

GSM based Home Security Alert Alarm System using Ardino

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Abstract:- With break-ins and shady stuff happening more than ever these days, it's totally understandable to want our homes to be as safe as possible. And so, the cool article I chanced upon was about a home security system that was like having a watchdog, only much smarter and less furry. And it has something called Arduino. Essentially, the brain of this operation, that's friends with a GSM gizmo so that if something fishy is going on, you'd get a text or a call. Now, the thing's even got a PIR motion sensor, like those laser sensor, in a heist movie, but less Dramatic and more reliable. He catches sight of any unwanted guests and advises you right away. it's kind of like having a little security guard in a box. Easy setup and doesn't break the bank-all thanks to this SIM800A thingamajig. Plus, does not mess with the other home techy gadgets. Well, if one is fussy about ensuring his place is safe, this might just be the ticket.

Keywords:- Home Safety or Security using GSM, Keypad, Arduinio and Servo .

I. INTRODUCTION

An Arduino microcontroller, GSM module, keypad, and servo motor are used in the home security alarm system, which offers a clever and safe method of protecting property. The main functions of this system are to allow or prohibit access to those who are permitted and to notify the homeowner or security staff of any efforts at unauthorized entrance. A keypad for entering passwords is the first step in the setup process. A servo motor that regulates a door's locking mechanism is operated by users entering a predetermined password. The servo motor opens the door and allows entry if the right password is input. On the other hand, if the homeowner enters an erroneous password, the GSM module notifies them of the possible security breach by sending an alarm SMS or calling a pre-specified cell number. Even in isolated locations without internet access, real-time communication is guaranteed by the GSM module. It is set up to respond quickly to emergency notifications and, if necessary, notify several contacts. The Arduino microcontroller functions as the main component, handling keypad input, servo motor control, and GSM module connectivity. The system is appropriate for small-scale

industrial, commercial, and residential applications due to its affordable and small hardware.

These systems have demonstrated efficacy in real-world situations and have been dependable in both academic research and real-world applications. According to research, they are a good substitute for conventional security systems because of their low cost, ease of use, and effectiveness. A mechanical layer of protection is added by integrating the servo motor, guaranteeing both electronic monitoring and physical access control.

II. LITERATURE REVIEW

Again, every now and again, security issues arise in our lives, particularly while we are outside. People have been creating some really cool technological devices in their labs to keep us safe and sound, as we will see in the case of Baballe et al.[1] and his colleagues creating this Internet of Things security alarm that uses a tiny microcontroller called Arduino and a sensor that can detect movement. If a burglar tries to enter discreetly, it will display a show and even send you an SMS about the breach. Next is Albak et al[3]. and his team, who developed a gadget that shows you what's going on in your house using your phone's infrared sensor. It's comparable to having a private A smart home warning buddy that can notify you of irregularities like a fire, gas leak, or burglary was then created by Sarhan et al. and his colleagues, who took it a step further. Because it will send you a message and give you with updates, you can relax knowing that your location is protected. Naturally, RRakib et al[4]. and their team are responsible for somehow enabling you to control your entire home from your phone, even while you're not there. You can check to see if the lights are on or if the door of your refrigerator is left open thanks to some GSM magic. Nwe et al.[5] and his team also had the wonderful idea to mix Bluetooth and home automation to create a very safe home. It appears that your house has a VIP access system. Oyekola et al[10]. and their colleagues built a home security system that was entirely wire-free. They used amazing gadgets like GSM technology, PIR sensors, and ultrasonic sensors to keep things safe. Additionally, Abdullah et al[11]. and his group discussed the significance of home security systems in our communities to ensure everyone's safety and stability without revealing all

of our secrets to the outside world. According to Elimarteena et al[12]. and their associates, there has never been a bigger need for home security systems. Others, including Shankar et al. and his team, used a system that snaps photos whenever someone tries to steal your stuff. They assembled a camera, sensor, and Arduino to detect if someone is moving around when they shouldn't. If something seems wrong, it will SMS you or even call your phone. Lastly, Gupta et al[14]. and his group develop a home security system that incorporates a number of little assistants. Regardless of the location, this employs sensors to detect whether there is a fire, gas leak, or break-in before sounding an alert. It is powered by an Arduino Uno, a gadget that doubles as a tiny computer for your house, and features a small screen to show what's happening. Every day, homes are getting smarter and more safe, so I say thanks to these tech-savvy geniuses.

