IOT BASED VEHICLE THEFT DETECTION AND ENGINE LOOKING SYSTEM

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ABSTRACT

The advancement of smart home technology has revolutionized traditional security measures, offering more efficient and convenient solutions for safeguarding homes and properties. In this project, we propose a smart door lock system that integrates Passive Infrared (PIR) motion detection, a solenoid-based locking mechanism, and an ESP32 Cam module for intruder capturing and remote monitoring. The core components of the system include a PIR sensor, which detects motion in the vicinity of the door, and a solenoid actuator, which controls the locking and unlocking of the door. The ESP32 Cam module serves as the central processing unit, responsible for coordinating the operation of the components and capturing images or videos of intruders. Upon detecting motion, the PIR sensor triggers the ESP32 Cam module to activate the solenoid, thereby locking the door to prevent unauthorized access. Simultaneously, the ESP32 Cam captures images or videos of the intruder using its built-in camera and stores the evidence locally or transmits it to a designated mobile device.
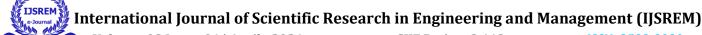
Keywords: Biometric access control, Motion detection, Intruder detection, PIR sensor, ESP32 Cam, Smartphone app control, Solenoid actuator

1. INTRODUCTION

In today's rapidly evolving world, smart home technology has become increasingly prevalent, offering homeowners enhanced convenience, security, and peace of mind. One area where this technology has made significant strides is in the realm of home security systems. Traditional door locks, while effective, often lack the advanced features and capabilities needed to meet the demands of modern homeowners.

In response to this need, we propose a cutting-edge solution: a smart door lock system that utilizes Passive Infrared (PIR) motion detection, a solenoid-based locking mechanism, and an ESP32 Cam module for intruder capturing and remote monitoring. This system combines the latest in sensor technology, electromechanical actuation, and wireless connectivity to create a comprehensive and intelligent security solution for homes.

The primary objective of this smart door lock system is to provide homeowners with a reliable and effective means of protecting their property from unauthorized access. By integrating PIR motion detection, the system can detect movement in the vicinity of the door and respond accordingly, activating the solenoid-based locking mechanism to secure the door.

Furthermore, the inclusion of an ESP32 Cam module adds an extra layer of security by enabling the system to capture images or videos of intruders in real-time. This visual evidence can be invaluable in identifying and apprehending potential threats, as well as providing peace of mind to homeowners knowing that their property is being actively monitored.

In addition to its security features, the smart door lock system offers convenience and flexibility to homeowners. With remote monitoring and control capabilities, users can access the system from anywhere with an internet connection, allowing them to lock or unlock the door and view captured footage using a smartphone or other connected device.

2. LITERATURE SURVEY

1. "Development of a Smart Home Security System Based on Internet of Things (IoT)" by Abdallah et al. (2019)

This paper presents a comprehensive review of IoT-based smart home security systems, including door locks. It discusses various sensor technologies, such as PIR sensors, and their integration with solenoid actuators for door locking mechanisms. The study highlights the importance of remote monitoring and intruder capturing capabilities for enhancing home security.

2. "Design and Implementation of Smart Door Lock System Based on IoT" by Huang et al. (2020)

Huang et al. explore the design and implementation of a smart door lock system using IoT technologies. The paper discusses the integration of PIR motion sensors and solenoid actuators for door locking, as well as the use of ESP32 microcontrollers for wireless communication and control. The study emphasizes the importance of energy efficiency and real-time monitoring in smart door lock systems.

3. "Smart Door Lock System Using IoT" by Saini et al. (2018)

This paper presents a review of smart door lock systems utilizing IoT technologies. It discusses the role of PIR sensors in detecting motion near the door and triggering the locking mechanism. The study also explores the integration of camera modules for intruder capturing and remote monitoring, highlighting the potential benefits for home security.

4. "Implementation of a Smart Door Lock System for Home Security Based on IoT and Android Application" by Parate et al. (2021)

Parate et al. describe the implementation of a smart door lock system using IoT and an Android application. The paper discusses the use of PIR sensors for motion detection and solenoid actuators for door locking. It also explores the integration of ESP32-based camera modules for capturing images or videos of intruders, emphasizing the importance of real-time alerts and remote monitoring for home security.

