STUDY OF SMART DOOR MONITORING AND LOCKING SYSTEM USING ARDUINO UNO AND GSM MODULE

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ABSTRACT

Many people have problems with their belongings at home, and most of them have security problems to solve. To protect their house, the door should be locked, and then the house is safe; hence, an attempt has been made here to develop a smart door by using electronic devices like an Arduino and a GSM module. The door function on these devices will indicate whether the door is locked or unlocked, and the GSM module will send an SMS indicating whether the door is locked or unlocked, as well as who is unlocking the door. Another feature is the lamp. For example, the people lock and unlock the door. In some cases, the user thinks that I have locked my house door, but the door is in the unlocked position. By using a lamp, which indicates on and off, the user can see whether the door is locked or unlocked. This system has been successfully developed, and it is suitable for all kinds of houses. In past years, the technology has increased rapidly with this door locking system, and inventions have been made according to the technology. By using more components, the cost will increase, and the user can't afford to buy that device. The device should be low cost with advanced technology, then the user can easily access the device.

KEYWORDS: Arduino, locking system, GSM module, smart door

INTRODUCTION:

Many people use different objects to protect their houses and assets. People give more importance to their valuable things than to their houses. By using this smart door system, people can protect their doors in a safe and secure manner. The key lockers are somewhat safe but not completely; the key lockers are easily broken by thieves and intruders. By using GSM technology, the user gets alert messages, and by doing so, he can easily protect his house. Therefore, by utilising a smart door monitoring and locking system, it is possible to handle this issue by letting people know the lock condition, such as whether it is locked or unlocked, and if the door is open or closed. The lock, door, and lamp states in the house will all be saved by this system. When someone enters the house without first opening the lock or tampering with the appearance, an SMS will be sent to the owner alerting them to the situation. The owner can verify the states by sending an SMS from a mobile phone. This system can also send an SMS to lock and unlock the door and turn on and off the lamp.

LITERATURE SURVEY:

There have been numerous inventions prior to the use of this technology.[1] As the work outlines the development of a GSM-based advanced alert home locker safety security system using the Arduino and GSM module, related works utilising GSM technology and Arduino UNO are provided. GSM and RFID-based back locker security system. Advanced locker security system using GSM, RFID, and password technologies with lock movement that is automatic. Implemented a GSM-enabled home security system the use of a microcontroller. RFID, fingerprint, password, and GSM-enabled locker opening and closing system. Using Arduino and IOT, a smart home automation and security system. The concept was created by the website Ran Dom Nerd Tutorials and involves using an Arduino to operate a 12V bulb through SMS. [2] Use the Arduino platform to lock and unlock doors in three different ways, using a keypad, Bluetooth, and GSM module-based electronic door lock system. These three components are ineffective without a keypad matrix and a four-character password. To unlock a door lock, a Bluetooth kit and password were used to connect a smart phone to it. To unlock his phone, the GSM module was used to text passwords to it. After three unsuccessful password entry attempts, it sends an SMS message about this module and uses the buzzer to warn against unauthorised logins. The locking and opening processes of a door were simulated using a servo motor. The door was operated by a servo motor. It was displayed on a 16X2 LCD. [3] To monitor the door opening operation, a single wrist-worn sensor is proposed. It can track how a person moves their upper limbs as they go about their daily lives. Three subtitles described the entire motion of opening the door: holding, rotating, and opening. These signals can be detected and recognised by the proposed system. A wrist-worn gyroscope data sensor and a 3-axis accelerometer are used in the data collection phase.

PROPOSED METHOD:

The following are the primary units that make up this system.

