

# A Global System for Mobile Communications (GSM) Module is Using in Smart Home Security Systems

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**ABSTRACT:** Security is a growing concern for everyone. Home security is becoming more and more important in today's world as the risk of infiltration rises daily. Home security systems were created to protect homes from intruders and are necessary for convenience and safety. The problem arises in traditional system such as lack of monitoring of gas leakage, and accidents due to fire in their house. Hence author focusses on the GSM is using in smart home security system which provides using GSM technology, the owner of the house or business receives remote notification through SMS. It concluded that the mobile network has been used in the design and testing of the GSM-based home security system. Through use of GSM technology, the users may get notifications from anywhere, making the system position independent. In future them, they may use a GPRS modem in addition to a GSM modem to connect to the internet and improve our project's IOT potential. The sensor may be linked to an IOT cloud server, as well as the video that is collected may also be transmitted through an internet protocol towards the cloud server.

**KEYWORDS:** Automation, Global System for Mobile Communication, Smart Home Security, Sensor, Technology.

## 1. INTRODUCTION

Global System for Mobile Communications, or GSM. Mobile voice & data services are sent using this digital mobile connectivity. The most extensively used telecommunications system, GSM, is used all across the world. Each 200 kHz channel in the circuit-switched GSM system is divided into eight 25 kHz time slots. In the majority of the world, GSM uses the 900 MHz and 1800 MHz mobile communication frequencies. GSM uses the frequencies 850 MHz and 1900 MHz in the US. Time Division Multiple Access (TDMA) is a narrowband technology used by GSM, which offers basic to sophisticated phone and data services, includes roaming. The ability for using their GSM phone number on a different GSM network is known as roaming. GSM converts data to an electronic form, compresses it, and delivers it across a channel alongside two other streams of user information, each in its own time slot [1], [2]. Home automation is one of the application-based technologies with the fastest global growth rates in the current era of digital technology as well as intelligent systems. As digital but instead wireless technology have been incorporated into houses during the past ten years, the concept of living comfortably in a home has altered [3],[4]. Receiving delivered Short Message Services (SMS) and processing it further as necessary to carry out as many actions is the fundamental idea behind the work. This essay uses a lot of commonly used terms, like GSM (Global System for Mobile Communications), SMS, and others. This service is accessible on the majority of digital mobile phones (also known as a text messaging service). Houses that are totally automated in terms of carrying out a predefined activity, providing feedback to home users, and responding to situations are referred to as intelligent homes [5],[6]. Automated and regulated systems close and distant from the controls are needed for controlled networks and intelligent home security systems, including communication systems, emergency response

systems, as well as theft monitoring systems. Intelligent home security systems are essential in preventing break-ins at access points and tracking unauthorized incursions or activity around the house by adding an extra layer of protection through user authentication [7],[8]. Numerous studies have been conducted on the design of various types of intelligent home security systems, including sensor-based systems that react and contact-based systems that depend on scans of the user's hand or finger to authenticate them.

On a single system, several sophisticated home security systems are built. Intelligent home security system is possible even in faraway locations thanks to GSM technology. Home security has become a need for homeowners over the past several years in order to protect their property from burglars. Therefore, researchers and businesses are working to develop algorithms and grades that will keep your house secure from invaders [9], [10]. This results in contemporary, sophisticated home automation technology, commonly known as home automation system. This technology allows the owner of a home to operate a variety of different items, including the lighting system, lowering, electrical appliances, and more. Instead of a traditional electrical connection, wireless technology is now utilized to operate household appliances. Utilizing GSM technology, messages are sent from appliances to output devices [11]. This implies that the GSM Modem delivers the relevant notification to the home owner's phone after detecting any intrusion. The GSM module digitizes the signals or data that are sent from sensors or other equipment and sends them to the receiver. Numerous studies have been conducted on several types of home security systems, including sensor-based security systems, palm, finger, and figure prints, as well as keypad activation enabling authentication. Every type of security system only employs the GSM module technique.

### *1.1.History of GSM module:*

The concept of home automation has been present since the late 1970s, but as technology and services have developed, so have our expectations of what ought and shouldn't be offered to a household. These expectations have altered significantly over time, and now lean more toward automation systems. There has been a change. Different advantages and applications of cutting-edge contemporary technology are being made available to some of the systems that are built and put into place. A home safe system that keeps an eye on the barriers to touch, heat, smoke, and sound was presented by using a GSM module, it gathers data from the sensor and sends an SMS to the appropriate number. The entire system is controlled by a PIC microcontroller 16F76. Viraj Mali et al. suggested a low-cost system for home automation and security that uses motion sensors and GSM, with Arduino acting as the alarm and alert system and sending signals to the appropriate user through mobile. A Bluetooth-based home automation system created by N. Srikantan and F. Tankarande enables users to operate a variety of Bluetooth-enabled devices in a domestic setting. It has various restrictions that a full home security system does not offer and is too complicated for widespread usage. An access control system that permits authorized people to enter restricted areas and RF wireless communication that communicates have been created by Bhawani Annapurna et al. indications of theft in the homes nearby. The home security alarm system developed by Huang et al. is based on wireless sensor networks and GSM technology. It is made up of a single center nodes module and several data collecting node modules that operate in point-to-multipoint communication mode. This technology gets over geographic restrictions, which raises the cost of operation.

