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## **Theft Detection and Alert System Using PIR Sensor**

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### **ABSTRACT –**

Security is a major concern in today's world, and theft prevention systems play a crucial role in safeguarding valuable assets. This project proposes a Theft Detection and Alert System using a PIR (Passive Infrared) sensor, GSM module, GPS module, LCD display, Arduino Uno, and buzzer to detect unauthorized access and provide real-time alerts. The PIR sensor detects human movement in a restricted area. Once motion is detected, the Arduino Uno processes the signal and triggers a buzzer to alert nearby individuals. Simultaneously, the GSM module sends an SMS alert to the concerned authorities, while the GPS module provides the exact location of the intrusion. The LCD display is used to show real-time status updates of the system. This system is cost-effective, power-efficient, and easy to implement, making it suitable for homes, offices, and industrial security applications. By integrating sensor-based detection with communication technologies, this project ensures enhanced security and quick response to potential threats.

**Keywords - Theft Detection, PIR Sensor, GSM Module, Arduino Uno, Real-Time Alerts.**

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### **INTRODUCTION**

Security has become a critical concern in both residential and commercial spaces due to the increasing risk of theft and unauthorized access. Traditional security measures, such as locks and surveillance cameras, are often insufficient without real-time monitoring and alert systems. To enhance security, modern technology can be leveraged to detect intrusions and provide immediate alerts.

This project focuses on developing a Theft Detection and Alert System using a PIR (Passive Infrared) sensor integrated with Arduino Uno, GSM module, GPS module, LCD display, and a buzzer. The PIR sensor detects motion by sensing infrared radiation emitted by human bodies. When unauthorized movement is detected, the system activates a buzzer to alert people nearby and simultaneously sends an SMS notification via the GSM module. The GPS module helps track the location of the intrusion, while the LCD display provides system status updates.

One of the key advantages of this system is its ability to provide instant alerts and location tracking, which significantly reduces response time compared to conventional security methods. By integrating motion detection, wireless communication, and GPS tracking, the system ensures a highly effective security mechanism that can be remotely monitored. This makes it particularly useful for locations where physical security measures may not be sufficient, such as remote warehouses, unoccupied houses, or high-security zones.

This theft detection system is cost-effective, energy-efficient, and easy to install, making it ideal for both personal and commercial security applications. By leveraging IoT and automation technologies, it ensures enhanced protection against unauthorized access, providing users with peace of mind and improved security management.

By integrating sensor-based detection with real-time communication, this system enhances security and ensures a quick response to potential threats. It is a cost-effective, efficient, and reliable solution suitable for homes, offices, and industrial areas.

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### **LETERATURE REVIEW**

A theft detection system using a PIR (Passive Infrared) sensor detects unauthorized movement by sensing changes in infrared radiation caused by human or animal presence. When motion is detected, the system can trigger alarms, activate cameras, or send alerts to the owner, enhancing security in homes, offices, and restricted areas. It can be integrated with IoT for remote monitoring, making it an effective and automated security solution[1]. Researchers have explored various smart home security methods. Some use ultrasonic or PIR sensors to detect motion and trigger cameras, while others employ ARM-based systems for video surveillance and remote alerts. Networked home automation and smart grids have also been studied for security improvements. Advanced techniques like Gaussian models, wavelet-based detection, and cloud-based monitoring enhance real-time surveillance, ensuring efficient and adaptable security solutions[2]. Several IoT-based theft detection systems using Raspberry Pi have been developed. They commonly use PIR sensors and cameras to detect motion, capture images or video, and send alerts to users via internet or GSM. Some systems also

include features like night vision, alarms, or smart flooring to track movement. These setups are low-cost and ideal for small-area security like homes, offices, or lockers[3]

