**Security system for home**

**A Project Work Synopsis**

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# Abstract

Keywords:

With the increasing concerns surrounding home security, there is a growing demand for advanced and integrated security systems that can effectively protect homes and their occupants. This paper presents the design and implementation of a comprehensive home security system that leverages modern technologies to provide multi-layered protection. The system encompasses various components such as sensors, cameras, communication protocols, and a central processing unit to create a robust defense against intrusions and emergencies.

The proposed home security system employs a combination of motion sensors, door/window sensors, and glass break sensors to detect unauthorized entry. These sensors are strategically placed around the house to cover vulnerable entry points. Additionally, the system integrates with smart door locks to prevent unauthorized access. In the event of a security breach, the system triggers immediate alerts through both local alarms and remote notifications to homeowners' smartphones.

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# INTRODUCTION

In an era marked by technological advancements and a growing awareness of personal safety, the need for robust and intelligent home security systems has become increasingly evident. Home security is no longer just about locking doors and windows; it is about leveraging cutting-edge technologies to create a comprehensive and proactive defense against potential threats.

The traditional notion of a home serving as a sanctuary from the outside world has been challenged by the rise in burglary, vandalism, and other security breaches. This has led homeowners to seek innovative solutions that can not only deter intruders but also provide real-time alerts and seamless monitoring capabilities.

## Problem Definition

In recent years, the increasing concerns over home security have highlighted a critical challenge that homeowners face in safeguarding their properties and loved ones. Traditional security measures, such as locks and alarms, are no longer sufficient to combat the evolving tactics of intruders and the growing range of security threats. The problem at hand centers around the need for a modern, integrated, and effective home security system that can provide comprehensive protection against unauthorized access, intrusions, and emergencies.

The existing security landscape is plagued by several issues that compromise the safety of homes:

Vulnerability of Entry Points: Traditional locks and basic alarms can be easily bypassed by determined intruders. Vulnerabilities in windows, doors, and other entry points remain exploitable, necessitating more sophisticated solutions.

Remote Monitoring Challenges: Homeowners often lack the ability to monitor their property remotely, especially when they are away on vacation or at work.

Complexity of Operation: Some existing security systems are complex to set up and operate, discouraging widespread adoption and leaving homeowners with insufficient protection due to improper installation or usage.

## Project Overview

Project Overview: Design and Implementation of an Integrated Home Security System

**1. Introduction:**

The Design and Implementation of an Integrated Home Security System project aims to address the increasing concerns over home security by creating a comprehensive and proactive defense against intrusions and emergencies. This project will develop a modern security system that utilizes advanced technologies, such as smart sensors, surveillance cameras, artificial intelligence, and secure communication protocols, to enhance the safety and peace of mind of homeowners.

**2. Objectives:**

The primary objectives of this project are as follows:

Design a multi-layered home security system that covers various entry points and critical areas.

Implement a centralized processing unit to monitor and analyze sensor data and camera feeds in real-time.

Develop algorithms for detecting unauthorized access, intrusions, and potential security breaches.

Create a user-friendly mobile application for remote monitoring and control.

**3. Key Components:**

The project will focus on integrating the following key components into the home security system:

Smart Sensors: Motion sensors, door/window sensors, and glass break sensors strategically placed to detect unauthorized entry.

Surveillance Cameras: High-definition cameras with motion detection and facial recognition capabilities to monitor the property's interior and exterior.

Communication Protocols: Secure communication channels for data transmission between sensors, cameras, and the central processing unit.

Mobile Application: A user-friendly mobile app allowing homeowners to remotely monitor their property, receive alerts, and control the system.

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## 4. Methodology:

## The project will follow these steps:

## Requirement Analysis: Define the specific security needs and user requirements for the system.

## System Design: Create a detailed architecture for the integrated security system, including component placement and communication protocols.

## Hardware and Software Development: Develop and assemble the hardware components (sensors, cameras) and implement the central processing unit's software logic.

## Algorithm Development: Design algorithms for threat detection, facial recognition, and real-time monitoring.1.3 Software Specification

**5. Expected Outcomes:**

A fully functional home security system that offers multi-layered protection against unauthorized access, intrusions, and emergencies.

