Volume 9, Issue 4, April – 2024 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24APR2449

Smart Home Security System Using GSM Module

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Abstract: In this technicle time, the Electronic devices gives us flexibility and makes our life so simple. But along this the crime rate is also increasing a lot. Every person wants to keep their home safe. And day by day the demand for home security system is also increasing. That is why we create a Home Security System which is a cost efficient device. So that every person can bring this device to their home to keep their home safe. The GSM module is a very advance technology in current time. The GSM system mainly used for make a communication. By attaching GSM module in Home Security System we make a advance security system which has the calling and messaging feature. The Home Security System is made by using Arduino Uno, Ultrasonic Sensor, GSM Module, LED, BUZZER, Voltage Regulator Step-Down. If the sensor detect anything immediately it will trigger the alarm. And it will send a signal to Arduino Uno and a call will generate to the user. By our Home Security System everyone can protect their home easily.

Keywords:- *Security System, GSM MODULE, Iot , Smart Home.*

I. INTRODUCTION

In this technical time, the Electronic devices gives us flexibility and makes our life so simple. But along this the crime rate is also increasing a lot. Every person wants to keep their home safe. And day by day the demand for home security system is also increasing. That is why we create a Home Security System which is a cost efficient device. So that every person can bring this device to their home to keep their home safe. The Home Security System is made by using Arduino Uno, Ultrasonic Sensor, GSM Module, LED, BUZZER, Voltage Regulator Step-Down. If the sensor detect anything immediately it will trigger the alarm. And it will send a signal to Arduino Uno and a call will generate to the user. By our Home Security System everyone can protect their home easily.

II. REVIEW STUDY

In the year 2024 Mohankumar et al published a paper on The integration of RFID technology with Arduino microcontrollers revolutionizes home security systems by offering a keyless access solution. By replacing traditional locks and keys, this cutting-edge system enhances convenience and safety. It operates through RFID cards or tags, ensuring only authorized individuals can enter. Arduino coordinates the RFID reader and locking mechanism, simplifying access control. Additional features like smartphone connectivity enable remote access management. The system's advantages include enhanced security, user-friendliness, and access event monitoring. It eliminates the need for manual keys, enhancing residential security management. The system's architecture includes RFID readers, Arduino boards, and electronic locks. Bluetooth-enabled door locks extend convenience, while Arduino Uno facilitates home automation integration. The system can also utilize biometric or smart card authentication for added security layers. RFID-based door locks offer high identification rates and seamless entry experiences. Overall, RFID door lock systems with Arduino integration provide a robust, efficient, and cost-effective solution for bolstering home security.[1] In the year 2024 the author Rajib Kumar Kar published a paper about ensuring women's safety, particularly in regions with high crime rates, is crucial. Current challenges include the lack of reliable public transport and the unavailability of taxis during late hours, making it risky for women to commute alone. Emerging research proposes a fast response strategy to address these concerns by developing a specific security system for women, focusing on microcontroller-based intelligent security. Utilizing components like Arduino Nano, GPS, and GSM modules, this system aims to provide real-time location tracking and immediate communication with predefined contacts during emergencies. Compared to traditional safety devices like stun guns and panic buttons, the proposed system offers several advantages. It provides real-time location tracking and automatic alerting, enhancing user safety. Activation requires minimal manual intervention, ensuring user-friendliness. Additionally, the system's compact and lightweight design makes it easy to carry, ensuring it's always accessible when needed. The hardware implementation involves integrating the Arduino Nano, GSM module, GPS module, battery charger, and push buttons onto a printed circuit board (PCB). The system operates by detecting user input through buttons, tracking their location via GPS, and sending alert messages via GSM to predefined contacts. Results demonstrate successful operation, with the system sending location information and emergency messages upon button activation. Future enhancements may include integrating additional sensors like heart rate monitors for advanced threat detection. Moreover, incorporating cameras could enable capturing and transmitting images of assailants to authorities for immediate action. In conclusion, the proposed system offers a practical and affordable solution to enhance women's safety, particularly in unsafe environments. Its real-time tracking, automatic alerting, and user-friendly design make it a significant improvement over existing safety devices. Future efforts aim to deploy the system in remote areas and enhance its capabilities further to provide comprehensive protection for women.[2] In the year 2023 the author Shikha Gupta et al published a paper about the smart home security

