



National Conference on Advances in Engineering and Applied Science (NCAEAS)

29th January 2018

Organized by : Anjuman College of Engineering and Technology (ACET) Nagpur,

Maharashtra, India, In association with

International Journal of Scientific Research in Science and Technology



A Review on IoT and Fingerprint Based Door Locking System

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ABSTRACT

The main idea of this paper is to suggest two ways for unlocking a door using Internet of Things (IoT) and Fingerprint. Security has always been a major concern for the households and the office environment, and for this concern various approaches are in place to address the problem. Most of the major door lock security systems have several loopholes which could be broken down to gain access to the desired places, and it creates a concern for a secure lifestyle and proper working environment[2]. Additionally, terrorism and unauthorized access to places have become a major issue now-a-days, and there is a need for a secure system to prevent unauthorized access especially in shared access environment. Recently, research on IoT systems for smart buildings has been attracting increasing attention[2]. Today, Internet of Things (IoT) is one of the promising solutions. The Internet of Things (IoT) is a system, combination of embedded controllers, sensors, software's and network. After internet and mobile communication the development of IoT can support a variety of applications including Intelligent Art, Intelligent Logistics, Intelligent Medicine & Healthcare, Intelligent Transportation, Intelligent Power, Smart Life etc[9]. The Internet is a worldwide system of interconnected computer networks. There are several ways that enable us to access the Internet. Technology is keep improving, method to access the Internet also increase. People can access Internet services by using their cell phone, laptop and various gadgets. IoT allows a number of objects that have been embedded with wired or wireless communication interfaces to automatically communicate and interact with each other[9]. The Internet is a technology that has greatly enhanced our lives. Fingerprint is a reliable biometric feature having a wide range of applications that require authentication[3]. Biometric systems such as fingerprint provide tools to enforce reliable logs of system transactions and protect an individual's right to privacy.

Keywords: IoT, Smartphone, Arduino UNO, Fingerprint Sensor, Biometric Systems

I. INTRODUCTION

These days office/corporate environment security is a major threat faced by every individual when away from home or at the home. Instead, He finds an alternative solution which provides better, reliable

and atomized security. Among mainstream personal identification methods we mostly see password and identification cards techniques. But it is easy to hack password now and identification cards may get lost, thus making these methods quite unreliable[2]. Although in some places people use

smart cards, there might arise a situation when someone loses the card or keeps the card inside. These are some of the hassles that people might face when using keys or smart cards.

That is when our system, fingerprint based lock system comes into play. Our design is implemented to provide better securities as users don't need to remember passwords and don't need any sort of keys or cards that often get lost[2]. the internet is very common and is available everywhere and online all time due to its growth in the technology. The term "Internet of Things" (IoT) was first used in 1999 by British technology pioneer Kevin Ashton to describe a system in which objects in the physical world could be connected to the Internet by sensors[8]. Today, Internet of Things(IoT) is one of the promising solutions. The Internet of Things(IoT) is the network of physical objects—devices, vehicles, buildings and other items embedded with electronics, software, sensors, and network connectivity—that enables these objects to collect and exchange data. The concept of the Internet of Things (IoT) was proposed by the Auto-ID Laboratory of MIT in 1999 [6].The basic principle for establishing an IoT service involves connecting various smart objects into a human interactive network, enabling internet access for smart objects. Internet of Things (IoT) incorporates concepts from pervasive computing and enables. A system which is a Combination of Embedded controller, sensors, Software's and Network is called the Internet of Things (IoT).Thus, developing a method by which people can be provided with superior control over the internet and be informed of the status of interactive objects in the physical world will be the main focus of IoT[6]. Fingerprint lock system because fingerprint scanning is more accurate and cost effective method. It is also secure because fingerprint duplication is virtually

impossible. Additionally, we have also used password authentication system for security purposes to ensure access to not enrolled people. Fingerprints are one of many forms of biometrics, used to identify individuals and verify their identity. The analysis of fingerprints for matching purposes generally requires the comparison of several features of the print pattern[2].

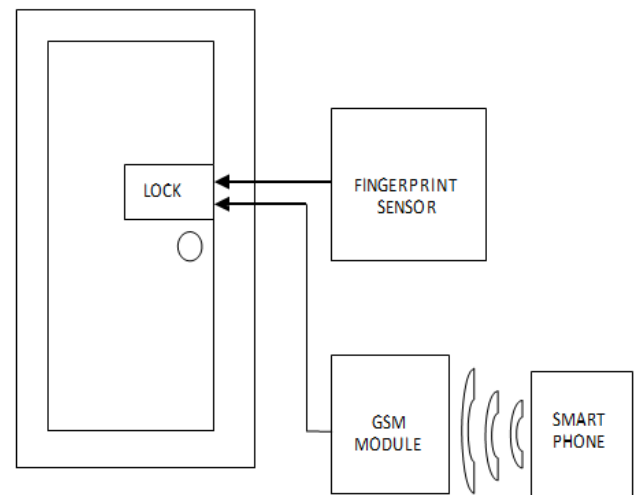


Figure 1. Implementation of IoT and Fingerprint Based Door Locking System.

