IJCTA, 9(21), 2016, pp. 83-86

Smart Locking System for Homes

Aman Pathak* Utkarsh Sundaram**

Abstract : A door which serves as an entrance to the home or office isn't just about keeping the bad guys out, it's also about letting the right people in-like family, friends. With the Smart door access system, you can lock or unlock door from your smartphone over internet or Bluetooth and allow entry for you family, friends.[4] An android application will be used to interface the door locking system, making it easier for the people to control the very door itself remotely.[1] Facial Recognition is also used for making it easier to unlock the door, by just looking into camera one can unlock door, given, his image is present in the database. Smartphone's application based control will require an internet connection.[8] Project is designed keeping in the mind the complete security and automation of the homes/offices.

Keywords : Smart lock, Automation, security, internet, Facial Recognition

1. INTRODUCTION

Safety is a basic requirement of every living being. Be it a safety of his belongings or safety of his own life. We have been taking several measures in order to attain it to live a worry free life.

For example, we rely on Health insurances to take care of our health expenses in the time of any disaster. Likewise, for our houses we have a traditional method of using locks and keys. But now, as humans are getting busier day by day, the use of traditional locks and keys can be cumbersome. There can be a lot of problems if we don't advance to a smarter technology.

For example, with a traditional lock, you cannot allow any of your friend or guest to get to your place if your doors are locked and you're not in town to get to your home and unlock it. Or if you lost your keys, you either have to find a locksmith or break the very lock itself.

This is where our smart locking device come to the scene. A lock which is authorized by a person's face using a mere camera of any kind. This ensures that only people with registered face IDs can access the doors.[3] Not just that, the person can wirelessly open his door from any part of the world. All he need is to be connected to the internet. This concept covers the field of automation and security. Might be the one big step in making home smarter and more secure [9]

Objectives

1. To make an automated lock for doors which works on signals.
2. Getting the locking device connect to the internet and also enabling the Bluetooth module for short distance signaling.
3. Installing a camera in-front of doors which will be used for face detection authorization.
4. Making an App for phones which will use the phone's front camera for the authorization and can send unlocking signal via Bluetooth or the internet.
5. Keeping the logs of by whose faces the door has been opened.
6. A friend's list section in the app which can be used to grant other people temporary access to your doors.

* Department of Electronics and Communication Engineering University Of Petroleum and Energy studies, Dehradun, Uttarakhand, India Email- amanpathakengg@gmail.com

** Department of Electronics and Communication Engineering University Of Petroleum and Energy studies, Dehradun, Uttarakhand, India Email- ustheleo@gmail.com

The rest of the paper is organized as follows. Proposed system and algorithms are given in section II. Paper results are presented in section III. Conclusions are given in section IV.

2. PROPOSED SYSTEM AND ALGORITHM

Smart door lock working algorithm

In this project we have a microcontroller board which is the core of the design , interfacing the smartphone with the door lock for locking or unlocking the same .

Door lock is controlled by servo motors, which is activated by the microcontroller on receiving the command from the communicating device (here smartphone).

For opening and closing the door first connection to the hosting server is checked .If the connection is not found then it will try to connect to the hosting server[1]

After this facial recognition is done through pie camera via scilab if the person is standing in front of the door [5]

If the face matches with the image present in database, then, microcontroller command to open the door and notify the user[6]

A Wi-Fi/Bluetooth module is also provided for remotely controlling the door using an android application for this: Data Sent over the application will be used to give command to microcontroller. In turn microcontroller activates the servo to lock/unlock the door lock.[9]

DESIGN & METHODOLOGY

1. Microcontroller Board – to serve as the main control hardware of the project.
2. A servo motor attached to a lock bar will be the door lock which will act according to the microcontroller's signal.

Fig. 1.

3. Designing of algorithms for interfacing the motors with the microcontroller.
4. Connecting the microcontroller to the internet so that signals can be sent to the microcontroller online.
5. Designing a mobile app which can authorize the lock using face detection and sends a signal to the microcontroller to lock/unlock the door.
6. Enabling Bluetooth module on the microcontroller to pair up with any smartphone for short distance signaling.
7. Pairing Calling bell and Alarm with the microcontroller.
8. Setting up profile database over the cloud.
9. Final Testing