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24APR2449

system described in the paper encompasses various features including intrusion detection, gas leakage detection, automatic lighting control, and fire detection. The system utilizes a range of sensors such as IR sensors for intruder detection, flame sensors for fire detection, LDRs for monitoring light intensity, and gas sensors for detecting gas leaks. These sensors are interfaced with an Arduino Uno board, which serves as the main processing unit. In the event of detecting unauthorized entry, gas leakage, or fire, the system triggers an alarm and sends notifications to the concerned authorities via GSM technology. The notifications are transmitted to authorized mobile phones, providing immediate alerts for prompt action. Additionally, the system incorporates LED indicators, a buzzer for audible alerts, and an LCD display for visual notifications. The system offers several advantages including quick detection of fire and gas leaks, remote monitoring and management of home security, and uninterrupted functionality. However, it may be prone to false alarms and does not directly address extinguishing fires or stopping gas leaks. Nonetheless, it provides valuable early warning capabilities to mitigate potential risks. In conclusion, the described smart home security system offers a comprehensive solution for safeguarding homes against intruders, gas leaks, and fire hazards. Its future scope includes enhancements such as additional sensor modules for broader coverage and integration of voice alarm systems. Overall, the system presents a promising approach to enhancing home security and safety.[3] In the year 2023 the author Manjushree Nayak et al published a paper which discusses the implementation of a smart home security system using advanced technologies such as GSM and Arduino platform. This system aims to provide enhanced security for homeowners by integrating various sensors and control mechanisms to detect and prevent potential threats such as intrusion, gas leakage, and fire hazards. The concept of smart homes, also known as automated homes, is introduced as a means of automating daily tasks and enhancing comfort, security, and convenience for homeowners. Key components of smart home systems include the control of electrical appliances, surveillance of house interiors, and provision of alerts for security breaches such as gas leaks and unauthorized entry through password-protected door lock systems. Home security is identified as a critical concern, particularly with the increasing incidence of criminal activities. The proposed smart home security system addresses this concern by providing a comfortable, convenient, and secure environment through the integration of various sensors and communication technologies. The system is designed to incorporate four types of security measures: human presence detection, door lock security using passwords, gas leakage detection, and smoke detection. In the event of any security breach, such as the presence of an intruder or the detection of gas or smoke, the system triggers alarms and sends notifications to emergency contacts via GSM technology. A detailed literature review is provided, highlighting relevant research on smart home systems, IoT, and big data applications in home automation. Previous studies have addressed various aspects of smart home security, including sensor-based motion detection, IoT-enabled security systems, and wireless communication technologies. The methodology section outlines the design and implementation of the proposed smart home security system. It describes the input devices (sensors, keypad), the microcontroller unit responsible for processing data and controlling devices, the GSM modem for communication, and the final control devices (buzzer, motor driver, etc.).The working principle of the system is explained, detailing how sensors detect human presence, gas leakage, or smoke, and trigger appropriate actions such as sounding alarms or sending alerts via GSM communication. The use of analog-to-digital conversion and comparison with predefined thresholds is highlighted as part of the data processing mechanism. Potential enhancements and future directions for the system are discussed, including the integration of fingerprint-based door lock systems, additional sensor modules for monitoring environmental parameters, and the use of algorithms for localization in wireless sensor networks. In conclusion, the paper presents a comprehensive overview of the design, implementation, and potential applications of a smart home security system. By leveraging advanced technologies such as GSM and Arduino, the system offers homeowners a reliable and effective means of protecting their property and ensuring peace of mind.[4] In the year 2022 author OE Ikpenyi et al published a paper on Construction of GSM based home security alert system using passive infrared sensor. We all now that the security challange around the world is increasing a lot for the crimes as like robberies, theft, and burglary. A security system created by using GSM module, Arduino uno, and a sensor. If the System found any disturbance between the house it will start its work. It will trigger its alarm system and immediately call or send a msg to the owner. BAsicaly the gsm module is for the communication. The whole structure of Home Security System is quite user-friendly and it can protect the home easily.[5] in the year 2022 the author Recy Anne C. Dequiros published a paper on Intrusion Alarm System for Smart Home Protection and Security Using Arduino with SMS Notification. Mainly the system is made by using GSM technology, Arduino uno, and ultra sonic sensor. By using GSM technology we can upgrade our home features like remote monitoring and control various devices and provide us a essential feature that is Home Security System and make our home a smart home. In the current time home automation is growing by using electronic devices by minimizing human interfere. The Home Security System prefered by the user for its safeness and it is more efficient than advance devices. And the alarm system, call and msg feature provide a user attractive solution.[6] In the year 2021 author Md. Abdullah Al Rakib et al published a aper on GSM Based Home Safety and Security System in which it was discussed about The GSM technology can control our whole home appliances, home safety, home security system easily. Basically this technology provides us a remote control method and also provides some feedbacks on the device status by the messages or calls. For home security system we used an Antitheft system, it will report owner through the call or the message. This paper also describe how the GSM module works for different purposes. The main focus of Home Security System is if user is outside of his home and any disturbance found between his home then GSM module directly call that person or send a text message to the user. Basically we use the GSM module