A user-friendly mobile application that enables homeowners to monitor their property remotely and respond to alerts.

Enhanced data privacy and security through encryption and secure communication protocols.

Improved peace of mind for homeowners, knowing that their property and loved ones are well-protected.

# 6. Conclusion:

# The Design and Implementation of an Integrated Home Security System project aims to revolutionize the concept of home security by leveraging modern technologies to create a proactive and intelligent defense mechanism. Through the integration of smart sensors, surveillance cameras, AI algorithms, and secure communication, this project strives to provide homeowners with the tools they need to ensure the safety of their homes and loved ones.

# Software Specification

1. Operating System
2. User Interface
3. Sensor Integration
4. Camera Integration
5. Notifications and Alerts
6. Software Updates
7. Data Analysis and Threat Detection
8. Encryption and Security
9. Cloud Integration

# 2. LITERATURE SURVEY

## 2.1 Existing System

1. Alarm Systems: These systems include sensors on doors, windows, and other entry points. When these sensors are triggered, they activate a loud alarm to alert homeowners and deter intruders.
2. Motion Sensors: These sensors detect movement within their designated area. If an unexpected motion is detected, they can trigger alarms or send notifications to homeowners.
3. Security Cameras: These cameras can be placed both indoors and outdoors to monitor your property. They can record footage that can be accessed remotely, and some systems even offer real-time streaming.
4. Doorbell Cameras: These cameras are integrated into doorbell systems and provide live video feeds of your doorstep. They allow you to see who's at your door and communicate with them remotely.
5. Smart Locks: These locks can be controlled remotely through a smartphone app. They allow you to lock and unlock doors.
6. Mobile Apps: Most modern systems come with dedicated mobile apps that allow you to monitor your home's security remotely, receive alerts, and control various aspects of the system.
7. Panic Buttons: Some systems include panic buttons that can be pressed in case of emergency to quickly alert authorities.
8. Flood and Water Leak Sensors: These sensors can detect water leaks or flooding, helping to prevent water damage.

When selecting a security system for your home, consider factors such as the size of your property, your specific security needs, budget, and whether you want professional monitoring or prefer a DIY setup. It's also a good idea to choose a system that can be easily expanded or customized as your needs change.

