

Literature Survey on Door Lock Security Systems

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ABSTRACT

Today people are facing more problems about security in all over world, nowadays security is the most essential issue everywhere in the world; so security of everything gains higher and higher importance in recent years. Here in this paper, trying to reproduce the comprehensive literature study related to the various door locks and gate security systems that are necessary in the fields such as home, industries and vehicle security where possibilities of incursion are increasing day by day. In past days, the research is gone on various door lock security systems like traditional security systems which provide indications using alarm. Due to the advancement in recent techniques, some door lock security systems are based on microcontroller, GSM, GPS, many sensors, software like MATLAB, PROTEUS, biometrics like face recognition, Iris scanner, RFID, Smart Card and password etc. Each system has their own advantages and disadvantages. In most of systems, SMS technique is used for communication so the system will become cost effective, more reliable and it will take less time to deliver message. As security becomes major problem nowadays, the security monitoring systems today needs to make use of the latest technology. In some papers, the authors have presented door lock security monitoring system based on embedded and Zigbee and sometimes the lock is protected by automatic password hence it could not easily hack by hackers. Also the enhanced security systems are available based on android platform, wireless techniques and embedded systems. A lot of modification takes places in various Door lock security from the last few years, in next coming years many changes will takes place.

Keywords

Door Lock Security, GSM, RFID, SMS, Sensors, Camera, Alarm, Biometrics, WI FI, Password.

1. INTRODUCTION

Security represents protection of our life and assets. Ensuring safety of peoples and their valuable things is very important for the prevention of illegal handling. Hence, mainly focusing on door lock security or gate security is very important to avoid the further problems in monitored area [2]. Even with the use of mechanical locks, the crime, robberies get happened due to the fact that such locks were easily broken. So, there is a need to invent other kind of locks which cannot be easily broken. So, many authors present different kinds of digital door locks, automatic password based door locks, software based door locks etc. which have been widely used in houses and offices.

The prevention of unauthorized entry into buildings through the main doors is done by using ordinary, electronically operated locks, digital codes and biometrics technique like the finger print technology or some are based on thumb printing only. Nowadays, advanced automatic door security systems are available with the use of palmtop recognition systems face recognition systems, face detection systems, wireless sensors, PIR sensors, RFID techniques, smart cameras and many more that helps people to make their home or organizations secure from long distance. Hence, people need not to be worry about the home security though they are away from home.

Doors are to keep people out. They are being made of metals not simply wood any longer. The security sectors are experiencing variousness as it has never seen before. So, demand is to audit the authenticity of currently available systems and need is to research for the creation of more reliable and good systems which operate smartly with no more efforts. The important thing is to provide higher security.

2. LITERATURE SURVEY

Door lock security systems are classified based on technology used as 1) Password based, 2) Biometric based, 3) GSM based, 4) smart card based, 5) RFID based, 5) Door phone based, 6) Bluetooth based, 7) Social networking sites based, 8) OTP based, 9) Motion detector based, 10) VB based, 11) Combined system.

2.1 Password Based Systems

The programmable electronic code lock device [1] is programmed in such a way that it will operates only with the correct entry of predefined digits. It is also called an integrated combinational type lock. The programmable code lock is shown in Fig 1 as below.

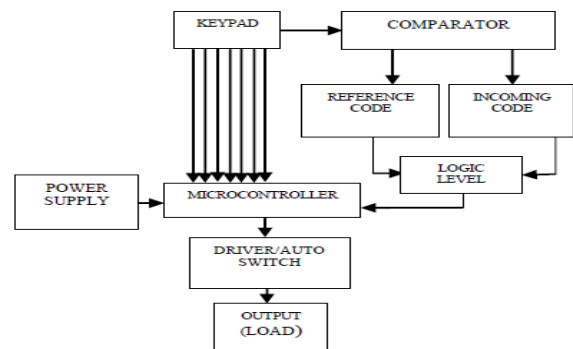


Fig 1: Programmable Electronic Code Lock

Electronics safe is its example. Based on the programmable electronic code lock, the reprogrammable digital door locks [2] were invented in that the password can change any time as it stored in PROM. For operating the device, GSM/CDMA module can be used. When any person calls up from his phone, the call will be received by the system. And the door will opens only if the call is from specified user.