Security is a major concern, especially when we're away from home. A low-cost system using PIR sensors, Arduino, and a GSM module can detect intruders and send instant alerts via SMS to the owner's phone. Arduino controls the system, while PIR sensors detect motion. GSM enables remote communication, making it an effective and user-friendly home security solution[4]. With embedded systems becoming more common, there's a lot of helpful information available. While working on this project, we learned from books, online articles, and manuals. This helped us understand the basics and made us more interested in the topic. One useful book was Linux for Embedded and Real Time Applications by Doug Abbott, which explained how to build embedded systems using Linux, including setting up the Linux kernel and toolchains. We also learned about ARM processors from The ARM Architecture by Leonid Ryzhyk. ARM processors are small, use less power, and are ideal for embedded systems due to their efficiency and useful feature[5]. In the past few years, many home security systems have been made to stop intruders. Most of these systems use motion sensors and cameras to detect if someone enters the house and then alert the owner. Some systems allow only people with special cards to enter. Others send messages or alerts through apps like Telegram or SMS when someone is detected. Some even let the owner unlock doors using their smartphone. Cameras are used to capture images or videos when motion is detected. Though many systems exist, there's still a need to improve home security. This project uses IoT devices to quickly detect intruders and send alerts to the house owner[6].

This part talks about smart home security systems from past research. One system by Ravi Kishore Kodali can send alerts to your phone if someone is near your door, even if your phone isn't online. You can also control lights or open the door from your phone. Another system by Shaik Anwar uses a motion sensor and camera to spot intruders. It sends their photo by email and makes a sound to warn neighbors. You can also control the door and hear alerts using your smartphone. Both systems help make homes safer using smart technology[7]. Security cameras and sensors help protect homes. Indoor cameras show what's happening inside, and outdoor cameras watch outside areas like doors and driveways. Some cameras let you see the video on your phone. Sensors can tell if a window or door is opened, if glass breaks, if there's smoke from a fire, or if someone is moving nearby. These sensors send a warning to your phone so you know if something is wrong. All of this helps keep your home safe[8]. Many people have created smart security systems using simple tools like motion and pressure sensors. Some systems can quickly spot intruders and use very little power. Others use smart cameras that only record when something moves or help understand what's happening in a room. Some systems can be controlled with a phone app, and some are made to protect things like oil using the internet. One study tested how well sensors can see in different directions, and another talked about the rules needed to keep these systems safe and fair. All these systems try to make homes and places safer in an easy and smart way[9].

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## PROPOSED METHODOLOGY

The proposed theft detection and alert system uses a Passive Infrared (PIR) sensor to detect unauthorized movement and trigger an appropriate response. The system begins by This part talks about smart home security systems from past research. One system by Ravi Kishore Kodali can send alerts to your phone if someone is near your door, even if your phone isn't online. You can also control lights or open the door from your phone. Another system by Shaik Anwar uses a motion sensor and camera to spot intruders. It sends their photo by email and makes a sound to warn neighbors. You can also control the door and hear alerts using your smart phone. Both systems help make homes safer using smart technology

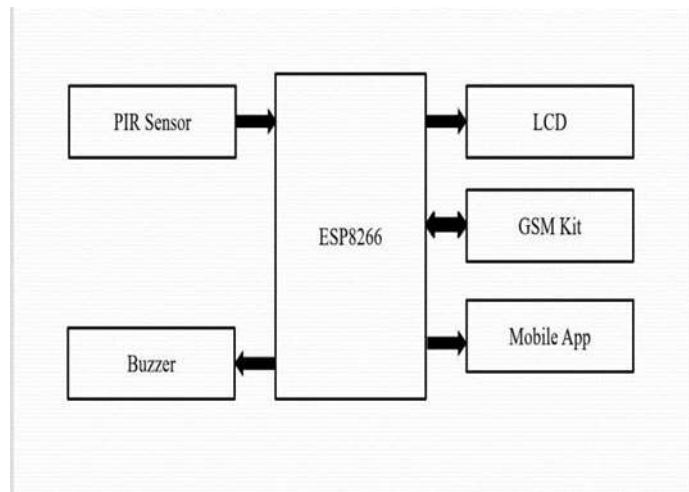
.microcontroller, PIR sensor, and alert mechanisms. The PIR sensor continuously scans the environment for changes in infrared radiation, which occur when a human or warm object moves within its range. This real-time monitoring ensures that any suspicious activity is promptly detected.

Once motion is detected, the PIR sensor sends a signal to the microcontroller, which processes the data to determine if the movement is unauthorized. To minimize false alarms, the system incorporates a predefined threshold and time delay, helping distinguish between actual intrusions and minor disturbances such as small animals or environmental changes. If the detected movement is confirmed as a potential threat, the microcontroller proceeds to activate the alert mechanisms.

