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COMPUTER COMMUNICATION NETWORKS

Experiential Learning Report

"Air quality detection and action taken using cisco packet tracer "

Submitted by

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ABSTRACT:

In this project, we propose a system for air quality detection and monitoring using Cisco Packet Tracer. The system utilizes various smart IoT devices such as window/door sensors, carbon monoxide detectors to ensure a safe and healthy environment in homes and buildings. The system is designed to communicate with a home gateway, which then connects to a smart phone application for remote monitoring and control.

The proposed system aims to enhance air quality detection and management by providing real-time data on air quality, temperature, humidity, and carbon monoxide levels. The proposed system has the potential to significantly improve the quality of life and safety for individuals and communities by providing a comprehensive and easy-to-use air quality managementsystem.

The proposed system aims to address the growing concern about air pollution and its negative impact on human health. The system is designed to detect and monitor air quality, temperature, humidity, and carbon monoxide levels in homes and buildings, and provide real-time data to users through a smart phone application. In summary, the proposed system offers a comprehensive and integrated solution for air quality detection and management using smart IoT devices, a home gateway, and a smart phone application. It has the potential to significantly improve the quality of life and safety for individuals and communities by providing a more effective and efficient way to manage air quality.

INTRODUCTION:

Air pollution has become a major concern worldwide due to its negative impact on human health and the environment. Indoor air pollution is also a growing concern, especially in urban areas where people spend most of their time indoors. To address this issue, we propose a system for air quality detection and management using Cisco Packet Tracer, a network simulation tool that can simulate and test networks and devices.

The proposed system utilizes smart IoT devices such as window/door sensors, carbon monoxide detectors to ensure a safe and healthy environment in homes and buildings. The system communicates with a home gateway, which acts as a central hub for all the devices, and a smart phone application, which allows users to monitor air quality in real-time, set alerts for specific conditions, and control the devices remotely.

The system aims to enhance air quality detection and management by providing real-time data on air quality, temperature, humidity, and carbon monoxide levels. The system is also equipped with a system that automatically detects and extinguishes fires, ensuring the safety of the occupants.

The proposed system has the potential to significantly improve the quality of life and safety for individuals and communities by providing a comprehensive and easy-to-use air quality management system. The rest of the paper will discuss the system's architecture, design, and implementation, as well as its benefits and limitations.

The system consists of various smart IoT devices that work together to ensure a safe and healthy environment. These include window/door sensors that can detect when windows or doors are opened, allowing fresh air to circulate, carbon monoxide detectors that can detect dangerous levels of the gas and trigger an alarm that can extinguish fires before they become too large.

The system communicates with a home gateway, which acts as a central hub for all the devices. The gateway is responsible for receiving data from the devices, processing it, and sending it to the smart phone application. The application allows users to monitor air quality in real-time, set alerts for specific conditions, and control the devices remotely.

The proposed system has several benefits. Firstly, it provides a comprehensive and easy-to-use air quality management system that can help individuals and communities to better understand and manage air pollution. Secondly, it can enhance the safety and well-being of occupants by detecting and alerting them to dangerous levels of carbon monoxide and fires. Finally, it can help to reduce energy consumption by automatically adjusting the heating, cooling, and ventilation systems in response to changes in air quality and temperature.

The proposed system is designed to be scalable and flexible, making it suitable for deployment in various settings such as homes, offices, and public spaces. It can be easily customized and expanded to include additional smart IoT devices, sensors, and other components, depending on the specific needs of the user. The system can also be integrated with existing building management systems, HVAC systems, and other devices, making it a valuable addition to any smart home or building.

