort and security to the people [5]. Hotel automation is an initiative where guests can easily access and control various appliances remotely using smartphones or computers without the need for human intervention. The sensors are deployed to operate the devices which react to the changes in the room's temperature, motion, and air quality. Motion-activated lights and fans, window opening and alarm activation when a carbon monoxide sensor detects a leak, and humidity and air conditioning regulation for maximum comfort are examples of automated features.[4][7].

Therefore, in this paper, we propose a smart hotel automation system using Cisco Packet Tracer, enabling IoT devices to be controlled via smartphones and laptops. The main contributions of this work include the installation of temperature-based fans and air conditioning systems for temperature control, carbon monoxide alarms to prevent fatal incidents, and a smart temperature controller that enhances guest comfort and safety. By adding IoT-based

controls, the system improves guest satisfaction by creating a more responsive and personalised experience, makes better use of resources, and simplifies facility management. This innovative approach demonstrates how IoT can transform traditional hotel operations into intelligent, efficient, and guest-focused experiences.

2 Literature review

The smart hotel automation system enables automatic appliance control and remote monitoring. Various smart systems using Cisco Packet Tracer have been proposed [1-10].

A.D. Azhari highlighted IoT in office networks with VLAN, SSL VPN, and ASA Firewall to optimize management and security [1]. Smart home automation studies demonstrated IoT-enabled device control, improving convenience, energy efficiency, comfort, and security using motion and temperature sensors for practical applications in homes and offices [2][4][6].

Smart classroom designs emphasized automated devices to improve safety, discipline, and efficiency, advocating for network redundancy and transparency [3][9].

B. Roy et al. introduced a three-phase smart home automation design enhancing convenience, safety, and security through IoT integration and network security [5]. IoT integration simulated smart hospitals automating lighting, HVAC, security, water management, and parking to enhance patient care and efficiency [7]. Shemsi I. showcases the implementation of a smart home system using Cisco Packet Tracer that integrates IoT devices for home automation, emphasising security and environmental management through sensors and microcontrollers [10].

3 Smart Hotel Automation System

Because of the tremendous growth in the tourism and hospitality industry around the world, we propose a smart hotel automation system which controls the appliances like CCTV, air conditioners, fans, doors, lamps, humidifiers, and coffee makers. The proposed system uses motion detectors that activated CCTV recording when the door opened and triggered lamps and the coffee maker upon guest detection. Temperature monitors alternated fan and AC usage based on room temperature, while a humiture monitor controlled the humidifier.

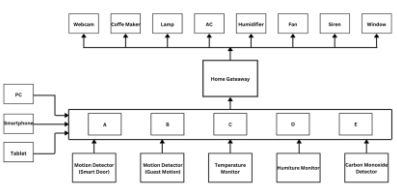

Fig 1. System Architecture

The proposed smart hotel automation system consists of five modules which are further explained in Section 4. All the connected appliances shown in Fig 3 are controlled and monitored through a tablet or PC as illustrated in Fig 2.

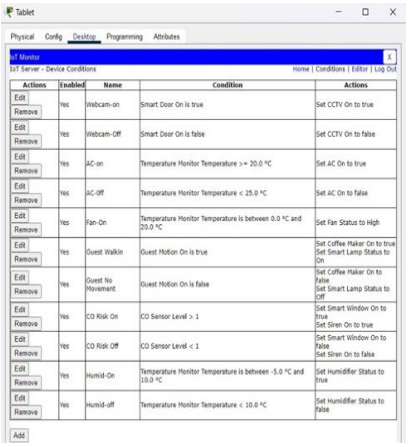

Fig 2. Operational Condition for IoT Devices

Fig 3. Available Devices

4 Experimental Setup And Result Analysis

We use Cisco packet tracer to simulate a smart environment using various sensors, appliances, gateway, laptops, smartphones and IoT server. The network architecture of "Smart Hotel Automation System" is shown in Fig 4.

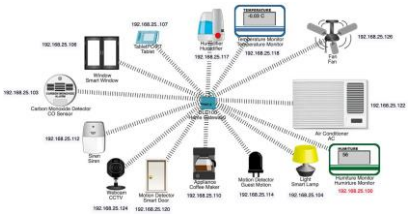

Fig 4. Topology

All appliances are controlled via a tablet connected to the home gateway as shown in Fig 4. Motion sensors and a temperature monitor are included to monitor room temperature and alternately regulate the operation of the air conditioner and fan. A humiture monitor is integrated to activate the humidifier when the temperature decreases. Additionally, a motion detector is implemented to activate lights and appliances when guest motion is detected. A carbon monoxide sensor detects CO leaks, triggering a siren and opening a window for ventilation as seen in Fig 4.

We described various smart devices in the system, listing their IP addresses and the conditions that control their actions in Fig 2. A temperature monitor (192.168.25.118) keeps track of the temperature, while the fan (192.168.25.126) turns on when the temperature lies between 0.0°C and 20.0 °C, and the humidifier (192.168.25.117) activates when the temperature is between -5.0°C and 10.0°C. The air conditioner (192.168.25.122) runs when the temperature is 20.0°C or higher and switches off below 25.0°C. A humiture monitor (192.168.25.100) also tracks both temperature and humidity. The smart lamp

(192.168.25.104) and coffee maker (192.168.25.110) are triggered by guest movement, activating when motion is detected. The smart door (192.168.25.120) and CCTV (192.168.25.124) also respond to motion. For safety, a carbon monoxide sensor (192.168.25.103) detects CO levels, activating both the siren (192.168.25.112) and smart window (192.168.25.106) if CO levels go above 1. A tablet (192.168.25.107) acts as a control panel, helping to manage or monitor these devices. Altogether, these devices create a smart environment that reacts to changes in temperature, humidity, and motion.

The Smart Hotel Automation system demonstrates how automation with IoT can improve the safety, comfort, and productivity of guests in a hospitality environment. The tested core functionalities include motion sensors, carbon monoxide detectors, thermal sensors, and webcams, which were all successfully tested in a simulated setting using Cisco Packet Tracer. Motion-activated webcams enhance security by providing authentication and real-time authorization, restricting building access to authorized individuals and ensuring guest safety. Motion and temperature sensors improve comfort by automating lights, appliances, and climate control. Carbon monoxide detectors ensure safety by triggering alarms and ventilation during gas leaks.

5 Discussions

The Smart Hotel Automation demonstrates how IoT can enhance guest convenience and safety in hospitality environments. By incorporating sensors that automatically respond to environmental changes this system minimises the need for human intervention, creating a responsive and secure environment for hotel guests. Its capabilities effectively reduce risks associated with hazardous situations like elevated carbon monoxide levels, which remain significant threats. Integrating a cloud server for remote management and real-time data monitoring would be a significant advancement for this project. Additionally, cloud integration would extend the technology beyond hotels, making it applicable in both residential and workplace settings. Also implementing encryption at the home gateway level would increase data transmission security, thereby protecting guest information and preventing unauthorised access.

6 Conclusion

The design of the proposed smart hotel automation system employs Cisco Packet Tracer to enhance understanding of automating IoT devices in real-world applications. This prototype serves as a foundational design for implementing appliance automation within the smart hotel. The functionalities of the IoT devices align with those in Cisco Packet Tracer. Mainly, the design includes AC automation for temperature adjustment, fan automation to regulate airflow, carbon monoxide alarm automation for safety, and door automation for secure and seamless entry. Additionally,

other appliances are incorporated into the smart hotel automation system to create a comfortable and efficient environment for guests.

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