III. PROPOSED SYSTEMS

Just as we care about our health and the things we use every day, we also worry about security. Security is a major concern in our day-to-day existence. In our highly modern society, technology has given us access to a wide range of tools for everyday use. In light of this, we have developed a security module system that can reduce the worldwide misconduct ratio, particularly with regard to domestic theft crimes. To live a modern life, we have to leave the house every day for a number of reasons. The main function of the device we designed is to provide security while the user leaves the house. The system includes a keypad to receive passwords, a GSM module to communicate with GSM phones, and other components. Keypads are employed for user authentication and control. Usually, it is made of To create a matrix, the buttons are arranged in rows and columns. The user must enter a security code in order to arm or disarm the system. The Arduino Uno will then communicate with the keypad to verify that the user's input is accurate and to send the appropriate signals based on the code entered. A servo motor powers a mechanical locking device, like a door lock or latch. It provides an extra degree of security since it enhances point accesses after the system is armed. The Arduino Uno determines the servo's rotational angle to lock or release the specified point of entry based on user commands or pre-established security measures. Our main facility has the speed, accuracy, and affordability to send to any point inside the GSM network. This will be very helpful when using security frameworks or systems with the help of SMS service on the mobile phone, which is the newest and most practical technology available today. The news is controlled by a security framework and sent in SMS format to the client's mobile device. As a result, an integrated security system is designed to regulate information without requiring a personal computer, making it simpler to quickly and economically manage the state of the house. A connection was established using the C programming language to develop a security system that functions automatically and allows two-way

communication through a client's mobile phone in the event of a home security breach. In the event of a security breach, the ringer is removed via a two-way link once it has completed its operation. included in the design configuration that can only be enlarged to add more sensors for the main structure. The Arduino Uno is an open-source microcontroller platform. The initial part of our setup is the Arduino. In order to call the previously configured smartphone or mobile phone, Arduino then connects to the GSM module and creates a serial transfer connection with the GSM module. The string of integer values that the code has set can be compared to the values that are input on a keypad. The keypad will send a signal and the message "Door Unlocked\" to the serial line. If the codes are accepted, the Arduino will let the servo motor know. The motor then turns 90 degrees to open the lock, allowing the door to be unlocked. Avoiding low output signals that are separated by less time than a predetermined interval is how our Arduino unit is controlled. The implementation of a door lock system that moves and makes simple security calls completed this project.

IV. HARDWARE

A. Controller Unit

The Arduino board functions as the system's main control module. It manages outputs like the servo motor and GSM module and processes inputs from parts like the keypad and PIR sensors. It is perfect for embedded systems because of its simplicity, programmability, and open-source nature. Digital pins for sensor interfacing and serial communication are provided by an Arduino Uno or comparable board for this project, guaranteeing effective completion of duties like message transmission and password verification. It is dependable and reasonably priced due to its usage of the ATmega328P microcontroller, which allows for real-time execution and minimal power consumption.



Fig 1: Arduino

B. A GSM Modem

In the event of unwanted access, the GSM module permits wireless connectivity for making calls or sending SMS alerts. Through serial communication (TX and RX pins), it establishes a connection with the Arduino and transmits commands using AT commands. The GSM module sends alarm messages to pre-specified mobile numbers when the Arduino triggers it. It is essential for communicating security information in real time, especially in places without internet access. It is perfect for these kinds of applications because of its low power consumption and Arduino compatibility.

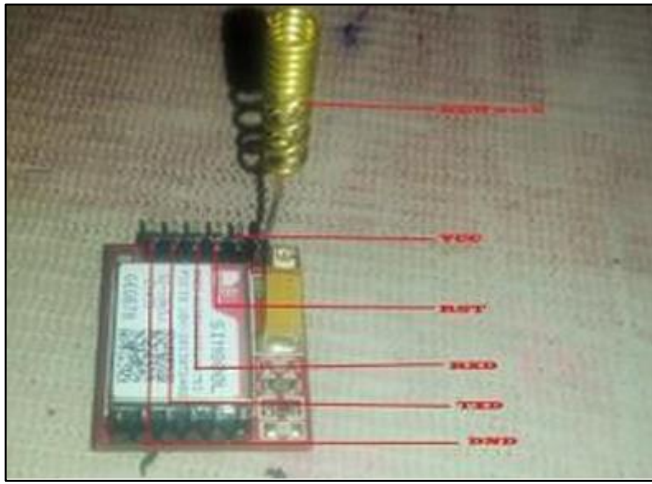


Fig 2: A-6 GSM-750x75

C. A Servo Motor

A mechanical locking mechanism, such as a door lock or latch, is activated after authentication. It enables the Arduino Uno to open and close access points in response to user commands or security programs. Additionally, it forces the entry point that the system has been configured to block.