- Arduino Uno
- Servo Motor
- GSM Module
- Lamp
- Relay
- Door sensor

BLOCK DIAGRAM OF DOOR LOCKING SYSTEM
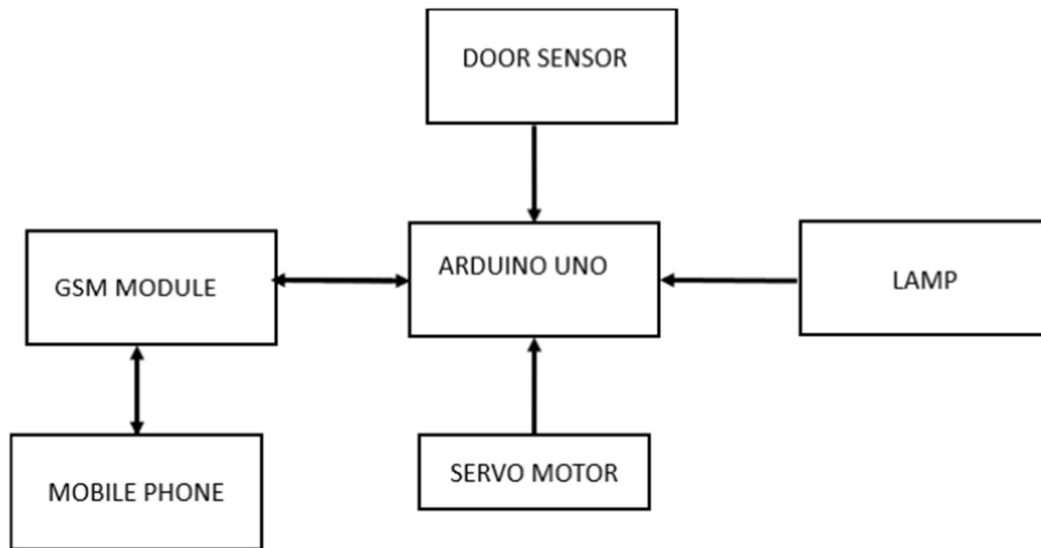
a) Arduino Uno:

The Arduino Uno is a microcontroller. It has 6 analogy pins and 14 digital pins, as well as a USB port for connecting to a PC and the Arduino board, and a power jack for supplying power to the Arduino. Arduino Uno is an open-source platform, and the IDE is used to upload the code to the physical board.
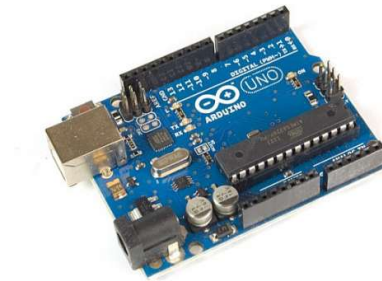
Figure (1)-Arduino Uno

b) GSM MODULE:

A GSM modem created especially for the Arduino UNO, which may be incorporated into numerous Internet of Things projects, is the SIM900 GSM/GPRS shield. This shield can be used to do about everything a typical cell phone including sending and receiving SMS text messages, making, and receiving phone calls, and connecting to the internet through GPRS, TCP/IP, and more! The shield also supports a quad-band GSM/GPRS network, making it virtually universally functional. board for the SIM900

Figure (2)-GSM Module

c) SERVO MOTOR:

A servo motor is a type of rotary actuator that allows for precise angular position control. It is made up of a motor and a position feedback sensor. A servo drive is required to complete the system. The feedback sensor is used by the drive to precisely regulate the rotational position of the motor. This is known as a closed-loop operation. By operating the system closed loop, servo motors provide a high-performance alternative to steppers. The servo motor has the ability to lock and unlock the lock. To unlock the lock switches, turn the servo motor to 0 degrees, and to 90 degrees to lock them.

Figure (3)-Servo Motor

d) RELAY AND LAMP:

Relays are electromechanical or electrical switches that allow circuits to be opened and closed. Relays operate one circuit by opening and closing contacts in another. When a relay contact is set to normally open (NO), it stays open even when the relay is turned off. Normally closed (NC) relay contacts have a closed contact even when the relay is not turned on. An electrical current will change the state of the contacts in either case. If one of the wires is severed, the lamp will be activated and deactivated by the two severed ends connected to the relay. The NC or NO point is located at one end. Break one of the wires and connect the two broken ends to the relay to turn on and off the lamp. One end connects to the NC or NO point, while the other connects to the common (COM) point.
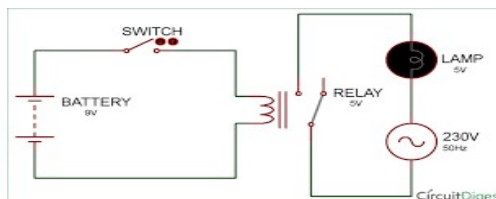

Figure (4)   **Figure (5)**

Figure 4&5-Relay, Relay with Lamp

e) DOOR SENSOR:

The door sensors work when electric current flows through them. When the current flows through it, the door will be opened and closed. When the door is closed, the electric current flows from one end to the other. If anyone opens the door, the electric current doesn't flow. When the door sensor is connected to the Arduino board, it shows 0 when the door is closed and sends 1 when the door is opened.

