Bluetooth and GSM based Smart Security System using Raspberry Pi

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Abstract. Latest wireless technologies enhanced the smart security system is more advanced. Android based secure smart door accessing system is designed for high secure and robust application. This type of applications implemented for Banking, home, business applications. In the proposed system we implement this smart security system with Bluetooth and GSM module for higher security. Hardware implementation is designed through Raspberry pi module for high processing data. This wireless data access system very fast and secure in real time applications.

Keywords: Bluetooth, GSM, Raspberry Pi, Android APP, LCD.

1. Introduction
The technology development has introduced many new security threats in the society. The same technology also offers the necessary solutions to be implemented in order to increase the security level of each and every individual and increase the trust and reliability. The GSM controlled security automation and burglar alerting system provides optimum security for residential areas. The servo door locking system which traps the burglar inside the room acts as an added advantage to the system by capturing the burglar. Once the sensor is interrupted the owner gets a call and after few moments every door in the house will get locked with a separate lock so that the burglar gets trapped inside. The proposed system functions accurately as internet accessibility is found everywhere. The GSM and Bluetooth based smart home system provides security at cheap cost and does not compromise on security at the same time. The system provides the required security equally to all the citizens as internet is available to everyone and can be accessed by anyone This information is straightforwardly given to Arduino. In this existing system accuracy of data transfer system is very less and its complex integration of audio speaker connection and consume huge power. To avoid this we proposed new sign conversion system using raspberry pi.

2. Literature Survey
Salma Mohammed ET, al [1, 2] design and applied through a passive type radio frequency method and attmega 16 microcontroller. The reader tag reads the ID number from the RFID tag. The author proposes the formidable locker security system with low cost and without error. Shweta S.Joshi, Vinayak Ekke ET .al [3] describe the proposed an authorized locker key system, using random password through the mobile. The user can enter the password only three times, if the password is correct the authorized person can access the locker. If the password is wrong more than three times, a buzzer is alarmed and the locked cannot be opened. In the reference architecture the DC motor is used for locking and opening the door of the locker .And max -232 is used for sharing the data through GSM. Parth Parab, Vinayak Shinde ET, al [4] propose two implementation systems, the locker system is opened and closed. The locker has some components reed relay, solenoid latch etc. The permanent locker presents other door of the locker, where the read relay is present at the same place of the locker. The solenoid is placed on the upper side of read relay with the latch of the door. The main part of the locking architecture is the solenoid. Solenoid entirely fits in the latch and it’s released, when the door is to be unlocked by user. L.Nagarajane et.al [5] proposed the cost saving smart locker for safety and
security aspects for bank, office and also for all security system. The author recommended the proposal to safe guard the jewels and documents where the safety is not sure in home. The locker system generates a message to the user phone. Using Arduino sensor device and GSM module, the biometric system is operated. Modhuli D Goswami et.al [6] Submit and describe the Arduino based biometric Locker system using aadhar card details. To ensure the person personal details the fingerprint module, and HC05 Bluetooth module is implemented for biometric security. Servomotor is used to unlock the locker by itself when the fingerprint is entered correctly by the authorized person. The aadhar card details are stored in cloud management, with the help of mobile app. The webpage is used to see updates of immediate action take place. The aadhar card of the user is scanned by QR code which is in the sensors and stores the information in Google sheet. This Google sheet can be accessed by the user by username and password. The webpage is accessible from the mobile app, where the user can access from anywhere. This proposed system is a user-friendly biometric locker for all the users.

Abdallah Kassem and Sami El MurrIn et.al [8] Many buildings have many flats, with many keys for everything like gate, car etc. Maintaining these keys involved too much confusion for all keys. To avoid is problem an Innovative lock system is proposed as prototype using new technology. This new method will have enhancement and innovations compare to the existing prototype. The propose system has a smart digital locking system for all types of door. The door lock system has a door lock of secret code instead of measure keys. A centralized embedded module is fit on the door lock system to open the door. This system would avoid more complications and more reliable mechanism for the overall operation. The biggest advantage is with minimum effort and cost, it can be easy to access and installed of infrastructure. Gyanendra K, Pawan et.al [9] the author proposes the RFID method, for door lock access system. This RFID system is already used in all types of IOT applications for inventory and detection of all applications. This locking system is in step by step process, as activate, authenticate, and check the user, and unlock the door. The major use and advantage are low power and compare to active tags, passive tag is lighter and low-cost effort. The basic information of the user database is maintaining before register in and leaves of the user.

3. Proposed System

In this proposed system a low-cost, easily-installable and high secure door accessing system is developed with wireless technology GSM, Bluetooth, after researching lots of recently published papers and considering the reality of it. In this section, the experiment block diagrams with setup are illustrated.

