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C-Sey –Smart Door Lock System

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Abstract: This paper proposes a novel approach which deals with a security based system conceived with a notion to provide a smart door lock system to replace the conventional lock and key module and is also aimed at protecting our residence from burglaries when we are away from our home. The way of using the door lock has been changed over last few years, there has been a lot of modification with the use of technologies like RFID, but it still doesn't give a solution to the problems associated with portable objects like key, cards etc. A total of 4 modules have been implemented on an electronic door lock with a gear motor within it which facilitates themechanical system of lock and unlock. An Arduino MEGA microcontroller has been deployed to control the overall system. The 4 modules being fingerprint module which uses the fingerprint sensor, messaging module involving GSM, Passcode module using keypad and Voice Controller module which involves the usage of Bluetooth module. A 3D house model has been used to implement and demonstrate the proposed system.

Keywords: Door lock system,Keypad, Fingerprint sensor,GSM,Voice ControlledSystem

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I. INTRODUCTION

Technology has been playing a vital rolein human life. Over the years many social problems in our environment has been solved using technology but there is a constant requirement of advancement in the technology with the changing lifestyles of human.According to the Crime in India version 4.0 published by the ICRB there has been substantial decline in the burglary from the year 2008 to 2018 in India. The door locking system is an essential requirement for all the doors. The door locking systems are traditionally the mechanical locks that are operated using keys. Such types of systems have proved to be vulnerable for key duplication and intrusion by various ways thereby lacking security.It was found in a study conducted by the Alarm Industry Research and Education Foundation(AIREF) that burglars took less than 60 secs to break into the home.So anything that makes their access to the home harder including home security system,deadbolt locksetc. can deter their efforts and keep our house safe to a large extent.According to Electronic Safety Associations'(ESA), Home Safety Fast Facts reports 9 out of 10 burglars avoid home with electronic safety system with the fear of being caught.These facts have encouraged the development of numerous security systems such as the CCTV camera, cloud camera, night vision camera for both commercial and residential purpose. Apart from that with the advent of new technologies like PIN(Personal Identification Number),the burden of carrying large bunch of keys have been reduced and people are now shifting to technologies like them to make their life easier because it reduces the risk of forgetting the keys, carrying it everywhere, or making numerous duplicates. However in the case of PIN the regular usage of pin may lead to fading of the coating on the buttons and the mucky fingerprint may remain on the buttons which may lead to security breaching so in order to avoid hacking the PIN,must be changed frequently.

Some digital door locks are powered only by electricity which poses a major problem during a power outage during which the system will restrict the resident from entering into the house. Hence, a battery powered digital door lock combined with the electrical powered one turns out to be a better solution in such situations.

This project deals with 4 modules that is intended to give maximum safety to the home, the conventional PIN module which requires the proper entry of PIN,the fingerprint module which provides the maximum authentication as no two individual can have same fingerprint, the GSM module which uses the messaging technique and the voice controlled module which uses the Bluetooth technology.

II. LITERATURE SURVEY

Jayant Dabhade, Amirush Javare, Tushar Ghayal, Ankur Shelar, Ankita Gupta: This paper proposes a novel approach towards home automation which uses bluetooh as main part of system. The system consists of different features like SMS, Burglar alarm, Vibration sensor and motion sensor and android application. It includes two modes of operation emergency and door lock/unlock for guest user. Thus this system tries to make door lock system more secure and better to be used in home networking, banks, office.

Kyu Hwang, Jin-Wook Baek: Digital door locks operate by combination of different ways like digital key, security password and number codes. The system uses ZigBee protocol as major part of system. When a person is detected by human detection module the ZigBee module comes into work and sends signal to video door phone and checks whether the person has ZigBee tag or not, video door phone further also sends command to camera module which is turned on. If the ZigBee tag is valid then a motor which is connected locking system is operated that allows user to access the door. Otherwise user can interact with speaker phone which thereby connects him to owner.

Yong Tae Park, Pranesh Sthapit, Jae-Young Pyun: Door lock system proposed here includes Radio Frequency Identification (RFID) reader which is used for authentication purpose, touch Liquid Crystal Display (LCD), motor, sensor module for detecting the condition inside house and lastly communication and control module. Sensor nodes are placed at different places house for sensing environment conditions. Centralized controller is used to monitor and control the status of ZigBee modules. This system enables user to conveniently control and monitor condition all at once before entering and leaving the house

N.H, Ismail, Zarina Tukiran, N.N. Shamsuddin, E.I.S saadon: This system uses Bluetooth technology to provide connection between user and smart phone as well as controller board. Manual and micro controller controlling is used to lock and unlock door. By providing connection with relay board and connection to Arduino board we can control door lock remotely from tablet or smartphone.