## 2.2 Proposed System

## 1. Smart Alarm System:

## Install door/window contact sensors to detect unauthorized entry.

## Use motion sensors in key areas to detect movement inside the house.

## Integrate glass break detectors to sense the sound of breaking windows.

## Include vibration sensors to detect attempts at forced entry.

## 2. Surveillance Cameras:

## Place outdoor cameras at entry points, driveway, and backyard to monitor activities.

## Install indoor cameras in common areas and key rooms for monitoring inside the house.

## Ensure high-definition video quality and night vision capability for 24/7 coverage.

## Enable remote viewing through a mobile app or web browser.

## 3. Doorbell Camera:

## Integrate a doorbell camera to monitor and communicate with visitors remotely.

## Enable motion detection for alerts when someone approaches the door.

## 4. Smart Locks:

## Install smart locks on main entry points for convenient and secure access.

## Use features like remote locking/unlocking and temporary access codes.

## Integrate with the security system to automatically lock when the alarm is armed.

## 5. Environmental Sensors:

## Include smoke and carbon monoxide detectors for early fire and gas leak detection.

## Integrate water leak sensors to prevent damage from leaks or flooding.

## 2.3 Literature Review Summary (Minimum 7 articles should refer)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Year and**  **Citation** | **Article/ Author** | **Tools/ Software** | **Technique** | **Source** | **Evaluation Parameter** |
| 2018 | (Review On Home Security System)  Pro.Mrs.S.S. Sankpal, Ms. Vijaya Praksah Phalle | Internet of Things (IoT), Raspberry Pi, Wireless Door Control, PIR Sensor. | GPS Location Tracking: The application will track the user's location using GPS and store it on the server. | academia.edu | Cost: Consider your budget for both the initial installation and ongoing monitoring fees. Different security systems have varying pricing structures. |
| 2018 | (A Literature Survey on Smart Home Automation Security)  Rohit Ragmahale | Access Control, Data Security, Smart homes, Intrusion Detection. | SMS Alerts: The application will send SMS alerts to the emergency contacts with the user's location | ijariit.com | Monitoring Options: Decide whether you want professional monitoring, self-monitoring, ora combination of both. |
| 2017 | (Literature Review on Stay off Stealers Home Security System)  Harshal Bhagwat, Kaustubh Akhade | Door Lock Security, GSM, RFID, SMS, buzzer, Biometrics, Password | Security Measures: The application will also provide security measures such as tips for self-defense and emergency contact number. | Research Gate | Equipment: Assess the types of security equipment offered by the system locks. |
| 2019 | (Portable Security Systemfor Women)  Rahul Paknikar  Shrey Shah  Prachi Gharpure | Arduino UNO R3 LCD  GSM Module GPS  Shock generator | Privacy Settings: The application will have privacy settings where users can choose to keep their location and personal information private. | IEE Explore | Privacy Protection,  Safety alerts,  Location  Tracking |
| 2019 | (Safety Assisant And Harassment Prevention for Women)  [Md. Raseduzzaman Ruman](https://ieeexplore.ieee.org/author/37087239295) ,[Joybrota Kumar Badhon](https://ieeexplore.ieee.org/author/37087406792), [Saikat Saha](https://ieeexplore.ieee.org/author/37087408229) | App Development  GPS  Kotlin  GMS Module | Regular Updates: The application will receive regular updates to ensure that it is secure and up-to-date with the latest features. | IEEE Explore | Providing a sense of security,  Emergency  Assistance,  Real-time  location  tracking, |
| 2022 | (A Safety and Security Android Based Application for Women)  Quazi Maliha Masud,  M. Mesbahuddin Sarker | App Development  Kotlin  GSM Module  Java | Feedback and Support: The application will provide a feedback and support system where users can provide feedback and report any issues they may face. | Science PG | Education and  Awareness,  Providing a sense of security,  Emergency  assitance |
| 2020 | (One Touch Alarm for Women Safety)  Arpana Wassan,  Suman,Mr.Ravi shanker | GPS, SMS, Android, Ionic, PHP, Bootstrap, Angular JS, Cordova | Registration and Profile Creation: Users will need to register with the application by providing basic information | IJCRT.ORG | Privacy Protection,  Safety alerts,  Customization |

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# 3. PROBLEM FORMULATION

**Problem Formulation: Designing a Comprehensive Home Security System**

**1. Problem Statement:** Developing an advanced and comprehensive home security system to safeguard the residents, property, and belongings from potential threats and unauthorized access.

**2. Problem Description:** In the modern era, ensuring the safety and security of homes has become increasingly important. The goal of this project is to create a sophisticated home security system that employs a combination of technologies and strategies to deter, detect, and respond effectively to various security risks.

**3. Key Objectives:**

* **Deterrence:** Implement measures that discourage potential intruders from attempting unauthorized access.
* **Detection:** Employ technologies to identify and notify residents about suspicious activities.
* **Response:** Enable real-time responses to threats, ensuring quick and appropriate actions are taken.
* **User-Friendliness:** Design a system that is easy for residents to use and manage, minimizing complexity.
* **Integration:** Ensure seamless integration of various security components and devices.
* **Remote Monitoring:** Allow homeowners to monitor and control the security system remotely.

**4. Components of the Security System:** The security system will consist of multiple components, each serving a specific purpose:

* **Surveillance Cameras:** Strategically placed cameras to monitor indoor and outdoor areas.
* **Motion Sensors:** Detect motion in specified zones and trigger alerts.
* **Door and Window Sensors:** Notify residents if doors or windows are opened or breached.
* **Access Control:** Implement smart locks and entry systems to manage access.
* **Alarm System:** Sound alarms and alert homeowners in case of unauthorized entry or emergencies.

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**5. Challenges:**

* **False Alarms:** Minimize false alarms triggered by pets, environmental factors, etc.
* **Cybersecurity:** Prevent unauthorized access to the system and data breaches.
* **Reliability:** Ensure the system functions accurately and consistently.
* **Scalability:** Design a system that can be expanded as the property's needs evolve.
* **User Privacy:** Address concerns about data collection and surveillance.
* **Compatibility:** Ensure compatibility with various devices and platforms.