![Fig.1.Block diagram](image)

The proposed system is implemented with wireless technology. We used Bluetooth Application which integrated to Bluetooth module by using app we send password, if the password matches it opens the door, if it is not corrects means wrongly typed 3 passwords it automatically sends GSM alerts to authorized person and buzzer alerts the wrong password alert through Buzzer. The hardware modules used in this proposed system explains below.
A. Regulated Power Supply

In this section of RPS we need 5v dc to work RPI processor. This RPS module is getting the required voltages from higher voltages with the help of filters and voltage regulators. 12v alternating current received by 230 v alternating current step-down by transformer, Bridge rectifier used to converts AC voltage to DC voltage. 1000 micro farad Capacitor for filtering the noise and voltage regulator 7805 used to provide 5v DC for operating the RPI processor.

![Fig.2. Regulated Power Supply](image)

B. Raspberry Pi

Raspberry pi processor used to integrate the all input and output peripherals, process the input data and control the output modules. This processor having 4 USB ports for integrating output modules. 1GB RAM which is high speed process the data. 3.5mm audio socket for output voice, CSI camera port for interface camera, micro SD card for operating system storage, 1.2GHz speed 64 bit Broadcom processor. This processor having 40 GPIO pins. All input sensors and output modules are interfaced to processor. Python programming used to implement RPI based applications.

![Fig.3. Raspberry Pi](image)

C. GSM

GSM is a digital cellular technology used for sending and receiving all kind of data services includes voice messages, images, and videos. Basically, GSM sends the data via a channel in some time interval, and compress the data before sending. GSM is the technology supports spectrum, international roaming, and high speed, with all other telephone company services. It can support all kind of new technology and services. This GSM module helps the user to send the particular to transfer to authorized person. We used SIM 900L.
D. LCD Monitor

A liquid Crystal Display commonly abbreviated as LCD is essentially a display unit built using liquid technology. LCD module is 32 character displays, which is 16x2 models. Having 16 characters in row, LCD module interfaced to microprocessor with 16 pin configuration. LCD has 16 pins in series. Each pin is programmed to do here: Pins 1 and 16: Power and ground are these. Pin 3: This is used to change the LCD’s brightness. Pins 4–6: Used for LCD service. Pins 7–14: Used as line of info. Pins 15–16: Used to control backlight to the LCD...

E. BLUETOOTH

Bluetooth HC-05 Modules used to security application. This Bluetooth module integrated with android application for data transmission. This Bluetooth module 2.5GHz frequency which operated with 5v.

F. Buzzer

Peizo electric buzzer is used for intimating the changes in this system. Buzzer is the output module used to generate alarm. This module which converts the voltage to sound signal. We directly connected to RPI processor for alerting.
G. Software

In embedded system software module plays important role for any electronic automation. This proposed article we use Python IDE for programming development, debugging and compilation process. Python is effective scripting language for real time applications. Rasberian Operating System is used in Raspberry pi modules.

H. DC Motor

The DC Motor is a compact size, coreless DC motor used to access the door, once it is accessed by password authorization. This dc motor is helped to rotate the door process to authorized persons.

I. RESULTS

The initial state of all the sensors which displays their measured values on the LCD screen i.e., Bluetooth module, dc motor, GSM module. Figure 9 shows that hardware interfacing of dc motor for door opens and close, GSM for sending the door open otp for authentication of authorized person. Figure 10 shows that Powered on hardware device displayed on LCD module. Smart door lock title displayed on LCD.
Fig. 9. Output Hardware setup

Fig. 10. Powered Output Hardware setup

Hardware output displayed on LCD, it shows the correct password data shown in LCD. We operated password correctly then that time motor will rotate automatically. Figure 11 show that authentication displays on LCD module. When they entered password correct its shows on LCD and dc motor will rotate. Figure 11 shows the incorrect password shown in the LCD. Incorrect password is unauthorized then automatically sends GSM massage authorized persons.
Figure 13 shows the mobile one time password for the correct and incorrect passwords. When the pass is matched door will open then we get the SMS as authorized access. When the three times password does not match then incorrect data password entered then unauthorized access will get massage. It shows the wrong password. This is very high secure authentication for security.
4. Conclusion

The proposed system of smart locking system is to use for single person identification, and authentication, the results shows the authenticate through and Password and SMS alerts will sent. This process gives confidential secure accessing the locker. So, this Bluetooth android based locker system is safer and more reliable. The proposed system is low cost and low power in usage. And it’s also an economic electronic device. For future enhancement security system architecture can be implemented with some other features like face recognition and iris recognition with thumb impression. And some features added like the user information can be verified with the website.

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