

Review on Multilayered IOT Based House Security System

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Abstract - This paper proposes an advanced IoT-based house security system comprising three distinct modules designed to enhance overall safety. The first module employs RFID technology for gate automation, where vehicles equipped with RFID cards are recognized by an EM18 module, allowing seamless, secure access to authorized vehicles. This automated system eliminates the need for manual gate control and ensures that only registered cars can enter the premises. The second module focuses on a home locker, which is secured through a three-way authentication process that includes fingerprint recognition, RFID scanning, and a secret key entered via a keypad. This multi-layered approach to locker security ensures that access is granted only when all three authentication factors are successfully provided, greatly reducing the risk of unauthorized access. The third module enhances perimeter security by using a motion sensor to detect unauthorized movement at the back of the house. Upon detecting motion, the system immediately sends an alert to the homeowner's mobile device, enabling timely responses to potential threats. This IoT-based system integrates RFID technology, multi-factor authentication, and real-time mobile alerts to provide a comprehensive and effective security solution for residential settings. .

Key Words: IoT-based security system, RFID technology, Gate automation, Home locker security,

Multi-factor authentication, Fingerprint recognition, Motion sensor, Real-time alerts

1.INTRODUCTION

This paper proposes an advanced IoT-based house security system comprising three distinct modules designed to enhance overall safety [1][4][6]. The first module employs RFID technology for gate automation, where vehicles equipped with RFID cards are recognized by an EM18 module, allowing seamless, secure access to authorized vehicles [7][17]. This automated system eliminates the need for manual gate control and ensures that only registered cars can enter the premises [7][9]. The subsequent module centers around a home storage, which is gotten through a three way confirmation process that incorporates finger impression acknowledgment, RFID filtering, and a mystery key entered by means of a keypad [7][9]. This complex way to deal with storage security guarantees that entrance is conceded just when each of the three verification factors are effectively given, enormously lessening the gamble of unapproved access [9]. The third module upgrades border security by utilizing a movement sensor to distinguish unapproved development at the rear of the house[6]. After distinguishing movement, the framework. promptly sends a caution to the mortgage holder's cell phone, empowering ideal reactions to expected dangers [6]. This

IoT based framework coordinates RFID innovation, multifaceted validation, and ongoing versatile cautions to give an extensive and powerful security answer for private settings [3][7][9]

2.METHODOLOGY

The proposed IoT-based home security framework incorporates three principal parts for thorough wellbeing [1][6][9][14]. In the first place, it utilizes RFID innovation for programmed entryway control, permitting just approved vehicles to enter flawlessly [1][7]. Second, it includes a hearty three-step verification framework for home storage spaces, consolidating finger impression filtering, RFID checks, and a mysterious keypad code to upgrade protection from unapproved access [1][5][9]. Third, movement sensors are set at the back of the house to distinguish uncommon action; upon location, the framework sends ongoing warnings to the property holder's cell phone, empowering fast reactions to likely dangers [1][6][14]. This interconnected framework utilizes IoT innovation to give dependable access control and observation, guaranteeing property holders have a solid sense of safety and in charge of their current circumstance [1][4][15].

Approaches used for building System :

1) Modular Design based approach: The system is built in distinct modules (e.g., RFID access control, authentication for lockers, motion detection) that can operate independently but work together seamlessly [1][10][15].

2) Integration of Sensors and Actuators based approach : Various sensors (e.g., RFID readers, motion sensors) and actuators (e.g., smart locks) are integrated to monitor and control access points in real-time [1][7][9]. 3) User Authentication Mechanisms Based approach: Multiple authentication methods (like fingerprint scanning, RFID card reading, and keypad entry) are combined to enhance security and prevent unauthorized access [1][7][9].

4) Cloud Computing based approach: The system uses cloud services for data storage and processing, allowing for scalability and the ability to analyze security data over time [4][12][19].

5) Machine Learning and Analytics based approach: Data from the system can be analyzed using machine learning to detect patterns and improve the response to potential threats [4][12][19].

6) Remote Monitoring and Control based approach: Homeowners can access the system remotely through mobile applications, receiving real-time alerts and notifications about security events [1][6][9][14].

3.LITERATURE REVIEW

K. Sachine et al. (2023) present a comprehensive study on a Smart Home Security System using IoT technology in their paper titled "SMART HOME SECURITY SYSTEM USING IOT" (DOI: 10.1109/ICCCNT.2023.10307277). The paper emphasizes the integration of IoT devices for enhancing home security, focusing on real-time monitoring, motion detection, and remote control features. The authors discuss the system's architecture, which includes sensors, cameras, and cloud connectivity, ensuring instant notifications and access for homeowners. The study highlights the benefits of IoT-based systems, such as cost-effectiveness, scalability, and automation, while addressing challenges like data security and device reliability. Overall, the paper contributes to the growing body of research on leveraging IoT for smart home applications.