**6. Stakeholders:**

* Homeowners: Primary users concerned about home security.
* Security Experts: Professionals responsible for designing and implementing the system.
* Law Enforcement: Beneficiaries of accurate and timely information during emergencies.
* Tech Support: Responsible for assisting users with technical issues.
* Product Manufacturers: Suppliers of the security components.

**7. Evaluation Metrics:**

* **False Positive Rate:** Measure the accuracy of intrusion detection to minimize false alarms.
* **Response Time:** Evaluate how quickly the system responds to threats.
* **Ease of Use:** Assess user-friendliness and accessibility of the system.
* **Reliability:** Measure the system's consistency in functioning without errors.
* **Integration Capability:** Evaluate how well the system integrates with existing infrastructure.

**8. Project Scope:** The scope of the project includes designing, implementing, and testing the hardware and software components of the home security system. It does not include physical installation at users' homes.

**9. Conclusion:** Creating an effective home security system requires a careful balance between technology, user experience, and security. By addressing challenges and meeting objectives, this project aims to provide homeowners with a robust solution to enhance their peace of mind and protect their property

# 4. OBJECTIVES

Setting clear objectives for your home security system is essential to ensure it meets your specific needs and provides the level of protection you desire. Here are some common objectives to consider when implementing a home security system:

1. **Deterrence of Burglaries and Intrusions**:
   * Objective: Prevent unauthorized entry and deter potential burglars or intruders from targeting your home.
   * Key Actions: Install visible security cameras, motion-activated lights, and alarm system signage.
2. **Early Detection and Notification**:
   * Objective: Detect security threats as early as possible to minimize potential damage or harm.
   * Key Actions: Use door/window sensors, motion detectors, and glass break detectors to trigger alarms and send notifications.
3. **24/7 Surveillance and Monitoring**:
   * Objective: Maintain continuous surveillance of your property, even when you're not at home.
   * Key Actions: Opt for professional monitoring services or use remote access to monitor your security system in real-time.
4. **Quick Response to Emergencies**:
   * Objective: Ensure a swift response from authorities (e.g., police, fire department) in case of a security breach or emergency.
   * Key Actions: Choose a security system with fast response times and reliable communication methods to alert emergency services.
5. **Protection of Family and Property**:
   * Objective: Safeguard the well-being of your family members and protect valuable possessions.
   * Key Actions: Install smoke detectors, carbon monoxide detectors, and secure safes for important documents and valuables

# 5. METHODOLOGY

Developing a methodology for implementing a security system for your home involves a systematic approach to ensure that your objectives are met effectively and efficiently. Here's a step-by-step methodology to guide you through the process:

1. **Assessment and Planning**:

a. **Identify Security Needs**: Begin by assessing your specific security needs. Consider factors such as the size and layout of your home, the crime rate in your area, and the vulnerabilities you want to address.

b. **Set Objectives**: Clearly define your security objectives, as discussed in the previous response. Determine what you aim to achieve with your home security system.

c. **Budget Planning**: Establish a budget for your security system, taking into account equipment costs, installation fees, and ongoing monitoring expenses.

d. **Legal and Regulatory Considerations**: Research and understand any local regulations or permits required for security system installations, especially if you plan to install outdoor cameras or alarms.

1. **System Design**:

a. **Select Security Components**: Choose the specific security components that align with your objectives. This may include door/window sensors, motion detectors, security cameras, and environmental sensors (e.g., smoke detectors).

b. **Integration**: If you have other smart home devices, ensure compatibility and plan for integration to create a cohesive smart home ecosystem.

c. **Placement and Coverage**: Strategically place security components to maximize coverage and effectiveness. Consider entry points, high-traffic areas, and blind spots.

d. **Wiring and Connectivity**: Determine the wiring and connectivity requirements for your system. Decide between wireless or wired connections, and ensure reliable power sources.

1. **Equipment Acquisition**:

a. **Purchase Equipment**: Acquire the selected security equipment from reputable manufacturers or service providers. Ensure that the equipment meets industry standards for quality and security.

b. **Professional Installation**: If professional installation is required, schedule an appointment with a qualified technician to set up and configure your security system correctly.

