SMART FINGERPRINT OF LOCKING SYSTEM

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ABSTRACT

Smart locking system plays an important role in this digital world. Some of the current door locking system still consist of the mechanical key design with the digital interface to give it complete locking system look. Here we are giving it a new structure which uses a biometric authentication and a mobile application to unlock where you don't need keys anymore. Thus providing practically a good lock. The lock requires an internet connection if the client wish to open it by mobile application otherwise it can be operated offline by at the client. The proposed system is very convenient for client and easy to operate thus, Providing flexibility to the client for the entire mechanism.

Keyword: *U-lock, IoT, Firebase, Node MCU.*

1. INTRODUCTION

Everything today is turned into digitalized system which reduces the effort and complication in one's life. Similarly, locking system are digitalized too known as smart digital locking system. IoT (Internet of Things) plays an important role in this locking system as the lock is connected to the server with the help of internet providing us with many advantages. Many technologies can be integrated together by IoT for improving societal services [1] to provide ease of work.

IoT (Internet of Things) technology is enhancing day by day, the traditional lock has also been redefined and innovated [2]. This improvement on traditional lock are aimed to decrease the weakness. Smart locks require interaction between client and hardware unit which is generally embedded into door [3]. Smart lock is a digitalized lock which is used for locking/ unlocking mechanism by a wireless protocol operated by authorized person device [7].

In this paper, we present a smart locking system which uses IoT technology as a base concept. Here the lock uses a fingerprint as well an Android application to operate the lock. We provide two ways to operate the lock which means eradicating the traditional locking mechanism. If user have an internet connection than IoT is one way through android application and if for any reason user don't have an internet connection than fingerprint is the another way to authorize the legal user. Here we are providing a very convenient way for locking system which reduces the client efforts.

2. METHODOLOGY

The proposed system uses IoT technology to establish the connection between hardware and android application. The hardware unit requires an internet connection to establish a connection to the server where the authentication key plays an important role to help system communicate with the server. We are using Node MCU (micro-controller) to operate the entire hardware unit of lock.

The hardware unit comprises of fingerprint module (R305) and servo motor SG90 to show the locking mechanism which are integrated together on the board. The backend is supported by firebase cloud messing service which also provide the authentication API key which route the hardware to the real time database.

We also have an android application which is developed on android studio providing user the access to the lock. Firebase assistant is used to connect the application to the firebase which manage all your griddle dependencies of the application. The application controls the servo motor on the hardware unit where the firebase is a medium to provide access. A Boolean value is passed through the application to the server which indicates the status of the servo motor which is working on a real time database indicating the servo to rotate through certain degrees performing lock and unlock mechanism.

The fingerprint module works independently without any need of internet connection as well as operating servo motor if encounter the registered fingerprint.

3. SOFTWERE ANALYSIS AND DESIGN

The hardware comprises of three major units :

1. Node MCU

2. Fingerprint module (R305)

3. Servo Motor (SG90)

The system requires a power supply to be operated where Node MCU pass the voltage of 5.5 with the help of an adapter to the fingerprint module and the servo motor. The io pins of sensor and motor is connected to the digital pins of Node MCU to establish a communication between sensor and micro-controller. A thumb impression is stored in the form of an image in the fingerprint module which is used to authenticate the legitimate user. The entire code is embedded on Node MCU which triggers an open action when the fingerprint module encounters the authenticated
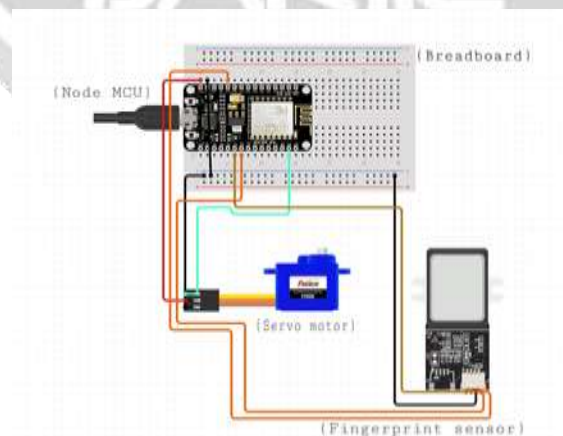
Fig -1: **Schematic of U-Lock (Digital Lock)**

3.1 Smartphone android application:

The application is controlling the servo motor which is actually a hardware unit for locking mechanism. User have two commands to open or close the lock in the form of a button in the application which is controlled by firebase by a status value (0,1) indicating open or close the micro-controller. This communication is taking place with the help of real time database.
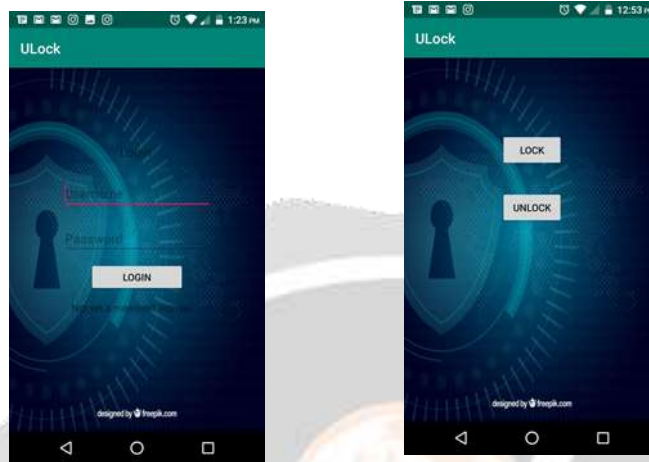
Fig- 2: Android application handling locking mechanism

4. CONCLUSIONS

The digital smart lock is very convenient system which help user to operate it with ease. This system includes fingerprint and in-build Wi-Fi module for internet connection. The lock can be used in offline mode as user is authorized by the registered fingerprint of the legitimate user. We use firebase cloud messing service for secure communication through OTP generation.

The proposed system requires no traditional key to open or close the lock as everything is digitalized. This system solves the problem of loosing key, make it easy for the user to handle the lock just by using their finger as a key and also giving the user access through the android application.

5. REFERENCES

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