The alert system is designed to notify users in multiple ways. It can trigger an audible alarm, such as a buzzer or siren, to deter intruders. Additionally, a visual alert, such as flashing LED lights, can be activated to indicate a security breach. For remote monitoring, the system can send notifications via SMS, email, or a mobile application using GSM, Wi-Fi, or IoT-based communication. This ensures that the owner is immediately informed, even if they are not physically present at the location.

To enhance security, the system can also log motion detection events, allowing users to review past activity. If integrated with a cloud-based platform, the system can provide real-time updates and remote access to security data. After an alert is triggered, the system either resets automatically or requires manual intervention, ensuring that it continues monitoring for any further unauthorized movements. This methodology provides an efficient and reliable solution for theft detection and prevention.

## BLOCK DIAGRAM



**Figure 1. Block diagram of Theft Detection And Alert System Using PIR Sensor**

The block diagram represents a theft detection system using a PIR sensor with an ESP8266 microcontroller as the central processing unit. The PIR sensor detects motion by sensing changes in infrared radiation caused by human movement. When motion is detected, the sensor sends a signal to the ESP8266, which processes the data and triggers the necessary response.

To alert users, the system activates a buzzer that produces a loud alarm, warning of unauthorized movement. At the same time, the LCD display provides real-time status updates, such as "Motion Detected" or "System Active," ensuring that users can visually monitor the system's operation.

For remote security monitoring, the ESP8266 is connected to a GSM kit, which sends SMS alerts to the user when suspicious activity is detected. Additionally, a mobile application is integrated into the system, allowing users to receive notifications and monitor security remotely through Wi-Fi or GSM communication.

This system provides an efficient and automated approach to theft detection, ensuring real-time alerts and enhanced security. By combining motion detection, alarms, and remote communication, it is suitable for homes, offices, and restricted areas requiring high-security measures.

## RESULT



**Figure 2. Model Of Theft Detection system Using PIR Sensor**



**Figure 3. Condition After Detecting The Person.**



**Figure 4. Message After Detecting Person Is Entering In Home.**

The Theft Detection and Alert System Using a PIR Sensor effectively detects unauthorized motion and provides real-time alerts. When the PIR sensor detects movement, the ESP8266 microcontroller processes the signal, activates a buzzer to sound an alarm, and displays a warning message on the LCD. Simultaneously, the GSM module sends SMS alerts to notify users, while the mobile app enables remote monitoring via Wi-Fi or GSM. The system successfully enhances security by offering instant alerts, reducing the risk of theft, and ensuring effective surveillance for homes, offices, and restricted areas.

## CONCLUSION

The Theft Detection and Alert System Using a PIR Sensor provides an efficient and automated security solution for detecting unauthorized movement. By utilizing a PIR sensor, ESP8266 microcontroller, buzzer, LCD display, GSM module, and mobile app, the system ensures real-time motion detection, instant alerts, and remote monitoring. The integration of alarms and SMS notifications enhances security, reducing the risk of theft and unauthorized access.

Overall, the system is cost-effective, reliable, and suitable for homes, offices, and restricted areas, making it a valuable security solution for modern surveillance needs.

## FUTURE SCOPE

1. AI-Powered Detection – AI can help distinguish between human motion and false triggers (e.g., pets or environmental changes), reducing false alarms.
2. IoT Integration – PIR sensors can be connected to mobile apps for real-time alerts, allowing remote monitoring and smart automation

## REFERENCE

1. Mr. Sadhan Godbole and et.al "Review on Theft Prevention System using Raspberry Pi and PIR Sensor"

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2. Mr. Abirami G,Prithvi,and et.al"Thft Detection System using PIR Sensor
  3. Mr .Gorba and et.a l"Thft Detection System"
  4. Mr. Krushna V.Rathod, and et.al"Arduino Uno Based Theft Detection Using Gsm Module"
  5. Mr. Vikrant A. Agaskar and et.al "IOT Based Theft Detection"
  6. Mr. K.Vijaya prabakaran, and et.al "IOT based smart intruder detection system for smart homes"
  7. Miss. Aishwarya B and et.al"Design And Implementation Of Iot Based Intelligent Security System"
  8. Mr. Zipporah Tarus and et.al "PIR Sensor Based Security System"
  9. Mr. K. M. Ramesh Kumar and et.al "Theft Detection and Prevention Based on Internet of Things"