Nateq Be-Nazir Ibn Minar, Mohammed Tarique: This paper presents the details about vulnerabilities in the security protocols of different technology and also further include some past security threats and their circumstances. It also provide some tips that end user should take care while working with such technologies.

Adnan Ibrahim, Afhal Paravath, Aswin P. K., Shijin Mohammed Iqbal, Shaeez Usman Abdulla: This paper introduced a Global System for Mobile communication (GSM) based digital door lock system using PIC platform. It makes use of 5-digit password to lock/unlock the doors by employing a gear motor. On three unsuccessful a warning message is sent to present mobile numbers as a means of notifying unauthorized access to door.

Chi-Huang Hung, Ying-Wen Bai, Je-Hong Ren: This design uses near field communication of smart phone to control the door lock system by a single button operation. It has three modes of operations to the user which allows to match timestamps permission to match user's password and allow it to access the door. There by enhancing security, also system includes sleep state and standby state to save power consumption for long time operation.

III. MODULE DESCRIPTION

The proposed project 'C-Sey' is a door lock system which constitute of four modules, each module implements authentication process in different ways.

The modules are as follows:

a) Fingerprint Module
b) Voice controlled system
c) Password-Authentication
d) GSM Module

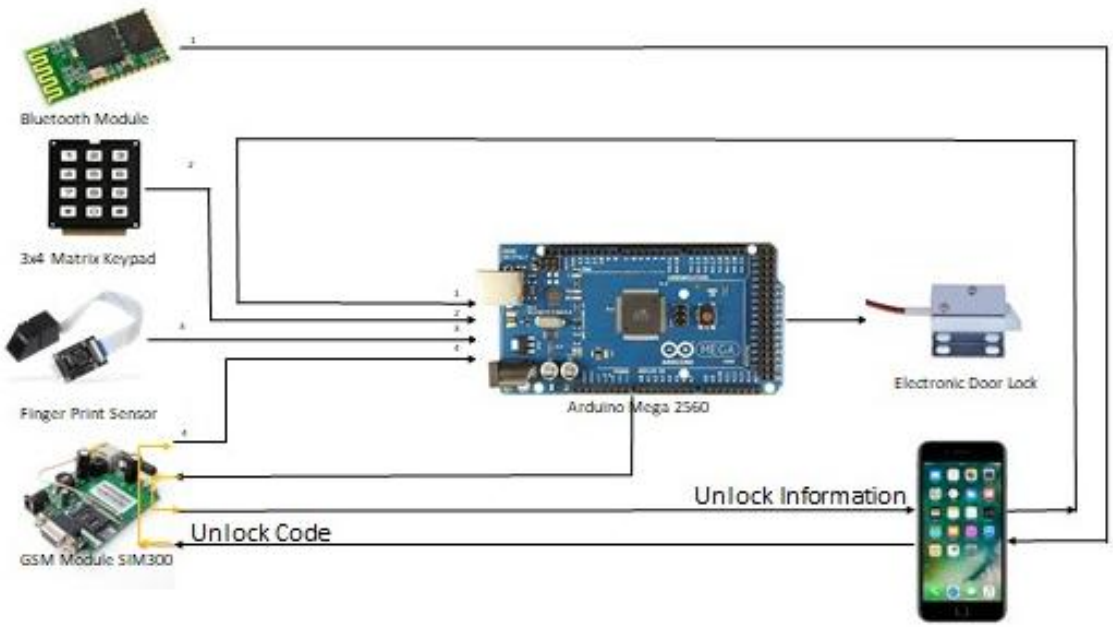

Fig 1: Block Diagram

a) Fingerprint Module

Fingerprint recognition is one of the most secure systems because a fingerprint of one person never matches with the others. Therefore, unauthorized access can be restricted by designing a lock that stores the fingerprints of one or more authorized users and unlock the system when a match is found. Bio-metrics authorization proves to be one of the best traits because the skin on our palms and soles exhibits a flow like pattern of ridges on each fingertip which is unique and immutable.This makes fingerprint a unique identification for everyone. The popularity and reliability on fingerprint scanner can be easily guessed from its use in recent hand-held devices like mobile phones and laptops.