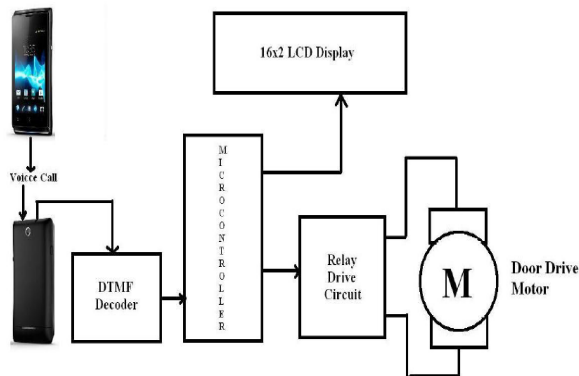


Fig 2: Password Protected Door Locking System based on Cell Phone

A cellphone controlled password protected door lock system [3] is as shown in Fig 2 which was proposed to open the door with the help of cell phone device by entering a specific code. The user can make a call to a system's number. This call is responsible for opening or closing of the entry with the use of correct password.

In latest password based system, a more advanced system [4] develops which communicates the owner of the office or house, when any unauthorized person tries to open the code, by giving correct code as well. While closing the door of office/home, the owner has to press the '0' key available on the hex keypad and leave the system. The system developed by Annie P. Oommen et. al. [5] allows for changing the password. To open the lock, the entered password must matches with the changed one. In some systems the security dial-up enables through the GSM modem [6], when the unauthorized person enters an invalid password then the controller informs to the owner through GSM modem. Latest security system [7] is designed where the locking security system can be enhanced with the help of RF and GSM wireless technology by using a 4 digit password which provides the authentication.

2.2 Biometric Based System

The palmtop recognition is the next step for fingerprint recognition. It [8] operates on the image of palmtop. Firstly system takes an image of the palmtop then it works on that image by partitioning it and process is required. At the end, verify the right person. Hence, it reduces the chances of error in other human recognition methods and clarifies the problems which were faced in the fingerprint recognition. The biometric technique is very useful in bank lockers. Except fingerprint recognition the vein detector and iris scanner gives best and accurate result so, in the bank security system [9], microcontroller continuously monitors the Vein Detector and Iris Scanner through keypad authenticated codes. During night the wireless motion detector will be active, if any variation occurs in its output, it will be sensed by the controller and alert sounds will be given by it.

Recently, the fast based principal component analysis approach is proposed in which the modification of principal component analysis approach for the face recognition and face detection process is done [10]. The image is captured by the web camera and it gets matched with the image stored in the database. New advanced door lock security systems are available based on the pattern of the human iris for providing a high level of security. And to make the system more efficient n reliable the simulation is done in MATLAB [11].

2.3 GSM Based Systems

In many door lock security systems, GSM is used for communication purpose. The purpose of a work cultivated by utilization of a circuits like a GSM module which gets activated by a controller [12] for sending SMS in emergency to proprietor and for sending corresponding services of security at the time of break in. For detecting obstacles, the system requires various sensors. It gathers data from the sensors and settles on a choice. With the help of GSM module, sends SMS to a respective number. A recently created model for security of door [13] easily controlled like remote control operations by a GSM hand set acts as the transmitter and the other GSM phone set with the DTMF associated with the motor attached to door with the use of DTMF decoder, a stepper motor and microcontroller unit.

Nowadays people want to be secure though they are away from home so, the work proposed by Jayashri Bangali et. al. [14]. When the owner is not at his home, security of home and important things is the big issue in front of all. Two frameworks were created which depends on GSM based technology. For detection of the gate-crashes, it takes place by capturing image through web camera. When peoples are not at their homes, the system sends notification in terms of SMS to the crisis number. A novel administrator based system [15] can login without any stretch to the system and can see guests record and listen their recorded messages and also automatically lock the door using mobile communication technology.