Figure (6)-Door Sensor

METHODOLOGIES:

The Internet of Things is now widely used (IOT) Almost every aspect of human life is now influenced by technology. Use IOT technology to improve your quality of life. The lock system is one of the areas that has been influenced by the massive IOT development, such as a lock system that can be opened or closed. Closed by entering a password or by using a gadget to control it. The door is a component of the smart home concept, So the lock system becomes an intriguing topic to debate. The document presents a lock system design for like someone is unlocking your door. Every user must keep their house safe. This is an advanced technology compared to previous technologies. in this GSM technology by operating a door without a key. control to open or lock it, which provides comfort and can be used effectively.

The lock system comes in a variety of security configurations utilising IOT technology, for instance,

1. Smart Lock System for Doors using Bluetooth Technology
2. Smart Fingerprint Authentication System

1. Smart Lock System for Doors using Bluetooth Technology:

 [5]. The apparatus makes use of Bluetooth technology as a protocol for communication between the access user and the series of locks. If the user of access is close to the door and uses the lock system, the door will automatically open and the other person will turn around as a result, and the user will not need to take any action. Bluetooth uses less electricity than wireless connectivity. The person with access is in the Bluetooth signal region, while the one without access is in the validation area. The system has not yet given the command to unlock or lock the door, but the condition indicates that the user of access is in the Bluetooth signal area. The door lock is still in the locked position even if the user with no access is present in the validation area because the identity of the user there does not match the identity stored on the server. The function of the door is that, without the need of a mechanic's key, this component allows the door to open and close automatically in response

to a system instruction. The function of the lock control system is the core of the whole SLS design; this component Its purpose was to perform the operation of unlocking or locking the door. Additionally, it serves as a Bluetooth server to look up the user's identification for access near the door lock. Additionally, it serves as the focal point of the communication protocol between the lock system and the access user. The function of the server is to store all of the user's identification and security information that is used as the lock on the lock system.

Figure (7)-Door locking system using Bluetooth technology

2. Smart Fingerprint Authentication System:

[6]. The designated individual enters his fingerprint into the system. The registered person's mobile number is then added to GSM, and this user is assigned a permanent image password. The user must first decide what kind of user they are. Selecting an authorised user is required. Afterward, they must provide their fingerprint to the fingerprint reader. The system verifies if the input fingerprint is registered once the user enters the fingerprint. The system will send an OTP to the fingerprint ID's mobile number if the provided fingerprint is approved. Otherwise, the system goes back to the first page if the provided fingerprint is not approved. After giving the correct OTP or image password, the system will be unlocked. If the input is incorrect three times, the system locks for a set period and a buzzer begins to sound. Or, the system displays a collection of images, and the user must choose one to use a password that is exclusive to him. The system chooses the OTP and picture passwords at random. The system goes back to the first page if the OTP or password is wrong. The unauthorised individual must first select the user type "unauthorised." The admin receives a randomly chosen picture. The person must choose the random image accurately. Otherwise, the system goes back to page one. The following attempt, which is also submitted to the admin, changes the picture password. system checks to see if the selected picture is accurate. If the chosen picture is accurate, the admin receives the OTP. To unlock the system, a person must accurately input the OTP. Otherwise, the system goes back to page one. An unauthorised individual can only perform these tasks by contacting the administrator for security reasons. This option is used for visitor visits, urgent entries, or assistance needs
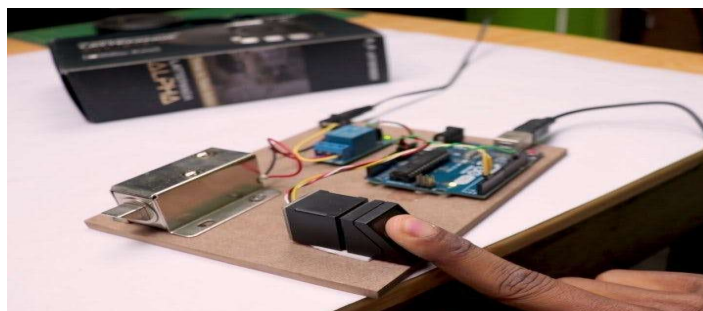
Figure (8)-Door locking system using Fingerprint

CONCLUSION:

By sending the messages to the user, he can easily identify whether the door is locked or unlocked. The user can also use the lamp to check the condition of the door; for example, if the user believes he has locked the door, but it is still unlocked, the lamp will turn on automatically, and the user can lock the door by looking at the lamp.

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