Smart Home Security System

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SMART HOME SECURITY SYSTEM

AMAN SHARMA,
1M.Tech Scholar,
Department of Electronics and Communcation,
RJIT Tekanpur

ANJANA GOEN
Associate Professor
Department of Electronics and Communication,
RJIT Tekanpur

ABSTRACT- Now Technology has spread in every field of our lives. In present era, Everybody is having somekind of connectivity with technology whether in form of mobile, laptop or others. Here we are going to discuss the use of technology in field of home security. In this system, we are using ARDUINO UNO microcontroller board. This system is based on door lock security with the help of 2 high level security passwords and simultaneously the system would be connected with owner's mobile phone through GSM Module So that the owner could open the door from remote location also. When any authorized would try to open the door, he would have to enter 2 passwords when asked to do so. If he enters right passwords then the door will get open. But in case, he enters any of the two or both passwords wrong then the system would get alert and send a message to the owner to ask him whether it is he or not and work accordingly. This system will be guard to Homes, Shops, Banks and institutions etc.

Keywords- Arduino Uno, GSM Module, Solenoid Lock, Home Security, Door Security

I. INTRODUCTION

In present scenario, Security issues are the most mind-boggling situations which have arose in front of every individual. So, in this type of situation, there must be some of the Smart solutions for them. Here in this paper, we are trying to give a very smart solution for the home security. This system protects the houses from unauthorized entry of any unknown and welcomes you and your guests too (when you would not be present at home). This system works on two high level security passwords. These passwords work as the key to authorization and only the person which is aware of these passwords would be able to unlock the door. This system could also be unlocked by the mobile phone by the owner. Whenever, there will be any unauthorized person then this system will send a message to the owner about the situation. If it will be owner or guests then door get unlocked by the permission of the owner. This system will boost the level of security in Homes, Banks and in several other institutions**.**

There are lots of incidents in which crime has happened due to lack of security. Empty homes, banks and other institutions are preferred locations for criminal to perform such crimes. This system is mainly targeted to securing the entry of unauthorized persons with bad intentions to the Home or other institutions. If someone tries to break the security by any mean then this system will also contact to the nearest police station and prevent the risk of theft[7].

Here, Arduino uno board will take care of the overall working of the system as central device. For the working of arduiono we shall have to Enter the desired password, which we want to use at the time of authentication, at the time of programming of the board. Now the Solenoid lock must have to be used in place of a mechanical lock so that it can be operated by the electrical signals[1].

Short messaging service is used as the alternative of the high level security password that is if the owner or user forgot the any of the two password then he might open the lock by using their mobile phone. To enable this service GSM module would also be used which will be connected directly to the Arduino Uno[2]. But this SMS service will be activated only if you entered a wrong password. Some other devices such as temperature sensor, relay board of 12v etc are also used to various purposes discussed in this paper. This system will take care of almost everything related to security in the absence of the owner of the house or banks.

1.2 Hardware Description

In the designing of this system various equipment have been used. This equipmentis Arduino Uno board, GSM Module, Solenoid lock for the doors, Relay board, Temperature sensor, Keypad etc. Now discussing about specifications of the equipments.

A. 1.2.1 ARDUINO UNO BOARD

Arduino Uno is a microcontroller board based on 8bit ATmega328Pmicrocontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button [3].

Here the programming of this board is done with the help of Computer using software Arduino Uno IDE (Integrated Development Environment).

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B. Table 1.1 Specification of the Arduino Uno Microcontroller [12].

Microcontroller	ATmega328P
Input Voltage (Recommended)	7-12 V
Input Voltage (Limit)	6-20V
Digital I/O Pins	14
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB(ATmega328P) of which 0.5KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz

C. 1.2.2 GSM MODULE

GSM is a mobile communication modem; it is stands for global system for mobilecommunication (GSM). GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands [13].

Designed for global market, SIM800 is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS

1900MHz. SIM800 features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24*24*3mm, SIM800 can meet almost all the space requirements in users' applications, such as M2M, smart phone, PDA and other mobile devices [4],[14]. The power supply to the board should be 12v, 1-2A

D. 1.2.3 SOLENOID DOOR LOCK

Solenoids are basically electromagnets: they are made of a big coil of copperwire with an armature (a slug of metal) in the middle. When the coil is energized, the slug is pulled into the centre of the coil. This makes the solenoid able to pull from one end.12V DC (can use 9-12 DC volts, but lower voltage results in weaker/slower operation) is used for its operation. It draws 650mA at 12V when activated. It is designed for 1-10 seconds long activation time [9].

Solenoid lock is connected to the Arduino board through Relay board. Here relay board is used to give ac supply to the solenoid so this could generate electromagnetism and lock may function its work[15].

1.2.4 TEMPERATURE SENSOR

This device is used to detect the temperature variation in the house or ininstitutions. This device will detect the temperature in case of fire or other critical situations. If a high level of temperature will be detected in the house then this device will contact the owner immediately[12].