The fingerprint sensor senses the fingerprint and when it matches with the stored fingerprint the Arduino commands the lock to open.

b) Voice controlled system

Voice controlled or speech controlled module is the system which uses the Bluetooth technology to connect to the application 'C-Sey'.The application was built with the help of MIT App Inventor. It already has google speech to text library which converts the spoken word into text. The serial connection between android application and Arduino microcontroller is done using Bluetooth.Both the Bluetooth address must be paired first and then the command or the password must be spoken just like giving commands on google. This technology uses the acoustic features of speech that will be converted to text. A disadvantage of voice-based recognition is that speech features are sensitive to a number of factors such as background noise.

c) Password-Authentication

This system stores the password of authenticated users for the purpose of validation which provides considerable security to the users. Power consumption is efficient and usage is user-friendly.

d) GSM Module

The SIM 300 module serves two purposes, one to indicate the status of the lock i.e. whether the door is locked or unlocked to our mobile device, the other purpose is for authentication. The authentication is done using a normal messaging technique.

IV. RESULTS

The outputs from the modules are as follows:

1) Voice Controlled module

Fig 2: Output of voice controlled module

2)Password authentication module

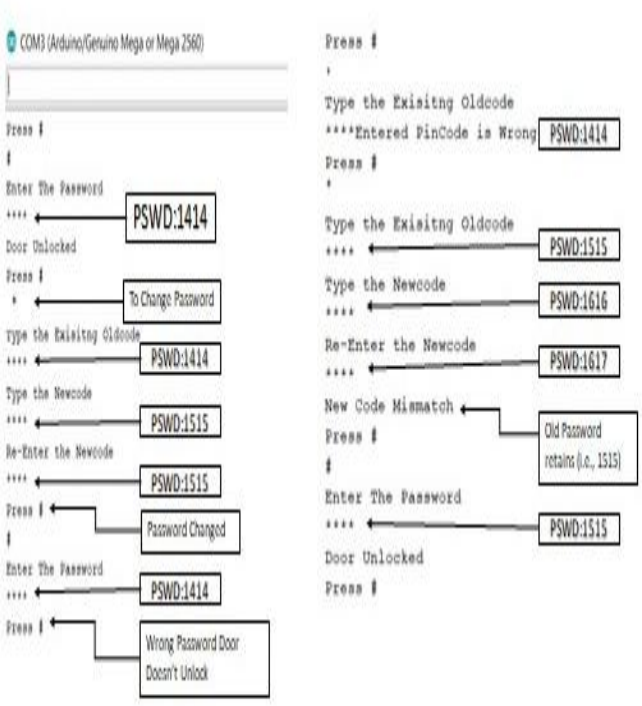

Fig 3: Output of password authentication module

3)GSM based module

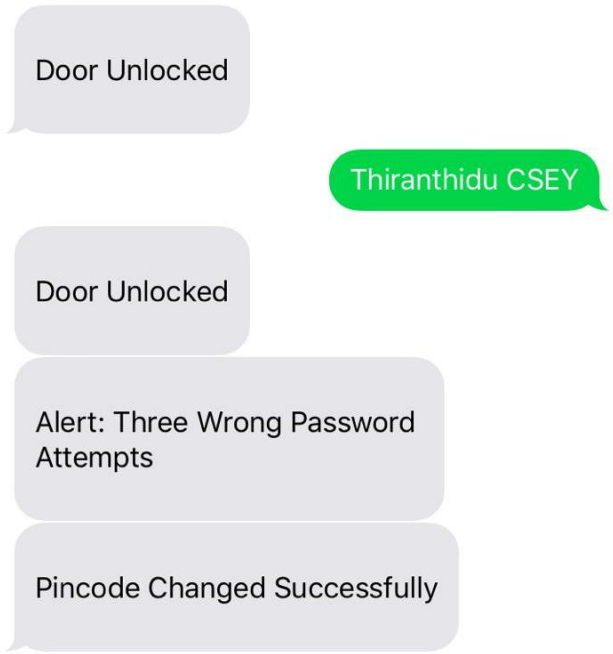

Fig 4: Password sent via SMS and unlock status displayed on the mobile screen

Fig 5: Output of GSM module viewed on Arduion IDE's Serial Monitor

V. CONCLUSION

Digital door lock is one the most popular devices and basic necessity that is used by people due to its low power, less expensive, easily to use nature. In reality there are many convenient locks but this system tries to meet all the user requirements with the inclusion of various modules. This paper proposes a locking system which consists of four modules which can send information to the Arduino microcontroller which then commands the lock attached to it accordingly. This low cost authentication system is made with an objective to take the door lock security system to a more advanced level. This technology will surely bring change in society to drop the percentage of crime.

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