In figure 1 there are two ways to control lock, first using Fingerprint sensor and second using GSM Module, Fingerprint sensor is used to sense finger then accordingly it will control the operation of door. The door can also be control by a Smartphone application to control the door[6].

II. METHODS AND MATERIAL

i. Hardware

1. To propose overall architecture for IoT and Fingerprint Based Door Locking System.
2. To design and implementation of door locking system.

3. Hardware implementation at back of door and fingerprint sensor.

ii. Software

1. To develop a C code for communication between Fingerprint sensor and Microcontroller in arduino IDE.
2. To develop an Smartphone Application in Java Language.

iii. Introduction to IoT and Fingerprint Based

Door Locking System

The Internet of Things (IoT) can be defined as a global infrastructure which combines intelligent services with situational awareness, and allows mutual communication between one thing and another, and between people and intelligent things over a network[6]. More recently, a variety of communication technologies have been fused to receive and provide information about things. Especially, IoT technologies have been enabled to communicate by the fusion of home appliances and mobile devices. The security currently become a very important issue in public or private institutions in which various security systems have been proposed and developed for some crucial processes. Security systems are vital for protection of information, property, and prevention from theft or crime. IoT is the network of physical objects, devices, buildings, vehicles and other items embedded sensors and network connectivity that enables using with electronics, software these objects to collect and exchange data [1]. As today fingerprint based system provides high degree of accuracy in terms security. Therefore, we have decided to introduce a system for locking which is based on the Fingerprint scanning. Our project basically, is a combination of Embedded Systems & Biometrics. An Embedded system is a combination of computer hardware and software Design

engineers optimized the size and characteristics of the microcontrollers. Biometrics refers to the automatic identification of a living person based on physiological or behavioural characteristics for authentication purpose. Among the existing biometric technologies are the face recognition ,fingerprint recognition, finger-geometry, hand geometry, iris recognition, vein recognition, voice recognition and signature recognition, Biometric method requires the physical presence of the person to be identified. Biometric recognition systems offer greater security and convenience than traditional methods of personal recognition. This system focuses on the use of fingerprints for door opening and closing[2,5]. generates output. Arduino control rotation of Servo Motor. Servo Motor Rotate Clockwise or Anticlockwise which control latch of door[3,6].

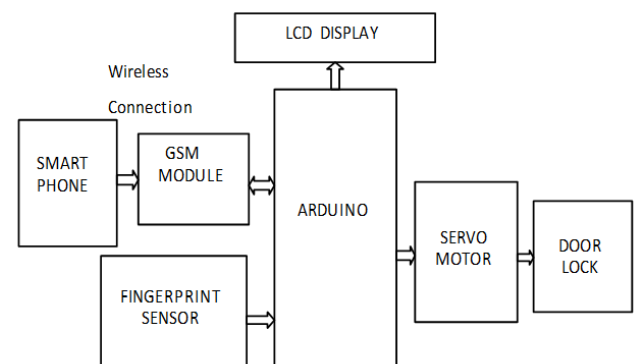


Figure 2. Basic Architecture of IoT and Fingerprint Based Door Locking System.

III. CONCLUSION

In our country, private and government organizations are very much concerned about security. The increasingly demand for intelligent The architecture as shown in figure 2, it consist of Smartphone, GSM Module, Fingerprint Sensor, Arduino Uno Board,LCD(Liquid Crystal Display) Servo Motor,& Door Lock. The GSM Module,

Arduino Uno Board, Servo Motor,& Door Lock are mounted behind the door, remaining Fingerprint Sensor is to be placed at front side of door. As Smartphone is a portable device we can control the operation of door remotely from anywhere in the world. Smartphone consist of an Application which will control the operation of door lock, if “Open” switch is pressed then door will open and if “Close” switch is pressed the door remains closed. Smartphone communicate with GSM Module wirelessly[6]. Similarly Fingerprint sensor also control the operation of door lock, if Fingerprint of authorized person is placed sensor will detect then door will open and if Fingerprint of unauthorized person is placed sensor will not detect and door will remains closed. Fingerprint sensor compare the fingerprint which is placed with the stored fingerprints. It consist of memory which store fingerprints. Arduino Uno is a microcontroller, the program dumped on the Arduino accordingly it industry solutions based on IoT will drive more opportunities for the companies that take advantage of the IoT.[5] Because of the advancements in sensing, identification, and network communication technologies, the diverse services have been gradually extended from internet to the IoT. IoT-based service provides human with obtaining and controlling the status of the smart object through internet. Fingerprint sensors may be placed at the various access points in the buildings to control. For fingerprint matching, a user only needs to place the finger (or thumb) on the scanner, an image is scanned, which is then compared against the templates already stored in the database[6]. Our proposed two way IoT and fingerprint based lock system is a reliable and very secure lock that will not only ensure safer environment but also ease lifestyle. This system can prove very useful in housing buildings, large offices, universities and so on[2].

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