In this system, Arduino Uno board is to be used as the programming of Arduino is simpler by the use of Arduino Uno IDE(integrated developmentEnvironment). Now all these devices must be connected to the Arduino and Tx and Rx must be defined to the Arduino with the help of programming.Power supply would be given to GSM module and Relay board[6].

E. 1.3. Methodology

After making appropriate connections, the system is ready to perform operation. In this system, we are using two high level passwords to the authentication of the owner. When owner enters the two passwords with help of keypad, two situations might arise-

1. If both the passwords are correct in such situation Arduino will match them with the password given in programming and immediately send signals to the

solenoid lock to get open. As solenoid lock get the signal a 12V ac current will pass through the copper coin which induce megnetism to open the lock. and then the door lock will get unlocked immediately and Owner can get into the house.

2. If any one of the two passwords or both the passwords are incorrect then the Arduino Uno board will send a signal to the GSM module. Now GSM after getting signal from Arduino, will send a message to the mobile number of owner given in the programming and asked him that "is it he or not"[13]. If the answer is YES i.e. it is owner then the door will get open. If he replied NO then system will send him another message and ask him, whether to call the Police or not. And will act on the advice of the owner given by replying the message.

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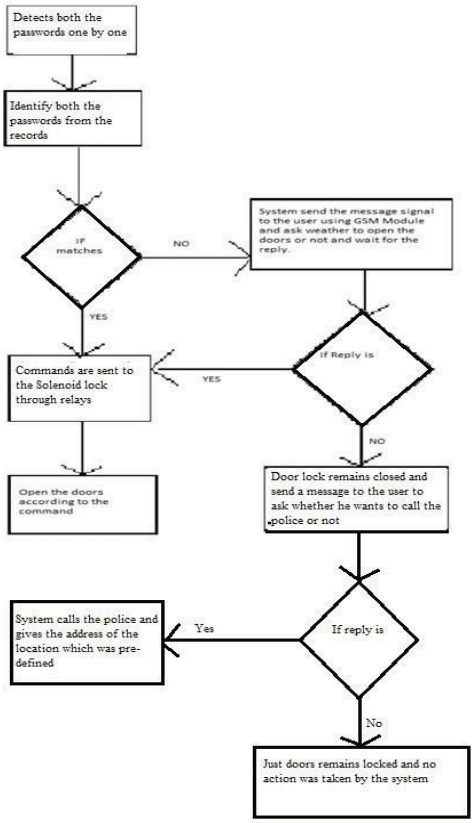

Fig 1.1 Flow chart of the System

In both the situations, Authorized person will not get troubled and will be able to open the door. It will hinder the entrance of unauthorized candidate.

In this system, we are also using temperature sensor which will detect the variation in temperature and if the temperature value is more than a specific value then also the system will notify the owner about it and ask him whether it should send the message to the fire department or not. When the system would send message to the any of the fire or police department. It will also send the address of the location to the department so that, in emergency situation help could be reach to the exact location as soon as possible.

1.4. Result

A prototype of the system was made and tested as shown in the fig 1.2. This security system works accurately and efficiently on every aspect of the functioning.

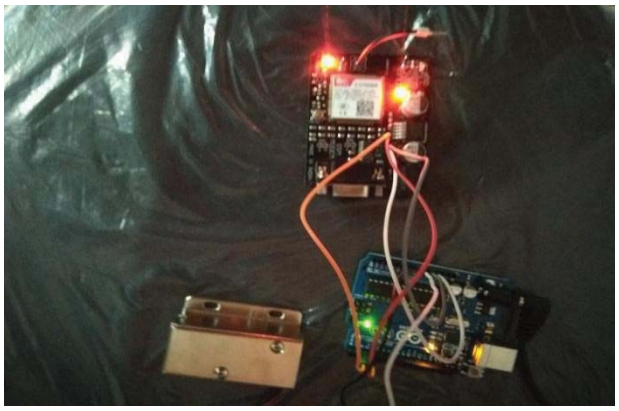

Fig. 1.2- Hardware Design

GSM module is performing good. It was tested by sending and receiving messages and it is sending and receiving messages very efficiently and able to read and write message. The temperature sensor was also tested by burning the wood and it is able to detect the variation in the temperature. The Solenoid lock works very well after entering the password. And additional relay board was used to connect Solenoid lock to the Arduino Uno board.

Here the system is tested on various parameters such as time lapse in execution, false alert. Here the experiment was performed approx. 20 times and the average time lapse was around 1000-1500 msec, in best case it is 800 msec and in worst case it is 2700msec. That means it is quite faster than other security systems and have a great response time.

In case of false alert, it is very efficient .Out of 50 random experiment it sent a false alert only once even after giving right passwords, which is quite good.

F. 1.5. Discussion

On discussing about the whole system, We have started with an idea of making such device whichcan be used for home or institute's security purpose. Now we have successfully implemented the device and got the desired result. We have received the message from device and also replied to open the lock. Hence the work is quite successful and flexible too. Now the system is ready to be implemented and to be used.

G. 1.6. References

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