5. "A Review on IoT Based Smart Lock Systems for Home Automation" by Gupta et al. (2020)

Gupta et al. provide a comprehensive review of IoT-based smart lock systems for home automation. The paper discusses the use of various sensor technologies, including PIR sensors, and their integration with solenoid actuators for door locking. It also explores the role of ESP32-based camera modules for intruder capturing and remote monitoring, highlighting the potential applications in enhancing home security.

These literature sources provide valuable insights into the design, implementation, and applications of smart door lock systems using PIR sensors, solenoid actuators, and ESP32-based camera modules. They highlight the importance of integrating these technologies for enhancing home security, including motion detection, door locking, and intruder capturing capabilities.

3. PROPOSED SYSTEM

3.1 Need of the project

Traditional mechanical door locks can be vulnerable to various security threats, such as lock picking, unauthorized duplication of keys, or physical tampering. A smart door lock system using IoT offers advanced security features, such as encryption, authentication, and remote monitoring, to prevent unauthorized access and enhance overall security. By leveraging IoT technologies, these systems offer advanced features and capabilities that address the evolving security challenges faced by homeowners and provide greater peace of mind.

3.2 Module Description

In a smart door lock system using PIR (Passive Infrared) sensors, solenoid actuators, and an ESP32 Cam module for intruder capturing, each component plays a critical role in ensuring the system's functionality and effectiveness. Here's a detailed description of each module:

3.2.1 PIR Sensor Module:

Functionality: The PIR sensor module is responsible for detecting motion or heat signatures in the vicinity of the door. It operates based on the principle of detecting changes in infrared radiation emitted by moving objects.

Placement: Typically positioned near the door entrance, the PIR sensor module continuously monitors for any movement in its detection range.

Output Signal: When motion is detected, the PIR sensor sends a signal to the microcontroller (e.g., ESP32 Cam module) to trigger the locking mechanism and initiate intruder capturing.

3.2.2 Solenoid Actuator:

Locking Mechanism: The solenoid actuator is used to control the locking and unlocking of the door. When activated, it engages or disengages the locking mechanism to secure or release the door.

Integration: The solenoid actuator is typically connected to the door's locking mechanism and controlled by the microcontroller (e.g., ESP32 Cam module) based on input from the PIR sensor module.

Power Requirements: Solenoid actuators require a brief pulse of electrical current to operate, making them suitable for applications where energy efficiency is a concern.

3.2.3 ESP32 Cam Module:

Central Processing Unit: The ESP32 Cam module serves as the central processing unit of the smart door lock system. It coordinates the operation of the PIR sensor, solenoid actuator, and camera module.

Intruder Capturing: Equipped with a built-in camera module, the ESP32 Cam captures images or videos of intruders when triggered by the PIR sensor. It can store the captured footage locally or transmit it to a designated server or cloud storage for further analysis.

Wireless Connectivity: The ESP32 Cam module supports Wi-Fi connectivity, allowing for remote monitoring and control of the smart door lock system via a smartphone app or web interface.

Alert Notifications: The ESP32 Cam module can be programmed to send real-time alert notifications to the homeowner's smartphone or other connected devices when motion is detected or an intruder is captured on camera.

3.2.4 Power Supply:

Power Requirements: Each module in the smart door lock system requires a stable power supply to operate effectively. This can be provided by batteries, a dedicated power adapter, or a combination of both.

3.2.5 Voltage Regulation:

In some cases, the solenoid actuator may require a different voltage level than what the microcontroller operates on. A relay can be used to regulate the voltage supplied to the solenoid, ensuring compatibility and proper operation of the locking mechanism.

4. CONCLUSION

In conclusion, the smart door lock system utilizing PIR sensors, solenoid actuators, and an ESP32 Cam module for intruder capturing represents a significant advancement in home security technology. By integrating these components into a cohesive system, the smart door lock offers enhanced security, convenience, and peace of mind for homeowners. The PIR sensors detect motion near the door, triggering the locking mechanism controlled by the solenoid actuator. This ensures that unauthorized access is prevented when potential intruders are detected. Simultaneously, the ESP32 Cam captures images or videos of the intruders, providing visual evidence of the intrusion.

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