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24APR2449

for making communication between home and the user securely [7]. In the year 2021 the author jamil Alsyaydeh published a paper about the DEVELOPMENT OF PROGRAMMABLE HOME SECURITY USING GSM SYSTEM FOR EARLY PREVENTION. Now a days Home Security System is essential for because of increasing crime around the world. A Home Security System using the GSM module technology has been developed to provide a real-time monitoring capability and send calls and notifications to the user. Basically the project aim is secure home by using GSM technologies, if any disturbance found then provide a call and msg to the user. GSM is a digital technology which is used for data and voice transmission. Over 690 mobile networks providing a real service across 213 countries. The structure of Home Security System Using GSM module structure is different and more reliable and user-friendly than other devices[8]. In the year 2020 the author Eseosa Ehioghae Efe et al published a paper on Design and Implementation of a Mobile-Based Home Security System in which it discusses the design and implementation of a mobile-based home security system using Arduino with ATmega2560 microcontroller, GSM module, and Android mobile application for controlling and monitoring the system. It aims to provide a low-cost, highly configurable solution to enhance home security against illegal intrusion. Various sensors and components are integrated to achieve efficient security measures [9]. In the year 2020 the author Ankita Saxena et al published a paper The content is an article published in the International Journal of Research in Engineering, Science and Management. It describes a novel architecture for a home security and monitoring system using Arduino microcontroller, sensors, and a GSM unit. The system can monitor a house by using different types of sensors that are integrated with a microcontroller and a GSM unit. The system can alert users via mobile phone when it detects a possible intruder into the house. The article also recommends future improvements to the system, such as reducing the time delay to turn ON and OFF of an appliance, adding speech recognition to the system, and expanding the system to 4G and 5G supportable. The article concludes that modern home security systems are capable of providing enough security from burglars, fire, smoke, etc., and they also provide immediate notification to the homeowner to take necessary action through their mobile [10]. In the year 2019 the author Najwa Nasuha Mahzan et al published a paper on Design of Arduino Based Home Security using GSM in which discusses a home security system using Arduino UNO, IR sensors, GSM module, buzzer, and LCD display. The system alerts users via SMS/call when IR sensor detects intruders. Hardware and software design details are provided, including the flow chart and pseudo code. Experiments were conducted to test the system's efficiency, showing LCD display status and SMS notifications. The system aims to enhance security, notify users in real-time, and provide safety for homeowners and residents [11]. In the year 2019 the author Munawir et al published a peper on Wi-Fi and GSM Based Motion Detection in Smart Home Security System in which it discuss about the system which uses WiFi and GSM modules for motion detection in a smart home security system. Components include Arduino, PIR sensor, NodeMCU V3 ESP8266, GSM Module SIM800L, and more. Testing shows the effectiveness of PIR sensor in detecting human body heat radiation. Results indicate successful motion detection and SMS notifications for improved home security. The system can be controlled remotely via an Android device connected to the internet [12]. In the year 2018 the author Leya Laiju et al published a paper on Home Security System, This paper addresses the escalating need for sophisticated home security solutions in today's crime-prone environment. It proposes an affordable, low-power IoT-based system that utilizes Telegram for secure data transmission. Integrating components such as USB webcams, fingerprint readers, and PIR modules, the system offers presence detection, authentication, and alerting capabilities. Raspberry Pi infrastructure, along with Python and Telegram Bot APIs, enables seamless integration and operation. Overall, the system aims to provide effective protection against intrusions and hazards while remaining