Fig 3: Servo Motor

D. Matrix keypad, 4x4

Users can enter alphanumeric or numeric passwords using the keypad, a 4x4 matrix input device. It functions by identifying the row and column of the pushed key when connected to the Arduino. The Arduino processes this input and compares it to a password that has been stored. The Arduino operates the servo motor if the input matches; if not, it causes the GSM module to broadcast an alert. Its haptic design guarantees easy-to-use interaction and quick data entry for security systems that rely on passwords.

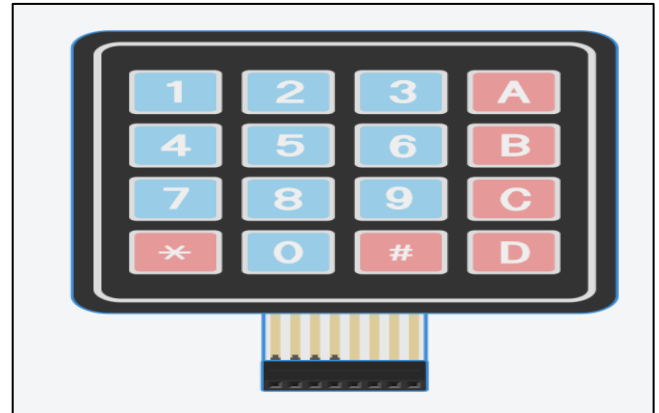


Fig 4: Keypad

E. GSM SIM 800A

A flexible GSM/GPRS module with strong communication capabilities is the SIM800 module. Because it supports quad-band frequencies, it can be used anywhere in the world. The SIM800 module in this system receives commands from the Arduino and uses them to make calls and send SMS notifications. Integration with the Arduino is made easier by its tiny form factor, low power consumption, and support for AT instructions. It also adds a vital layer to the system's performance by guaranteeing dependable and prompt communication during security situations.



Fig 5: SIM 800A Module

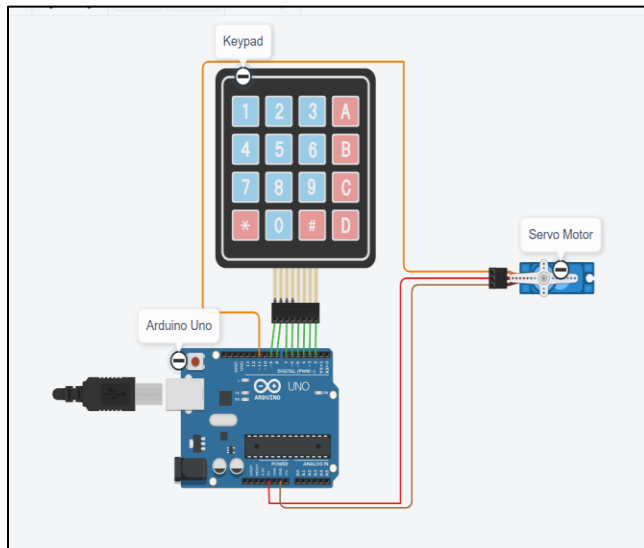


Fig 6: Home Security System

V. SOFTWARE

We used the open-source software business Arduino. The procedure starts with the system setting up a pre-defined password. When a user attempts to unlock the system, they enter a password that is read and compared to one that has previously been created. The system will switch to "Unlocked" when the one entered matches the specified one; in this scenario, the servo motor will activate and unlock the lock to allow entry. If the and the are not equal, the servo motor will shut off, the lock will remain engaged, and it won't unlock. The system is safe because only users who have the correct password can access it.

VI. WORKING

Home Security Alarm Systems are of high importance in modern society in which crime is rising fast to the advancement of technology that we have reached during the last decade, a homeowner needs not to bother much regarding the safety of his home while taking off from his house. Modern home security systems offer an immense amount of protection against burglars, smoke, and fire, etc. It also delivers the alarm instantaneously to the homeowner. This work is designed for creating a simple home security alarming system which is so efficient. The mapped out work of this project about sensing burglars and informing the owner through a phone call. The two parts of the working of this project is as follows.