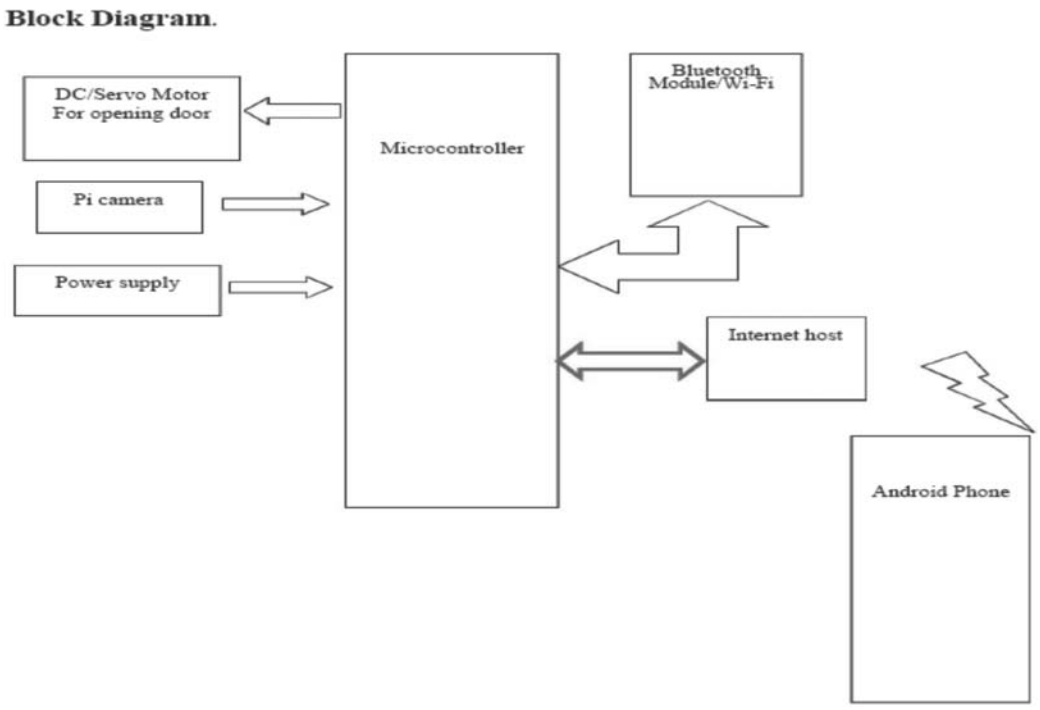

Fig. 2. Door locking/unlocking model

3. EXPERIMENT AND RESULT

A simple Bluetooth enabled lock was made to determine the time consumption in locking or unlocking the door and results were as followed:

Door state	*Execution time (approx.)*
Open	2 seconds
Close	2 seconds

Figure 2 shows the image processing done through scilab and Figure 3 shows the app available for the implementation of this project through smartphones. The system acts within the range of 2-3 second from getting facial recognition to initiating the DC motor to open the door [7]. When someone break in the smart lock sends a notification to people with registered face IDs and there's an option for the user to trigger an alarm from his smartphone or otherwise gives a log of information to the main user which usually takes 1.5-2 second. The proposed smart locking system has several implementations problems [8] .The first problem conceives with the availability of internet services around it which would make it somewhat difficult to access the door from the farthest location. Second, whenever the door opens or closes, it can be possible that a person can go inside by the means of other person these problems will be resolved in future.

Fig. 3.

Fig. 4.

4. CONCLUSION

In this paper, a smart door lock with advanced security features and is designed to work on the Internet of Things. The designed smart door lock senses the impact of an invalid visitor and alerts the user giving notification on his/her mobile. It can be used in every household or in office to minimize the human efforts and can save a lot of time. It nullifies the risk of keys getting lost or stolen. As the system is online, a person can lock/unlock doors from anywhere around the world at his own convenience. The logs created, can viewed by any of the registered users so that they can check at what time did the person unlocked/locked the door.

1. It can be used in every household or in office to minimize the human efforts and can save a lot of time.
2. It nullifies the risk of keys getting lost or stolen.
3. As the system is online, a person can lock/unlock doors from anywhere around the world at his own convenience.
4. It can also be used or physically disabled people[9]

1. Anti-Theft Reporting

Smart locking System for homes : When someone break in, the smart lock sends a notification to people with registered face IDs and there's an option for the user to trigger an alarm from his smartphone.

2. Extra Functions

The logs created, can viewed by any of the registered users so that they can check at what time did the person unlocked/locked the door.

A notification will be sent to the registered user if any person rings the bell when you are not home.

3. Cross-Platform Compatability

Users can operate their smart lock from any Android or iOS device.

5. REFERENCES

1. Ilkyu Ha," Security and Usability Improvement on a Digital Door Lock System based on Internet of Things" International Journal of Security and Its ApplicationsVol.9, No.8(2015), pp.45-54http://dx.doi.org/10.14257/ijsia.2015.98.05
2. Ohsung Doh," A Digital Door Lock System for the Internet of Things with Improved Security and UsabilityAdvanced Science and Technology Letters Vol.109 (Security, Reliability and Safety 2015), pp.33-38 http://dx.doi.org/10.14257/astl.2015.109.08
3. Hteik Htar Lwin, Aung Soe Khaing, Hla Myo Tun "Automatic Door Access System Using Face Recognition" INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 4, ISSUE 06, JUNE 2015 ISSN 2277-8616
4. Lia Kamelia,, Alfin Noorhassan,S.R, Mada Sanjaya and W.S., Edi Mulyana" DOOR-AUTOMATION SYSTEM USING BLUETOOTH-BASED ANDROID MOBILE PHONE " ARPN Jurnal of Engineering and Applied SciencesVOL. 9, NO. 10, OCTOBER 2014 ISSN 1819-6608
5. Er. Laxman Singh ,Er. Mauli Joshi "FACE DETECTION SYSTEM USING SCILAB IMAGE PROCESSING TOOL" International Journal of Engineering Technology and Computer Research (IJETCR) Volume 3; Issue 3; May-June 2015; Page No. 84-90ISSN: 2348 – 2117
6. Ricardo Fabbri Odemir Martinez BrunoLuciano da Fontoura Costaar"Scilab and SIP for Image Processing" Xiv:1203.4009v1 [cs.MS] 18 Mar 2012
7. Jeong-ile Jeong " A Study on the IoT Based Smart Door Lock System" Information Science and Applications (ICISA) 2016Volume 376 of the series Lecture Notes in Electrical Engineering pp 1307-1318Date: 16 February 2016
8. Prof. Pratima Patel, Prof. Samir Ajani" The Digital Locking andUnlocking System Based on Android for Smart Phone" International Journal of Advanced Research inComputer Science and Software EngineeringVolume 6, Issue 2,February 2016 ISSN: 2277 128X
9. Anuradha.R.S,Bharathi,.R, Karthika.,K,Kirithika.,S, S.Venkatasubramanian "Optimized Door Locking andUnlocking Using IoTforPhysically Challenged People" International Journal of Innovative Research in Computerand Communication Engineering Vol. 4, Issue 3, March 2016ISSN(Online): 23209801ISSN (Print): 23209798