2.4 Smart Card Based System

A model entryway security framework [16] is intended to permit an authorized person for getting a safe (without need of any key) entryway where valid card of smart RFID is necessary for ensuring the pass of the door. Total control activity is performed by the microcontroller.

2.5 RFID Based Systems

These types of security systems used for digital door lock [17] are utilizing inactive RFID tags (passive). With the help of this, it ensures that only valid person can get entry. Such systems are working in real time basic for opening the door in which user have to place the tag in contact with RFID detector, then the entryway gets opens and in the central server the registration data is stored with necessary data of the users. Attendance and person tracking is possible by using such type of system. RFID Based Gate Access Security System which points out authorized peoples and permits just them was effectively created by K.Srinivasa et. al. [18]. This system ought to have the capacity to minimize the trained or specialized human error during secured door access.

Latest RFID based door lock security system are based on arduino platform [19] with audio acknowledgement at the point when card put close to the RFID module, it peruses

the card data and it matches with the data stored in the program memory and shows authorize/unauthorized entry. Arduino is also used by many other applications for example A specific Arduino ATMEL processor can be used for sensing and recognition of person [20], another example like ECG Parameter Identification and Monitoring [21] as they have open source platform.

2.6 Door Phone Based System

The earlier system, a specific system in which identification of a visitant is done for the most part by direct communication with the set of the housing estate concerned [22]. A dialling up to the sets over the hands-free telephone is created by the framework at the entryway. Visitors enter inside through the gate by controlling the gate with the help of the telephone set. The latest system is based on video door phone surveillance which is used to identify the visitors, developed by Chau-Huang Wei et. al. [23]. The work utilized a novel powerline communication chip for build up a digital networked video door phone. Moreover, they exchanged audio and visual information and upgraded the passageway guarding capacities.

2.7 Bluetooth Based Systems

Bluetooth based system is a bit like sarvy house innovations that utilizes Bluetooth function available in smart devices [24]. The framework using Bluetooth turns out to be more simple and productive for proper utilization. Such systems are generally based on Arduino platform. The hardware of such framework is the combo of android smart phone and Bluetooth module. Arduino microcontroller here is acting as a controller and solenoid can be acting as output of locking system.

2.8 Social Networking Sites Based Systems

A specific work [25], the digitalization and safety perspectives were accomplished by utilizing the phone device and web camera. The model can empower a pin to close and open a door from allotted region using SMS from a (social networking site) like Facebook, Whatsapp etc.

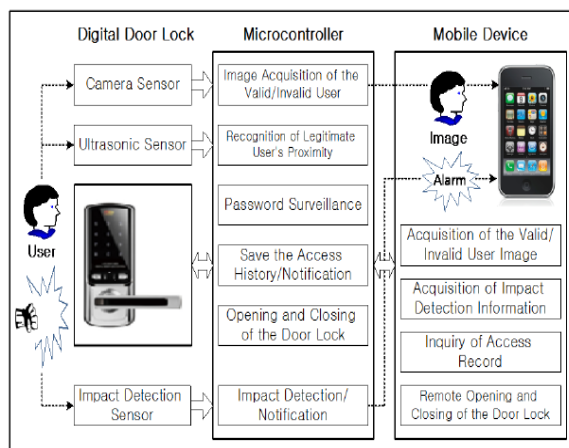


Fig 3: Digital Door Lock model based on Internet of Things

Recently, a new digital door lock system [26] get designed which detects the unknown physical contact of a visitant then immediately informs to the owner through the smart phone as shown in Fig 3. At the moment, if wrong password gets detected more than the specified times, the

system catches the picture of the unknown visitant and sends it to the owner through smart device. In this manner, increases the strength of the security function.