➤ Part I:

The first portion is where all of the keypad, servo motor, and Arduino connections are made. It inputs the information using a keypad and compares it to an existing password. The GSM module is activated. This project, computer hardware, and user community that develops and maps microcontroller

tools for building digital machines and cooperative objects that can detect and monitor observable and user-programmable substances in the real world. Here, we developed the necessary algorithm for servo motor and cell phone monitoring using the Arduino IDE programming. The Arduino IDE software, which is purchased from the Arduino designer, is used in this system to create the program for the Arduino controller. The Arduino Uno can be controlled by the Arduino software through the integration of the C programming language.

➤ System Design

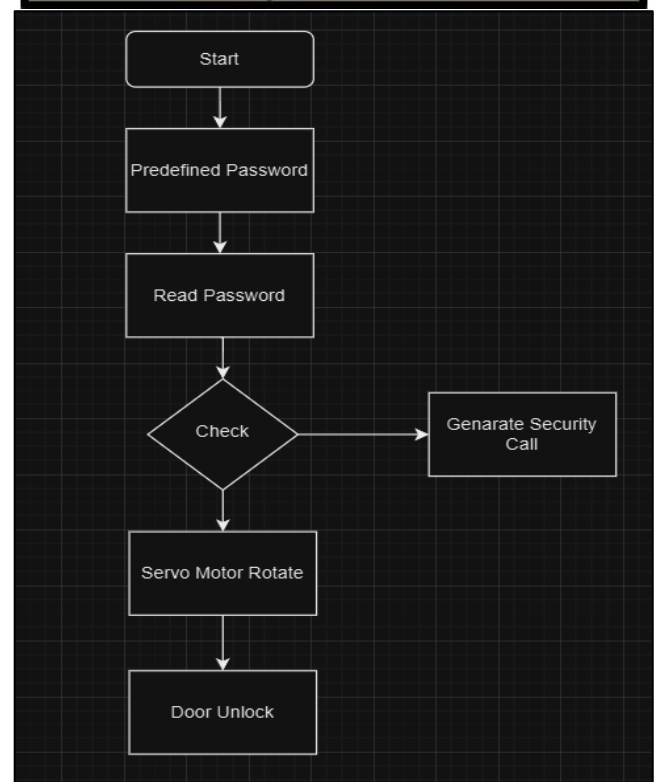
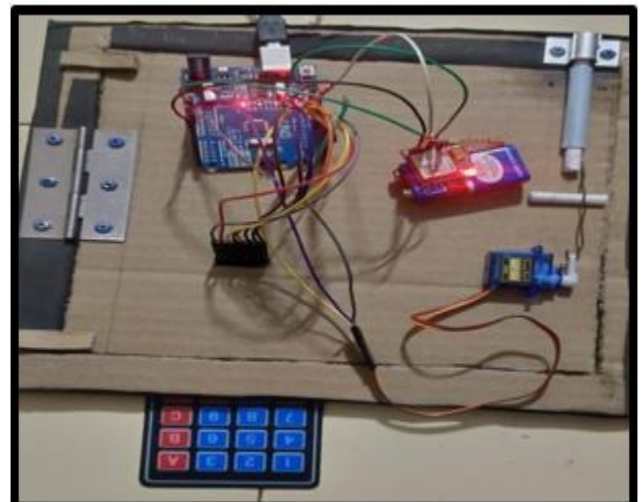


Fig 7: Flowchart of Accepting Input

➤ *Part II*

In a home security alert alarm system using Arduino, the major components that involve interaction and access control of users are the 4*4 keypad and the servo motor. A keypad has 8 pins four rows and four columns. All of them are connected to digital pins on the Arduino. For example, Arduino from pin 2 up to pin 9. The Arduino can use keypad.h to determine what key is being pressed through the intersection of a row and column. The servo motor has its signal connected to one of the PWM pins on the Arduino while the power goes to the 5V pin and the ground to the GND pin. Servo.h sets angle of motor Now one is able to move the door to the lock position ,say at 0° or unlock at say 90°. Once the passcode has been entered via the user key, Arduino compares it with a pre-coded number in its memory. In case of a match, Arduino activates a signal to

rotate the servo motor to the unlock position. In case the passcode does not match correctly for more than a few times, the mechanism associated with the alert such as a buzzer or call generation module gets activated. To produce a call if more than one time wrong password is entered that can be achieved by GSM module, such as SIM800L or SIM900A and connected to Arduino. Using a Tx of the GSM module connected to RX pin of Arduino pin 11, the RX pin connected to TX pin of Arduino, which is on pin 12, and the module's power pins to the 5V and GND pins of the Arduino. To talk to the GSM module in Arduino, the SoftwareSerial.h library is used in order to send AT commands to dial a predefined number. This shall also guarantee a mechanism of realtime alerts in conjunction with features within the security system.

