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IoT based security in Digital Door Lock

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ABSTRACT

Digital door locks have been widely used as part of the Internet of Things. However, there are reports that digital door locks being opened by invalid users to invade homes and offices. In this study, a digital door lock system that can work with the Internet of Things environment is proposed. It is designed and implemented to enhance security and convenience. In the overall system, there will be two different significant techniques to provide home security. One is to use video technology to see the front door in real time even if the home is empty and another is to provide communication between the door system and smart phone device. Connecting the smart door system with the smart phone through the cellular network, the house owner will have several opportunities such as controlling the house, getting instant video streaming, receiving and sending message, talking to the visitor and starting the alarm system. The experimental results indicate that the proposed system may provide a consistent support and assistance for safe and secure life.

Keywords: Digital Door, Internet of Things, Cellular network, security, smart phone.

I. INTRODUCTION

Over the world, Internet of Things and Machine Interpersonal Communication technologies which were developed for smart home system are becoming well known. The system is developed by using Supported Mobile Communication and Safety Powered Multifunctional Smart Door System. Home automation is one such application where Internet of Things oriented solutions is being implemented to make the secure and convenient living experience. Door lock system is an essential feature in this series of Home appliances which can be remotely controlled. In this work, intelligent door systems with confidential information contained in the digital code and the person's fingerprint is working, depending on the definition of identity.

[4]Recommended door lock system for detecting user ID RFID reader, LCD touch sensor module to determine the condition inside of house is used and finally includes communication module. In many cases, an intruder has tried to penetrate a private area by circumventing the lock. In this study, we will be designing and implement an IoT-based digital door lock to enhance the various security and monitoring functions using IoT technologies. The system is a three tier system based on IoT architecture using micro controller device, cloud and Android application. It aims to enhance several security and monitoring features based on IoT technologies [3].

II. IOT

The Internet of things is the internetworking of physical devices, vehicles, buildings, and other embedded with electronics, software, sensors, act-uators, and network connectivity that enable these objects to collect and exchange data In 2013 the Global Standards Initiative on Internet of Things (IoT-

GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human.

III. APPLICATIONS OF IOT

Internet of Things has a number of applications some of them are as follow:

Smart Home: Smart Home is one of the most popular IoT application at this moment because it is the one that is most affordable, efficient and easily available. From the Amazon Echo to the apple home automation, there are hundreds of products on the market.

Wearable: Watches are no longer just for telling time. The Apple Watch and other smart watches on the market have turned our wrists into Smartphone holsters by enabling text messaging, phone calls, and more.

IV. DESIGN OF SYSTEM

The main features of the proposed system are as follows. First, it has impact detection and alarm functions. This will help to detect an intruder who tries to open/break the door by applying physical force to the lock. Second, it has an image transfer function. Generally, an attacker who does not know the password will make a variety of attempts[3].

Therefore, when he enters the password the system clicks an image and sends it to the application on the user's phone. Fourth, the system can open the door lock automatically after recognizing a visitor's image. If a visitor does not know the code then he can enter a random code, the door lock system transmits his image to the admin. The user can remotely control the door lock through mobile app after reviewing the image. Fifth, the controller can detect a valid user if he is carrying the mobile device, and will open or close the door lock automatically.

V. OVERALL STRUCTURE OF THE SYSTEM

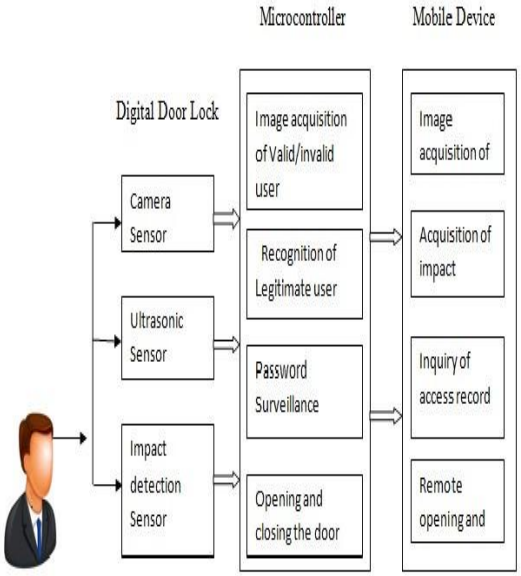

Figure 1. Structure of system

The controller detects physical impacts applied by a visitor, and notifies the user's mobile device. The controller detects that someone is entering the password it uses the camera to capture an image of the visitor. It transfers the image to the user's mobile device[2]. All of the access records are stored in the controller's database, which can be queried by the admin. If a person has lost his key, his image is captured and transferred to the admin by pressing a specific key, the user can then control the door lock remotely after verifying whether the visitor is valid or not. Another important function of the controller is automatically opening or closing the door when the mobile device user is near. When a valid user accesses the gate holding an object, as it is difficult to operate the door lock, the controller communicates with the user's mobile device via Bluetooth and opens the door automatically. The impact information and the invalid visitor image information is sent to the mobile user from the controller, and then the user can take

appropriate action. Further, if the user acquires image information for a valid visitor, it is possible to open or close the door lock remotely. It is also possible to query the incoming and outgoing records.

Pseudo Code

1. Foreach user
2. Input action
3. Switch action
4. Case “password”:
5. If (password is request number then take and send image)
6. Else if password is valid then open the door lock
7. Else if numer of mismatch >= 3 then take and send image
8. Else go to step 2
9. Case “impact”
10. Impact sensor operation
11. If impact value>= threshold value then camera sensor operation
12. Else go to step 2
13. Case “proximity”
14. If distance>=threshold value the mobile device synchronization
15. If valid user then send password, door oprn
16. Else go to step 2
17. Else go to step 2
18. End

VI. IMPLEMENTATION

A microcontroller is required to control the door lock and a Bluetooth module is used for communicating with the mobile device. An ultrasonic sensor is required to recognize a nearby user an impact vibration sensor is also required[2]. OpenWrt is used as the operating system of the system, the program to operate the controller can be written in C, PHP and MySQL are used for the database management, respectively, and UHTTP is used for the web server. Besides, various sensors for proximity and intrusion detection are connected to the system. A camera for capturing an image of users is installed, an impact sensor is attached for detecting an impact by an invalid user, and an ultrasonic sensor is attached to recognize the proximity of valid users[3].

VII. REMOTE CONTROL APPLICATION

The user can query all records of comings and goings from the Log menu. The Capture Log menu is for checking captured information, such as an invader’s image taken by the controller when an error occurs[2]. When an access request is generated by a valid visitor who does not possess the key, the Request menu allows the user to check the image of the requester and open the door. The Remote opening menu allows for remote door operation. The Option menu allows for password management and Bluetooth synchronization menu is a setting menu for automatic opening when approaching the door lock. The left side of the top of the figure is the main menu of the App, the right of the top shows the Bluetooth setup button for proximity open and a keypad for the remote open. The left of the bottom of the figure shows a list of the image information that has been captured by physical shock and the input mistake of password. And the right of the bottom shows an image of the item in the list.

VIII. CONCLUSION

In this paper, a digital door lock with enhanced security functions was designed to work with the Internet of Things. The designed digital door lock
Can sense the impact more than threshold by an invalid visitor and notifies the admin’s mobile device. If an incorrect password is repeated more than a certain number of times, the lock captures an image of the invalid user and transfers it to the mobile device, thus, strengthening the security function.

IX. REFERENCES

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