CIRCUIT:
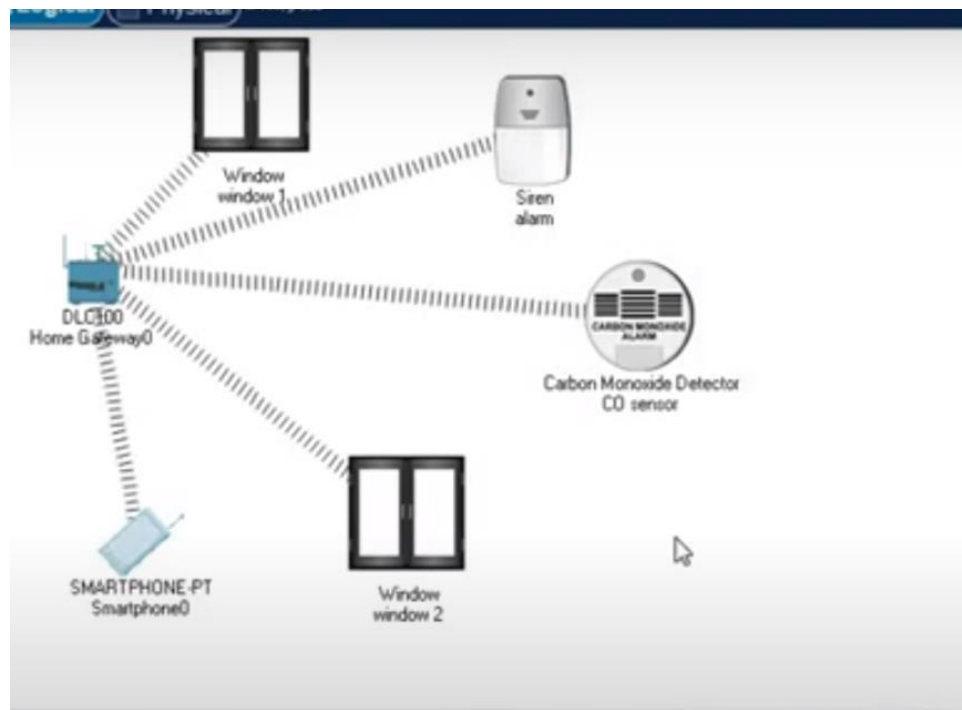
KEY TERMS:

HOME GATEWAY: A home gateway is a network device that acts as a central hub for various smart devices in a home or building. It connects to the internet and manages the flow of data between the various devices and the internet. The home gateway provides several functions, including routing data packets, filtering incoming and outgoing traffic, and providing security features such as firewall and intrusion detection.

In the context of the proposed system for air quality detection and management, the home gateway serves as a central hub for various smart IoT devices such as window/door sensors, carbon monoxide detectors. It receives data from these devices, processes it, and sends it to the smart phone application for monitoring and control. The home gateway also provides a secure and reliable way to communicate with the devices, ensuring that the system is operating efficiently andeffectively.

SMARTPHONE: In the context of the proposed system for air quality detection and management, the smartphone serves as a user interface for monitoring and controlling the various smart IoT devices connected to the home gateway. The smartphone application allows users to view real-time data on air quality, temperature, humidity, and carbon monoxide levels, set alerts for specific conditions, and control the devices remotely. The application communicates with the home gateway using wireless protocols such as Wi-Fi or Bluetooth, allowing users to access and control the devices from anywhere.

The smartphone is an essential component of the system, as it provides a convenient and user-friendly way to manage and monitor air quality in a home or building. The real-time data and control features provided by the smartphone application allow users to take immediate action to address air quality issues and ensure a safe and healthy environment.

WINDOW: In the proposed system for air quality detection and management, a window is a type of smart IoT device that is equipped with sensors to detect changes in the environment such as temperature,

humidity, and air quality. These sensors can detect when a window is opened or closed, and can also monitor the air quality and temperature inside and outside the building.

The data collected by the window sensors is sent to the home gateway for processing and analysis. The home gateway can use this data to determine when to open or close the windows to maintain optimal air quality and temperature levels inside the building. For example, if the temperature outside is cooler than the temperature inside the building, the home gateway can instruct the window to open to allow cooler air to circulate and reduce the need for air conditioning.