### *1.2. Requirement of Home Security System:*

Everyone's top priority is security. Everybody wants to feel safe in their home. Everyone wants to feel safe and secure from a variety of occurrences, such as robbery in their home, accidents brought on by LPG gas leaks, or accidents brought on by fire in their home. People frequently hear in the news nowadays about theft or home invasions in certain homes, bungalows, and apartments. These thefts or robberies happen while no one is home, yet occasionally we find that robberies happen even when people are home. Another unfavorable report we hear is that explosions or accidents are brought on by LPG gas cylinder leaks. LPG gas is often and widely utilized for culinary purposes in homes. So, an LPG gas cylinder may be found in any kitchen. However, these cylinders might leak LPG gas for a variety of reasons. And as a result of this LPG gas leak, a fire might start or an LPG gas cylinder could possibly explode. Which can harm the home or, in the worst cases, put the lives of those residing there in danger. The possibility of a home fire is another issue or worry. There might be a variety of reasons why this fire started or why the house caught fire. Fires can start for a variety of reasons, including electrical short circuits, candles or oil lamps maintained indoors, or fireworks during festival season. Early identification of each of these issues is crucial.

There are instances when a minor fire is lit, but if sufficient care is not taken to put it out or if appropriate measures are not taken to control it, it might turn into a major catastrophe by spreading throughout the entire home. The same is true for LPG gas leaks; if they are promptly identified and contained, a serious accident can be avoided. Additionally, it would be helpful if we could raise some alarm in the event of a heist. Consider the scenario where we are away from home and theft is occurring. If they learn about a theft in this situation, we can let our neighbors know so they can make noise or take other necessary measures to stop the crime. Let's consider yet another issue: misplacing our house key occasionally. Robbery may occur if we don't change our lock and these keys are discovered by burglars. Almost all know that it takes only a few minutes to make a duplicate key, and that it is simple to duplicate a key. These are the drawbacks of the conventional locking mechanism, which consists of a lock and a key. We have created a GSM-based home security system to address all the aforementioned shortcomings of the current system.

## **2. DISCUSSION**

Since of the dangerous and unsecure security systems for homes, business complexes, and industries, security is a major concern everywhere because thefts are rising daily. To protect residential premises from attackers, a number of conventional methods are available, but the majority of smart home security systems rely on wireless GSM connection.

### *2.1. GSM Modem:*

A GSM modem is a particular kind of modem that functions similarly to a mobile phone by accepting a SIM card and using a mobile operator subscription. A GSM modem resembles a mobile phone from of the standpoint of the mobile operator. Whenever a GSM modem is linked to a laptop, the computer may communicate via the mobile network using the GSM modem. Although mobile internet access is the most common usage for these GSM modems, many of them may also be used to send and receive SMS and MMS messages. A GSM modem could be a standalone

device connected through serial, USB, or Bluetooth, or it might be a mobile phone with GSM modem functionality.

### *2.2. Operation of GSM security system:*

Sensors, an Atmega81 microcontroller, a SIM300 (Gsm modem), a buzzer, an in-system operator, and relays for controlling appliances make up the system's hardware. As input devices, IR sensors and keypads are employed. As output devices, GSM modem, LCD display, and motor driver are employed. Microcontrollers are processing gadgets that receive input and use it to produce information in the form of instructions for other devices to follow. When an IR sensor detects the presence of any human within its range, the entire system begins to function. When a human presence is detected, a signal is sent to the microcontroller, which scans the IR sensor's state and activates the switches upon that keypad and LCD display. The input that must be given by the user to the controller in order for the door to open is shown on the LCD display. The user then uses the keypad to input the necessary data into the controller; in this case, a password must be typed. The LCD display shows the inputted password. If the password is entered correctly, a signal will be sent to the microcontroller, which further instructs the motor driver to open the door, and a signal also was sent to the GSM modem via USART, which notifies the home's owner on the registered phone number about just the presence of someone or around his gate by having to send a predetermined message. If a hacker enters the erroneous password three times, a signal is being sent to GSM through USART to notify registered users of a security alert, and in this instance, the microcontroller instructs the motor driver not even to open the door. This aids in alerting the home's owner to the presence of a familiar individual or an intruder nearby. Here, a serial protocol called USART is utilized for communications between such a microcontroller and a GSM modem. The component used in the operation are:

#### *2.2.1. GSM module*

A GSM module is a particular kind of modem that, from the perspective of the mobile operator, functions just like a mobile phone and takes a SIM card. A computer can utilize the GSM modem for communicate via the mobile network when GSM is linked to the PC. It is employed to facilitate and expedite the development process. It is an ultra-compact wireless module that really can enable voice, data, and fax at 900 & 1800 MHz.