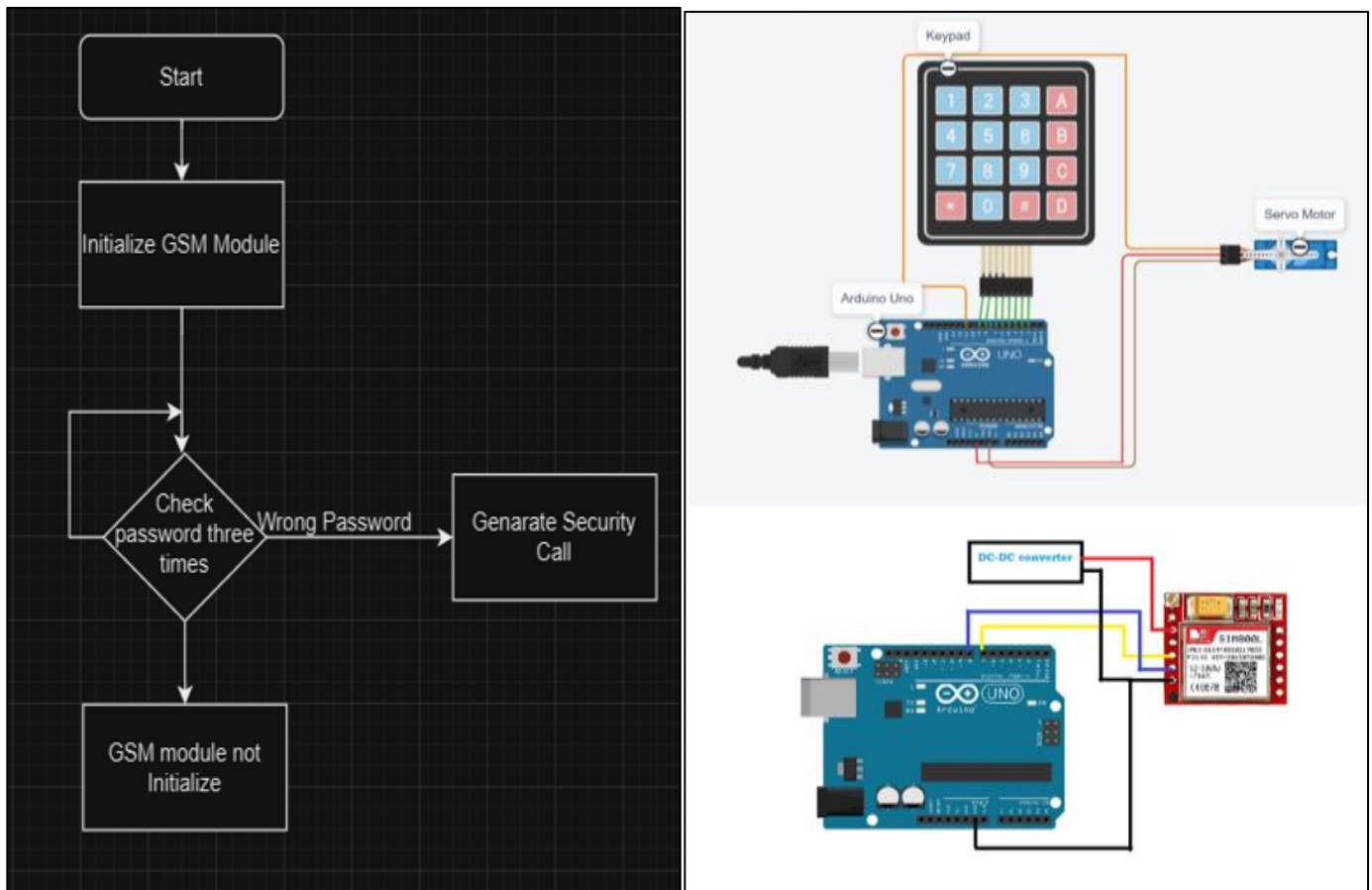


Fig 8: Generation of Security Call

VII. ALGORITHM ANS PSEUDOCODE

- Step 1: Start.
- Step 2: Confirms that each modul performs as planned.
- Step 3: after the password entry.
- Step 4: The SIM800A will then receive a signal.
- Step 5: Checking the balance takes a few minutes after setup.