Window sensors can also detect when a window is left open for an extended period of time, and can alert the user through the smartphone application. This can help to prevent energy waste and improve the efficiency of the HVAC system.

In summary, windows equipped with sensors are an important component of the proposed system for air quality detection and management. They provide real-time data on temperature, humidity, and air quality, and can be used to optimize the environment inside the building for the comfort and health of the occupants.

DOOR: In the proposed system for air quality detection and management, a door is a type of smart IoT device that is equipped with sensors to detect changes in the environment such as temperature, humidity, and air quality. These sensors can detect when a door is opened or closed, and can also monitor the air quality and temperature inside and outside the building.

The data collected by the door sensors is sent to the home gateway for processing and analysis. The home gateway can use this data to determine when to open or close the doors to maintain optimal air quality and temperature levels inside the building. For example, if the temperature outside is cooler than the temperature inside the building, the home gateway can instruct the door to open to allow cooler air to circulate and reduce the need for air conditioning.

Door sensors can also detect when a door is left open for an extended period of time, and can alert the user through the smartphone application. This can help to prevent energy waste and improve the efficiency of the HVAC system.

In addition to monitoring air quality and temperature, door sensors can also provide security features such as detecting when a door is opened unexpectedly or when there is an attempted break-in. This can help to improve the safety and security of the occupants of the building.

In summary, doors equipped with sensors are an important component of the proposed system for air quality detection and management. They provide real-time data on temperature, humidity, and air quality, and can be used to optimize the environment inside the building for the comfort and health of the occupants, as well as providing security features.

SIREN: In the proposed system for air quality detection and management, an alarm is a feature that is triggered when a potentially hazardous condition is detected, such as a high level of carbon monoxide in the air or a fire in the building. The alarm can be triggered by a smart IoT device such as a carbon monoxide detector and is designed to alert the occupants of the building to the presence of the hazard.

When an alarm is triggered, the home gateway receives a signal from the smart IoT device and sends an alert to the smartphone application. The smartphone application can then display a notification to the user or emit an audible alert to warn the occupants of the building.

The alarm feature is an important component of the proposed system, as it can help to prevent injury or loss of life in the event of a hazardous condition. By alerting the occupants of the building to the presence of a hazard, the alarm can give them time to evacuate the building and seek safety.

In addition to alerting the occupants of the building, the alarm feature can also be used to alert emergency services such as the fire department or paramedics. This can help to ensure a rapid response to the hazard and reduce the potential for damage or injury.

In summary, the alarm feature is an important part of the proposed system for air quality detection and management. It provides a critical safety feature by alerting the occupants of the building to the presence of hazardous conditions such as carbon monoxide or fire, and can help to prevent injury or loss of life.

CARBON DIOXIDE DETECTOR: In the proposed system for air quality detection and management, a carbon monoxide detector is a type of smart IoT device that is designed to detect the presence of carbon monoxide gas in the air. Carbon monoxide is a colorless, odorless gas that is produced by the incomplete combustion of fossil fuels such as gas, oil, or coal. It is toxic to humans and animals in high concentrations and can cause serious health problems or even death.

The carbon monoxide detector is equipped with sensors that can detect the presence of carbon monoxide gas in the air. When a high level of carbon monoxide is detected, the detector can trigger an alarm or send a signal to the home gateway to alert the occupants of the building.

The data collected by the carbon monoxide detector is sent to the home gateway for processing and analysis. The home gateway can use this data to determine when to activate the ventilation system or instruct the occupants to open the windows to reduce the level of carbon monoxide in the air.

The carbon monoxide detector is an important safety feature of the proposed system, as it can help to prevent the harmful effects of carbon monoxide poisoning. By detecting the presence of carbon monoxide gas in the air, the detector can alert the occupants of the building to the potential hazard and allow them to take appropriate action to reduce the risk.