#### *2.2.2. Arduino Controller Unit*

Arduino has been used to control incoming signals from numerous sensors and coupled modules. For creating and managing electronics, there is a physical computing platform called Arduino. It is a free, open-source IDE that enables programmers to analyses and manage electronic signals from connected devices. It has a thriving development community with an 8-bit Atmel AV microcontroller clock speed of 16MHz gratis. The Arduino board comes with a number of features, including a power USB port, a power barrel connector, and a voltage regulator as well as crystal oscillator.

#### *2.2.3. Sensor module*

The sensor module of the system is utilized to identify motion and human presence. The system will turn on the electricity and turn on the GSM linked to the Arduino when movement occurs. The PIR sensor, which is utilized in Arduino, can detect motion whether such a person is within

or outside of its detection range. Humans are not out of options because they are portable, inexpensive, and simple to use IR motion sensors,

#### 2.2.4. Location Monitor

The technology that refreshes the online servers and keeps track of the owner's status is called Location Monitor. With the aid of GPS, it is utilized to administer alarm services. It has a sizable memory where the coordinates are kept. Additionally, the data pusher features a GSM technology for sending data through SMS or GPRS.

### 3. CONCLUSION

The mobile network has been used in the design and testing of the GSM-based home security system. Through the use of GSM technology, the user may get warnings from any place, making the system position independent. AT commands are utilized in the system as a flexible means of exploring and controlling the mobile's services. Only SMS, which has been verified on mobile networks and is compatible with any cell network, is used for domestic communication. We've merged home automation and security into a single project and included an assistance button for an elderly person in it. This will provide optimal energy efficiency and system security by sending a message through GSM modem in the event of unauthorized entry or gas leakage. By automatically adjusting household appliances to the desired settings, energy may be saved. This system is said to be totally automated. As a result, once this system is placed inside a house or business, no human contact is needed for it to function. Humans can save the life of the person inside the house or business by employing this approach. Because fire incidents and LPG gas leaks can endanger lives.

#### REFERENCES:

- [1] J. Dabhade, A. Javare, T. Ghayal, A. Shelar, and A. Gupta, "Smart Door Lock System: Improving Home Security using Bluetooth Technology," *Int. J. Comput. Appl.*, 2017, doi: 10.5120/ijca2017913058.
- [2] *et al.*, "Intelligent Smart Home Automation and Security System Using Arduino and Wi-fi," *Int. J. Eng. Comput. Sci.*, 2017, doi: 10.18535/ijecs/v6i3.53.
- [3] R. F. Al-Mutawa and F. A. Eassa, "A smart home system based on internet of things," *Int. J. Adv. Comput. Sci. Appl.*, 2020, doi: 10.14569/ijacsa.2020.0110234.
- [4] M. Shariqsuhail, G. Viswanathareddy, G. Rambabu, C. V. R. Dharmasavarni, and V. K. Mittal, "Multi-functional secured smart home," 2016. doi: 10.1109/ICACCI.2016.7732455.
- [5] Y. Wang, Y. Zhao, S. Jiang, H. Feng, F. Li, and J. Wang, "Design of the Smart-home Security System based on Cloud Computing," *DEStech Trans. Eng. Technol. Res.*, 2016, doi: 10.12783/dtetr/iect2016/3714.
- [6] A. Aziz, M. H. A. Wahab, A. Mustapha, and M. F. M. Mohsin, "Design and development of smart home security system for disabled and elderly people," *J. Telecommun. Electron. Comput. Eng.*, 2017.
- [7] M. Köhler and F. Wortmann, "Making Security Available for Everyone-Towards a Community-Based Smart Home Security System," *Internet of Things (IOT)*, 2014.
- [8] S. Morsalin, A. M. J. Islam, G. R. Rahat, S. R. H. Pidim, A. Rahman, and M. A. B. Siddiqe, "Machine-to-machine communication based smart home security system by NFC, fingerprint, and PIR sensor with mobile android application," 2017. doi: 10.1109/CEEICT.2016.7873048.
- [9] S. Pandey, S. Gupta, S. Saxena, and D. Tyagi, "Smart Home Security System using IOT," *Int. Res. J. Eng. Technol.*, 2017.
- [10] M. S. Ab-Rahman and M. A. Razaly, "A review of security system for smart home applications," *Journal of Computer Science*. 2012. doi: 10.3844/jcssp.2012.1165.1170.

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- [11] P. Wibowo, S. A. Lubis, . Hermansyah, . Hamdani, and Z. Tharo, "Smart Home Security System Design Sensor Based on Pir and Microcontroller," *Int. J. Glob. Sustain.*, 2017, doi: 10.5296/ijgs.v1i1.12053.