Ahmad Anwar Zainuddin's 2022 paper, "Innovative IoT Smart Lock System: Enhancing Security with Fingerprint and RFID Technology" (DOI: <https://doi.org/10.56532/mjsat.v4i4.335>), explores an advanced IoT-based smart lock system that integrates fingerprint and RFID technology to boost security. The system enables keyless entry, enhancing both convenience and security for users. Zainuddin details the system's architecture, including biometric authentication and RFID

cards, highlighting its robust access control mechanisms. The paper emphasizes the potential of IoT in improving home and office security systems while addressing challenges related to data privacy, scalability, and system reliability. It is a significant contribution to the advancement of IoT security solutions.

In their 2020 paper, "A Smart IoT Security System for Smart-Home Using Motion Detection and Facial Recognition" (DOI: 10.1109/COMPSAC48688.2020.0-132), AKM Jahangir Alam Majumder and Joshua Aaron Izaguirre propose an IoT-based security system that leverages motion detection and facial recognition to enhance smart home security. The system is designed to automatically detect intruders through motion sensors and verify identities using facial recognition technology, providing real-time alerts and remote monitoring capabilities. The authors emphasize the system's efficiency in reducing false alarms and improving response time. They also discuss its scalability and potential for integration with other smart home devices, making it a robust solution for modern security challenges.

In the 2022 paper titled "Improving Home Automation Security: Integrating Device Fingerprinting Into Smart Home" (DOI: 10.1109/ACCESS.2022.2606478), Arun Cyril Jose and co-authors explore the use of device fingerprinting to enhance security in smart home automation systems. The paper discusses how device fingerprinting, which uniquely identifies devices based on their hardware and network characteristics, can be used to authenticate devices in smart home environments. By integrating this technology, the system can detect unauthorized devices and prevent potential security breaches. The authors highlight the advantages of this approach, such as improved accuracy in identifying devices and strengthening overall security, while also addressing challenges like privacy concerns and implementation complexity.

In their 2020 paper, "Systematic Survey on Smart Home Safety and Security Systems Using the Arduino Platform" (DOI: 10.1109/ACCESS.2020.3008610), Qusay I. Sarhan and co-authors present a comprehensive survey of smart home safety and security systems developed using the Arduino platform. The paper examines various Arduino-based applications that enhance home security, such as motion detectors, alarm systems, and access control mechanisms. It provides a detailed analysis of the platform's affordability, ease of use, and flexibility, making it an attractive option for DIY smart home solutions. The authors also discuss the limitations, such as processing power and scalability issues, and suggest future directions for improving Arduino-based security systems.

4.PROBLEMS IN THE PREVIOUS PAPERS

In evaluating these examinations on survey home security, a few key difficulties stick out. One significant issue is information security, as IoT gadgets are helpless against breaks, particularly in cloud-based frameworks. Gadget dependability is likewise a worry, especially with less expensive IoT choices. Protection issues emerge with biometric and RFID frameworks, and similarity difficulties can prevent combination with existing home robotization arrangements. Movement sensors and facial acknowledgment advancements frequently bring about deceptions or misidentification of clients, which can muddle security endeavors. Also, cutting edge innovations will more often than not be expensive and complex, making them less open for normal property holders. Gadget fingerprinting can present security gambles by GPS beacons, and incorporating it into existing frameworks can be actually troublesome. At long last, while Arduino-based frameworks offer a straightforward arrangement, they frequently miss the mark on handling power required for bigger arrangements and are more defenseless to security weaknesses.

5. FUTURE WORK

As we have discussed in the problems, first thing is to combining all the related systems to make an overall system which could work with high efficiency and might perform several task such as Prevention of entry of unauthorized person in the house. We are using raspberry pi for image preprocessing and detecting suspicious activity and human motion for safety purpose.

6. CONCLUSIONS

In conclusion, the advanced IoT-based house security system offers a comprehensive, modern solution to the growing need for enhanced residential safety. By integrating RFID technology for gate automation, multi-factor authentication for home lockers, and real-time alerts through motion sensors, the system provides a robust security framework that minimizes risks and maximizes convenience. Its modular and scalable design ensures it can be tailored to meet diverse security needs, from individual homes to larger communities and businesses. The use of IoT technologies allows for real-time monitoring, remote control, and automation, providing homeowners with peace of mind through 24/7 protection. The system not only improves security but also streamlines everyday operations, offering cost-effective, user-friendly solutions that reduce the need for manual oversight or security personnel. In an era of increasing security concerns and the rise of smart homes, this IoT-based system presents a forward-thinking, reliable approach to safeguarding homes, valuables, and loved ones.

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