With help of latest advanced technology, demonstration of an intelligent door system using Internet of Things is given by S. Nazeem Basha et. al. [27]. The system provides notification of intrusion by sending out email notification to the owner. It logs all the intrusion data into Google spread sheet of owner's Google drive account. ADXL345 accelerometer detects the change in motion of the door and raspberry pi reads the sensor intrusion data and to communicate to the Amazon Web Services Internet of Things (AWS IoT) console. Similar to the Arduno, Raspberry Pi module used mostly as It is an inexpensive computer that uses Linux-based operating system [28]. It is also having open source platform for using devices like GPIO, HDML, 10/100 Ethernet and USB port etc. It is also having slots for SD cards in which Linux raspberry package can be stored [29]. It has large scope in research and development in the field of automatic door lock systems

2.9 OTP Based Systems

The proposed method in latest work does not need administrator's help to access the facility if the user knows OTP technique and has a registered mobile phone [30]. Likewise the OTP is generated and sent to the proprietor's mobile phone whenever user requests to access facility. Then the OTP should enter through keypad on the door [31], the door will open. In case if the mobile is not available or off then the option to open the door is to answer the security question ask by system.

2.10 Motion Detector Based System

The Motion Detector System [32] working is based on the principle of amount of light falling on the photodiode. At the point when the laser light is falling constantly on the photodiode, its reading is 255 in decimals. But when it's hindered by deterrent, the voltage falls less than 50 in decimals. This flames the alarm and gives notification to the owner about the break in. And automatic lock can be activated.

2.11 VB Based System

Electronic eye [33] represents the model for capturing the door images with the help of microcontroller to ensure the safety for offices and houses. In this system, the image gets captured when the door is opened and these images are displayed by using VB application on computing system.

2.12 Combined System

The locker security system is as shown in Fig 4 in view of RFID, FINGERPRINT, PASSWORD and GSM technology [34] containing door locking frameworks which can be without much of a stretch, initiated, authenticated and validated by the authorized person. It unlocks the locker door in real time manner.

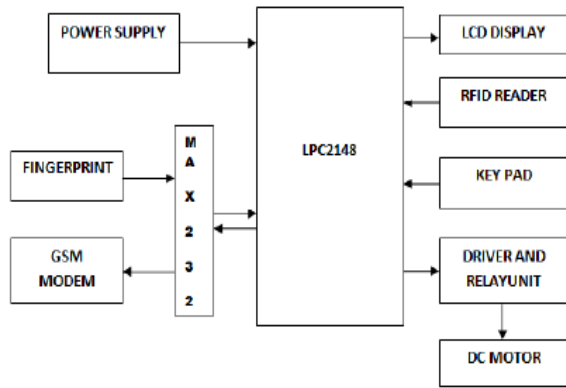


Fig 4: Locker Security System

3. SUMMARY

Recently proposed door lock systems based on Biometrics Techniques and Password Based Systems are studied and their problems are enlisted in Table 1. As per the requirements, authors developed the systems. And as per our knowledge, not a single system is suitable for all types of applications. Day by day technologies are developing and techniques of robbery are also developing. So, need is to develop a new smart and unbreakable technique in further studies.

Table 1. Recently Proposed Different Door Lock Security Systems using Various Techniques with Their Problems

Sr. No.	Biometrics Techniques		
	Specific Techniques	Ref.	Problems
1	Face Recognition	[10]	Need to improve reliability and robustness.
2	Palmtop Recognition	[8]	High resolution scanner is needed.
3	Face Recognition with GSM Technology and E-Mail Facility	[11], [15]	2D recognition is affect by changing in lighting, the person hair's, and if the person wear glassless. Net connectivity problems due to abnormal weather.
4	Iris scanner, Vein Detection, Unique Code	[9]	More memory required to store the data.
Sr. No.	Password Based Systems		
	Specific Techniques	Ref.	Problems
1	Digital Code Lock	[5], [6], [1]	Can't change the password, during power failure system will gets off.
2	One Time Password	[30], [31]	Timeout in few seconds and multiple uses means multiple lockouts.

4. CONCLUSION

In today's technologically advanced world, autonomous systems are gaining rapid popularity so the advancement in latest technology is continuously and rapidly made on different latest automatic door lock security systems. The need for an advanced door lock security systems using new technologies is increases day by day as security become a very important or serious issue for everybody. Due to the recent trends in various methods of security for home, buildings, companies' vehicles etc, there is no need to worry about this security any longer, as automatic security systems are here to deal with it. This paper tries to focus all recent door lock security systems in a comprehensive way.

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