unobtrusive and cost-efficient. Smart homes, trending today, automate appliances and bolster security through IoT technology. Our project utilizes Raspberry Pi to create an IoT-based security system. Integrated with sensors like PIR sensors, cameras, and fingerprint modules, it detects unauthorized access and triggers appropriate responses. This system aims to minimize manual effort, offering enhanced security features such as access control via fingerprint verification [13].in the year 2018 the author Soumya Johnson et al published a paper on home security system in which it discuss about A home security system comprises interworking components and devices using advanced technology to safeguard entry points like doors and windows. It includes a control panel, sensors, security cameras, and alarms to detect and deter intruders. Internet of Things (IoT) facilitates seamless connectivity and data exchange, enhancing security measures. Implementing IoT in home security eliminates the need for human intervention, offering efficient monitoring and communication capabilities. IoT revolutionizes the security sector by leveraging sensors and internet connectivity to monitor and control devices, enabling seamless environment modification. Home security is a prime application, necessitating cost-effective solutions. This paper focuses on developing a Home Security System using Arduino, integrating USB webcams and IR sensors for presence detection and authentication. The system enhances safety by capturing images and comparing them to a database [14]. In the year 2017 author Anitha A published a paper on Home security system using internet of things in which it discuss about IoT facilitates the connectivity of physical devices to the internet, with home security being a key application. This paper presents an affordable security system for homes and industries. Utilizing Arduino Uno, Reed sensors, a buzzer, and ESP8266 WiFi module, it notifies users of unauthorized entry via internet-connected notifications, offering ease of setup and low maintenance. IoT, or Internet of Things, enables connected physical objects to exchange data autonomously. It gathers information from various sources, allowing objects with IP addresses to transmit data over networks via embedded sensors and hardware. IoT surpasses traditional internet connectivity by enabling

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24APR2449

everyday objects to interact. Originating in 1985, IoT has rapidly expanded, benefiting both manufacturers and consumers with enhanced insights and user experiences [15]. In the year2017 the author Tanaya published a paper on home security system using iot in which it disscuss The advancing technology prompts upgrades in home security, with automation enhancing authenticity. This paper proposes a home security system incorporating face detection and IoT for remote monitoring. Utilizing Raspberry Pi as a standalone controller programmed in Python, it enables seamless communication and control. In today's context, ensuring safety and security is crucial, prompting advancements in home security systems. Leveraging modern technology, automated intelligent security systems are becoming prevalent, utilizing surveillance cameras and sensors for real-time monitoring. With the advent of IoT, which connects physical objects, these systems can transmit data efficiently, facilitating global monitoring and control. This paper focuses on a Raspberry Pi-based home security system, incorporating face detection techniques for enhanced security [16].

III. CONCLUSION

This home security system, built upon the power of a GSM module, transcends the limitations of traditional systems. It empowers homeowners with a mobile guardian that transcends physical boundaries. Imagine receiving an instant SMS alert, complete with the option to remotely activate alarms or view live camera footage, all from the comfort of your smartphone, regardless of your location. This system not only deters and detects intrusions but also fosters a proactive approach to security, allowing you to take immediate action and maintain constant vigilance over your home, even from afar. As technology continues to evolve, the integration of GSM modules in home security systems paves the way for a future where mobility and control are seamlessly woven into the fabric of home security, offering an unparalleled sense of protection and peace of mind.