- Step 6: A call is then generated.
- Step 7: Three rings will be heard on the phone.
- Step 8: If a call is placed to the specified number, the system will stop.
- Step 9: it is generated if the desired number is not called.

➤ Another Phone Call

- Step 10: The procedures from Steps 3 through 9 will be applied.

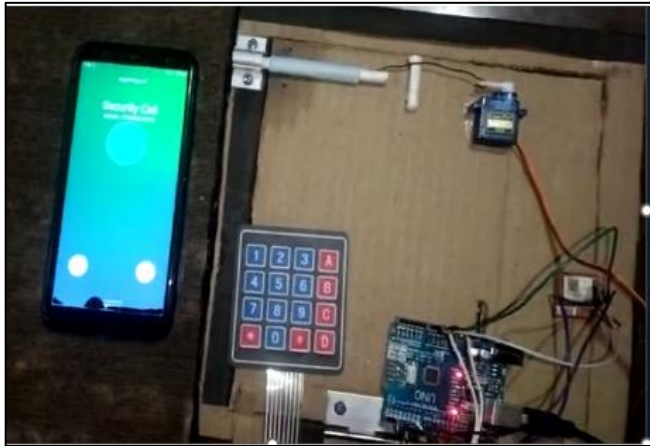


Fig 9: System Architecture

For security reasons, the illustrates how a servo motor is controlled by a password-protected locking mechanism. The system sets a predetermined password at the start of the process. The user is asked to input a password when they try to unlock the system, which the system reads and compares to the pre-established password. If the password entered matches the pre-established password, the system switches to a "Unlocked" state, activating the servo motor and permitting access. This comparison serves as a decision point. The servo motor is kept off and access is denied if the password entered does not match, leaving the system in a "Locked" condition. The system stays in a "Locked" state, turning off the servo motor and preventing access, if the password entered does not match. Only those who have the right password may trigger the servo motor to open the system thanks to this cycle of reading, verifying, and reacting to the password input. When unwanted attempts are made, the lock remains engaged thanks to this methodical process, which offers a secure approach to access control.

VIII. RESULT AND ANALYSIS

After our project is successfully completed, if any pass words are entered incorrectly, calls are made to the GSM Module SIM800L. After a brief period of time to verify that everything is in order, the SIM800L then calls the number we stored in our application.

If the password is valid, a signal will be sent to the servo motor, which will then rotate 90 degrees to unlock the door. Every system will function correctly in our algorithm.

IX. FUTURE PLAN

Figure 7: The overall framework's stream graph, which also demonstrates how to turn on or off by sending an SMS from the client's mobile device. The input obtained through the keypad will be filtered by the home security system when it is turned on. If deterrents are identified, the framework can activate ringer alerts and send an SMS or call to the client's cell phone. Due to our lack and necessity, home security features have shown to be highly desirable in the future. People are becoming increasingly concerned about protecting their homes from unauthorized people. With the use of sensors that may be synchronized with a GSM modem and a microcontroller such as an Arduino, our system is able to screen a residence. When there is a potential disruption, clients might receive an SMS alarm message on their cell phones. Since almost everyone carries a mobile phone these days, the most significant benefit of our work is that clients won't need to carry an additional gadget to monitor their homes thanks to this platform. The effectiveness of this framework can be increased by adding more sensors without altering the structure as a whole. This framework is updated based on measured quality. Therefore, this framework has been regarded as an up-to-date approach and is in line with modern technology. It functions similarly to a segregated home security system in that the client and the framework interact via SMS.

X. CONCLUSION

Home security system that uses GSM as its foundation. Our system will continuously check for input and call the home owner if it detects an incorrect input. We have mapped a servo motor, keypad, Arduino, and a GSM module. An alarm message will only be generated if an unknown or intruder approaches the system and tries different combinations. Other security alarm systems, such as those for fire, smoke, etc., can be added to our system. In this instance, we are unable to complete our system in accordance with our flowchart. We all belong to our group, though, and we firmly feel that this project has taught us a lot. Hopefully, we'll put our complete and final system into place.

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