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Department of Computer Science and Engineering
Program: Bachelor of Science in Computer Science and Engineering

Course No: CSE 4264
Course Title: Internet of Things (IOT) Lab

Project Proposal

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Project 1: Smart System for Air Pollution Monitoring with Safe Data Transmission

Project 2: IoT-Based Anti-Theft System for Enhanced Security

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Project 1 Title: Smart System for Air Pollution Monitoring with Safe Data Transmission

Objective:

The objective of this project is to design and develop an IoT-based system that monitors real-time air pollution levels and ensures secure data transmission. The system aims to provide accurate data regarding air quality, enabling authorities to take preventive measures. It will also focus on ensuring safe data communication using encryption techniques to avoid tampering or loss.

The Problem to be Solved:

- Rising pollution levels in urban and industrial areas pose serious risks to public health.
- Traditional methods of monitoring air quality lack real-time data accessibility and secure transmission mechanisms.
- This project addresses the need for an IoT-based system that measures pollution levels, transmits the data securely, and makes it available to stakeholders in real-time.

Features of the Project:

1. Real-Time Monitoring: The system will measure critical pollutants like CO₂, PM2.5, PM10, temperature, and humidity.
2. IoT Integration: Sensors will transmit real-time data to the cloud using microcontrollers such as ESP8266 or Raspberry Pi.
3. Safe Data Transmission: The project will implement encryption methods like AES or TLS protocols to secure the data during transmission.
4. User-Friendly Dashboard: The air quality data will be displayed on a user-friendly dashboard accessible via a web or mobile interface.
5. Alert Notifications: The system will send alerts to stakeholders if pollution levels cross safe thresholds.

Required Equipment:

Hardware: ESP8266 or Raspberry Pi microcontroller, MQ135 Gas Sensor (for CO₂), PM2.5/PM10 Sensor (e.g., SDS011 or similar), DHT22 Temperature and Humidity Sensor, Jumper wires and breadboard, Power Supply, Enclosure Box.

Software: Arduino IDE (for coding), MQTT or HTTP protocol for communication, Cloud Platform (e.g., Thingspeak or Firebase), Encryption Libraries for Secure Transmission

Reference Paper: [An IoT System for Air Pollution Monitoring with Safe Data Transmission](#)

Abstract: Air pollution has become a global issue due to rapid urbanization and industrialization. Bad air quality is Europe's most significant environmental health risk, causing serious health problems. External air pollution is not the only issue; internal air pollution is just as severe and can also lead to adverse health outcomes. IoT is a practical approach for monitoring and publishing real-time air quality information. Numerous IoT-based air quality monitoring systems have been proposed using micro-sensors for data collection. These systems are designed for outdoor air quality monitoring. They use sensors to measure air quality parameters such as CO₂, CO, PM₁₀, NO₂, temperature, and humidity. The data are acquired with a set of sensors placed on an electric car. They are then sent to the server. Users can subscribe to the list and receive information about local pollution. This system allows real-time localized air quality monitoring and sending data to customers. The work additionally presents a secure data transmission protocol ensuring system security. This protocol provides system-wide attack resiliency and interception, which is what existing solutions do not offer.

Project 2 Title: IoT-Based Anti-Theft System for Enhanced Security

Objective:

The objective of this project is to design and develop an IoT-based anti-theft system that detects unauthorized access and alerts users in real-time. The system aims to enhance security for homes, offices, and vehicles by integrating sensors, communication modules, and a user-friendly notification system.

The Problem to be Solved:

- Theft and unauthorized access are increasing concerns for homes, offices, and vehicles.
- Traditional security systems lack real-time alerts and remote monitoring capabilities.
- This project addresses the need for a cost-effective, IoT-based anti-theft system that detects intrusion and sends real-time notifications to the user.

Features of the Project:

1. Motion Detection: The system uses PIR motion sensors to detect any unauthorized movement or intrusion.
2. IoT Integration: Sensors and microcontrollers (e.g., ESP8266 or Arduino) are connected to a cloud server for real-time monitoring.
3. Real-Time Alerts: The system sends notifications via email, SMS, or mobile applications to alert the user about any suspicious activity.
4. Buzzer Alarm System: A loud buzzer activates when intrusion is detected, acting as a deterrent to potential intruders.
5. Remote Monitoring: Users can access and monitor the system remotely via a dashboard or mobile application.

Required Equipment:

Hardware: ESP8266 or Arduino Uno microcontroller, PIR Motion Sensor (for intrusion detection), Buzzer or Alarm Module, GSM Module or Wi-Fi Module (for communication), Power Supply, Jumper wires and breadboard, Enclosure Box

Software: Arduino IDE (for programming), Cloud Platform (e.g., Blynk, Thing speak, or Firebase), Notification APIs (e.g., Twilio for SMS, IFTTT for automation),

Reference Paper: [An Intelligent Anti-Theft Vehicle Locking System using IoT](#)

Abstract: In the present days, chattel crimes are increasing rapidly. Around 10 million cases are recorded annually. Vehicle crime is a predominant criminal activity observed globally. This is causing a panic to the owners of the vehicles in terms of monetary loss and mental agony. To curb this, many researchers have brought out several preventive measures in terms of security during the fleet. The present work is a step towards providing security to vehicles under the control of the owner. The proposed work is implemented by incorporating IoT platforms for the safety and security of the vehicles. The present work is implemented by incorporating a GPS module in the vehicle. Once the vehicle is missing, the owner gets an alert message on the mobile. The message received the geographical location of the vehicle. On receiving the message, the owner enters into the mobile app and clicks on the "STOP" button which locks the engine instantly. The present work is a step towards incorporating security to vehicles from thefts, assisting the owners from huge damages and fleet management. The developed system is the cheap alternative for vehicle security.