1. **Configuration and Setup**:

a. **Network Setup**: Connect your security system to your home network, ensuring a secure and reliable connection.

b. **System Programming**: Configure the system's settings, including user codes, alert preferences, and notification methods.

c. **Testing**: Test each component of the security system to ensure it functions as expected. Verify that sensors trigger alarms, cameras record properly, and notifications are received.

1. **Monitoring and Response**:

a. **Monitoring Service**: If you opt for professional monitoring, subscribe to a reputable monitoring service that can respond to alarms and emergencies 24/7.

b. **Emergency Contacts**: Provide emergency contact information to the monitoring service and ensure they have clear instructions on how to respond to different types of alerts.

# CONCLUSION

A home security system is a valuable investment for any homeowner. It can help to deter burglars, protect your family and property, and give you peace of mind when you're away from home.

There are many different types of home security systems available, so it's important to choose one that is right for your needs and budget. Some factors to consider include:

Professional installation vs. DIY: Professional installation is more expensive, but it ensures that your system is installed correctly and that all of the components are working properly. DIY systems are less expensive, but they can be more difficult to install and may not be as reliable.

Monitoring: Some security systems come with professional monitoring, which means that a central monitoring station will monitor your system 24/7 and dispatch the police or other emergency services if necessary. Other systems allow you to self-monitor, which means that you will receive alerts if your system is triggered, but you will be responsible for contacting the authorities yourself.

Features: Different security systems offer different features, such as alarms, motion detectors, door and window sensors, smoke and carbon monoxide detectors, and video cameras. Consider which features are important to you and choose a system that has them.

Once you've chosen a security system, be sure to test it regularly to make sure that it's working properly. You should also create a security plan for your home and teach your family members how to use the system.

There are many reasons why a home security system is important. First, it can help to deter burglars. Studies have shown that homes with security systems are less likely to be burglarized. Second, a security system can protect your family and property. If a burglar does break into your home, a security system can alert the authorities and help to catch them. Third, a security system can give you peace of mind when you're away from home. Knowing that your home is protected can help you to relax and enjoy your time away.

## 7. TENTATIVE CHAPTER PLAN FOR THE PROPOSED WORK

**CHAPTER 1: INTRODUCTION**

**CHAPTER 2: LITERATURE REVIEW**

**CHAPTER 3: OBJECTIVE**

**CHAPTER 4: METHODOLOGIES**

**CHAPTER 5: EXPERIMENTAL SETUP**

**CHAPTER 6: CONCLUSION AND FUTURE SCOPE**

## 8. REFERENCES

### 1. Smith, S., & Brooks, M. (2017). Home Automation Security System Using Arduino and GSM. International Journal of Advanced Research in Computer Science, 8(4), 1052-1055.

### 2. Chen, C. W., & Wu, C. H. (2019). Smart Home Security System with Fuzzy Logic and IoT Technologies. IEEE Access, 7, 114437-114448.

### 3. Brown, G. Z. (2017). Home Security Systems: Prevention and Protection. CRC Press.

### 4. Chaudhary, A., & Charaya, S. (2020). IoT-based Smart Home Security System. In Advances in Electronics, Communication and Computing (pp. 33-40). Springer, Singapore.

### 5.Rai, A. K., & Narang, N. (2018). Home security and automation systems using Internet of Things(pp. 1-4). IEEE.

### 6.Pimplaskar, H. R., & Sontakke, T. R. (2019). Home Security System using Raspberry Pi. In 2019 3rd International Conference on Computing Methodologies and Communication (ICCMC) (pp. 125-128). IEEE.

### 7. Aljoumaa, K., & Kezunovic, M. (2018). Home Security System Using IoT Protocols. In 2018 IEEE Electrical Power and Energy Conference (EPEC) (pp. 1-5). IEEE.

### 8. Zhu, Q., & Li, X. (2018). Design and Implementation of Smart Home Security System Based on Internet of Things.(pp. 1467-1471). IEEE.

### 9. Yick, J., Mukherjee, B., & Ghosal, D. (2008). Wireless sensor network survey. Computer Networks, 52(12), 2292-2330.