In summary, the carbon monoxide detector is a critical component of the proposed system for air quality detection and management. It provides a safety feature that can help to prevent the harmful effects of carbon monoxide poisoning and protect the occupants of the building.

WORKING :

The system utilizes various smart IoT devices such as window/door sensors, carbon monoxide detectors, to ensure a safe and healthy environment in homes and buildings. These devices are connected to a home gateway, which acts as a central hub for all the devices. The home gateway is responsible for receiving data from the devices, processing it, and sending it to the smart phone application.

The smart phone application allows users to monitor air quality in real-time, set alerts for specific conditions, and control the devices remotely. The application communicates with the home gateway using wireless protocols such as Wi-Fi or Bluetooth, allowing users to access and control the devices from anywhere.

The system is designed to provide real-time data on air quality, temperature, humidity, and carbon monoxide levels. The data is collected from the various sensors and devices connected to the home gateway, and is processed and analyzed to provide insights into the air quality and environment in the home or building.

The system is also equipped with a system that automatically detects and extinguishes fires, ensuring the safety of the occupants.

The proposed system is designed to be scalable and flexible, making it suitable for deployment in various settings such as homes, offices, and public spaces. The system can be easily customized and expanded to include additional smart IoT devices, sensors, and other components, depending on the specific needs of the user.

In summary, the proposed system offers a comprehensive and integrated solution for air quality detection and management using smart IoT devices, a home gateway, and a smart phone application. It has the potential to significantly improve the quality of life and safety for individuals and communities by providing a more effective and efficient way to manage air quality.
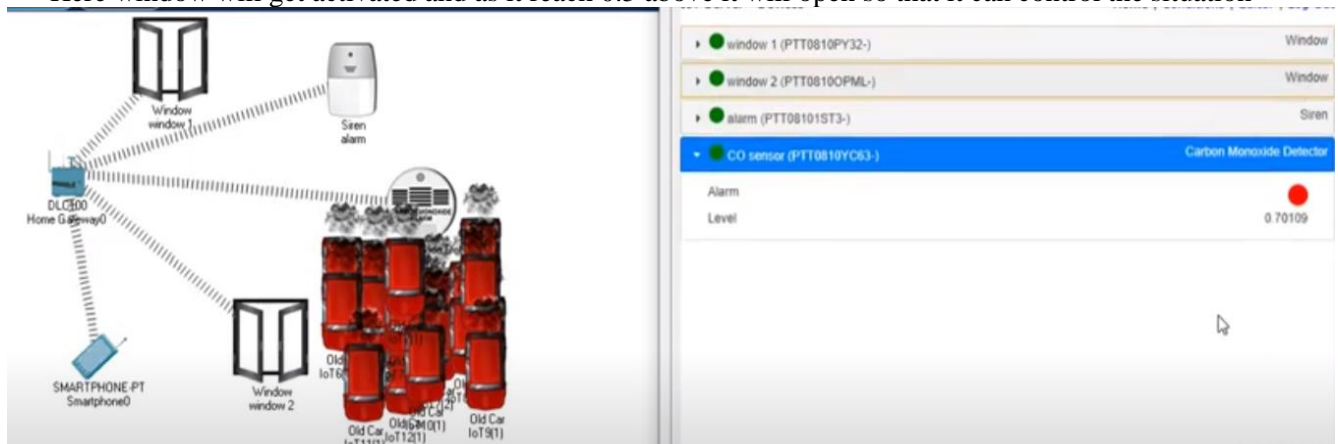
RESULTS:

When carbon monoxide level is less than 0.5:

Since it is no risk condition so no alert is required

When carbon monoxide level is greater than 0.5 but less than 0.7:

Here window will get activated and as it reach 0.5 above it will open so that it can control the situation

When carbon monoxide level is greater than 0.7 but less than 0.9:

Here window, door and siren will get activated and as it reach 0.7 above it will open so that it can control the situation and send alert message so that instant action can be taken
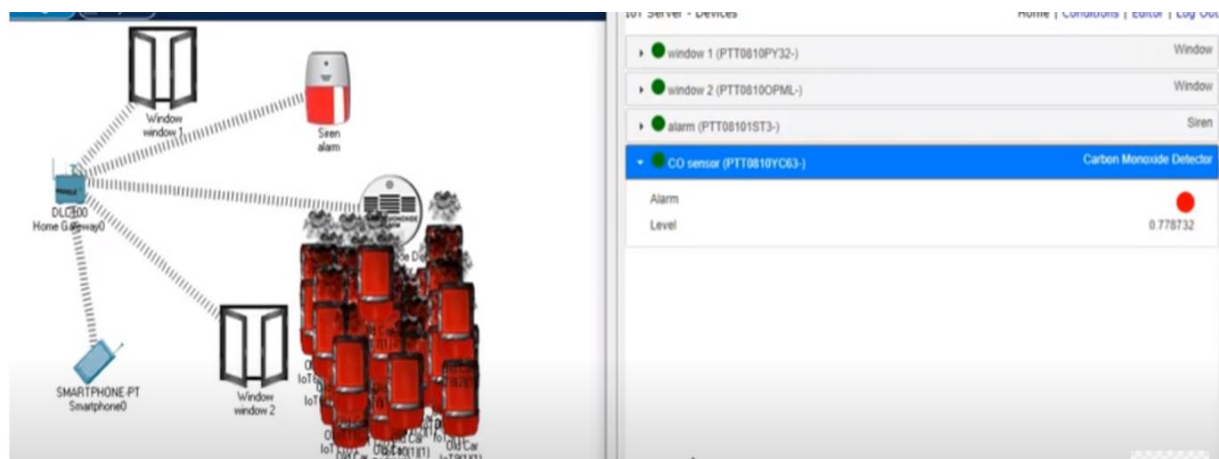
CONCLUSION:

The proposed system for air quality detection and management using a home gateway, smartphone, and various smart IoT devices such as window and door sensors, carbon monoxide detectors, and fire sprinklers has the potential to significantly improve the air quality and safety of indoor environments.

By integrating these smart IoT devices with a home gateway and smartphone, the system can collect and process real-time data on air quality, temperature, and other environmental factors. This data can then be used to make informed decisions about ventilation, heating, and other aspects of indoor environmental management, which can help to reduce the risk of health problems and create a more comfortable living or working space. The smart IoT devices such as carbon monoxide detectors and fire sprinklers provide critical safety features that can help to prevent the spread of fire and reduce the potential for injury or loss of life in the event of a fire or carbon monoxide leak. The proposed system can be easily integrated with existing smart home technologies and devices, making it a cost-effective solution for homeowners, property managers, and building owners. The use of a home gateway and smartphone as central control units for the system provides users with a convenient and user-friendly interface for managing their indoor environment. The system can be customized to meet the specific needs of different environments, such as homes, offices, schools, and hospitals.

The system can also help to reduce energy consumption and costs by optimizing heating and ventilation systems based on real-time environmental data. The implementation of the proposed system can help to address the growing concerns around indoor air quality and its impact on human health, particularly in urban environments where outdoor air pollution is a significant issue. The proposed system can also help to improve the quality of life for people with respiratory illnesses or other health conditions that are exacerbated by poor indoor air quality.

In summary, the proposed system for air quality detection and management using a home gateway, smartphone, and smart IoT devices has the potential to greatly enhance the safety, comfort, and overall quality of indoor environments. Its ability to collect real-time data and make informed decisions about environmental management can help to reduce health risks, energy consumption, and costs, making it a valuable addition to any smart home or building. Overall, the proposed system represents a significant step forward in the development of smart home technology, and has the potential to greatly enhance the safety and comfort of indoor environments