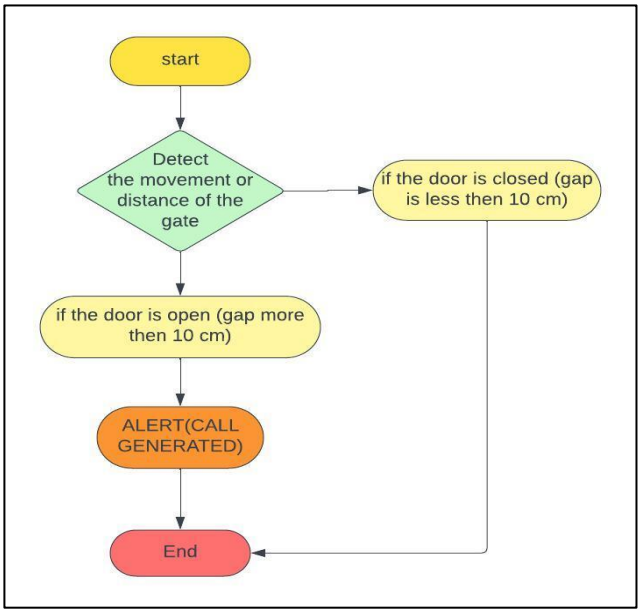

Fig 1 Block Diagram

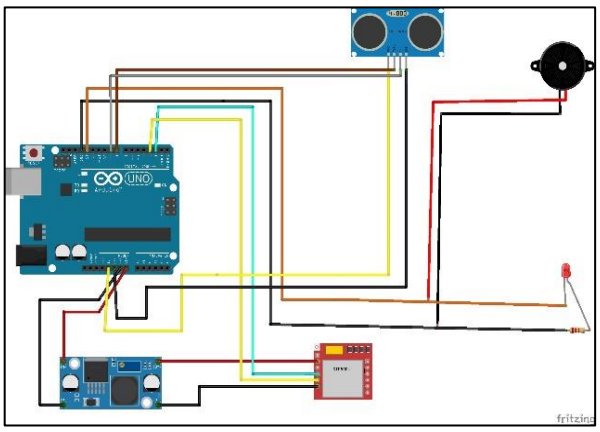

Fig 2 Circuit Diagram

Fig 3 Output

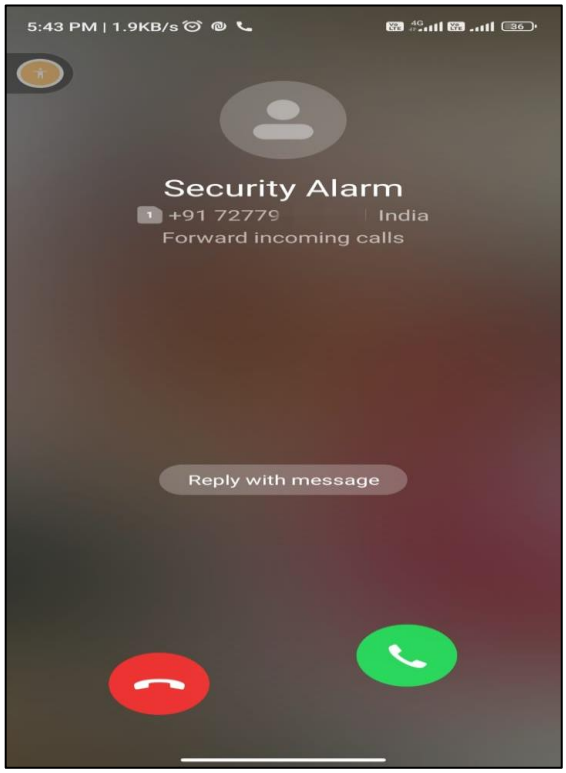

Fig 4 Output

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24APR2449

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