REVA UNIVERSITY
Bengaluru, India

SCHOOL OF ELECTRONICS AND COMMUNICATION ENGINEERING

A PROJECT REPORT
ON
"FINGERPRINT BASED DOOR ACCESS SYSTEM USING ARDUINO"
Submitted in fulfillment of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY
IN
ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted by

MOHITH DAS	(R20EN202)
DARSHAN AB	(R20EN180)
HARSHAVARDHAN S	(R20EN190)
JOYSON K SUNNY	(R20EN196)

Under the guidance of

NATARAJ Urs H.D
Asst. Prof., School of ECE
REVA University

May 2022
Rukmini Knowledge Park, Kattigenahalli, Yelahanka, Bengaluru-560064
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CERTIFICATE

Certified that the project work entitled "Fingerprint based door lock system using Arduino" carried out under my guidance by ***Mr. Mohith Das(R20EN202), Darshan AB(R20EN180), Harshavardhan S(R20EN190),Joyson K Sunny(R20EN196)***, a bonafide students of REVA University during the academic year 2020-21, is submitting the projectreport in partial fulfillment for the award of **Bachelor of Technology in Electronics and Communication Engineering** during the academic year **2021–22**. The project report has been tested for plagiarism and has passed the plagiarism test with the similarity score less than 25%. The project report has been approved as it satisfies the academic requirements in respect of project work prescribed for the said degree.

Signature with date

Mr. Nataraj Urs H.D
Internal Guide

Signature with date

Dr. R.C. Biradar
Director

Signature with date

Dr. M Dhanamjaya
Vice Chancellor

Name of the Examiner with affiliation **Signature with Date**

1.

2.

DECLARATION

We, Mr **Mohith Das**(R20EN202), **Darshan AB** (R20EN180), **Harshavardhan S** (R20EN190), **Joyson K Sunny**(R20EN196), students of B. Tech, belongs to School of Electronics and Communication Engineering, REVA University, declare that this Project Report / Dissertation entitled "**Fingerprint based door lock system using Arduino**" is the result the of project / dissertation work done by us under the supervision of Mr.Nataraj Urs H.D,Asst. Prof., School of ECE REVA University.

We submitting this Project Report / Dissertation in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology in Electronics and Communication Engineering** by the REVA University, Bengaluru during the academic year 2021-22.

We declare that this project report has been tested for plagiarism and has passed the plagiarism test with the similarity score less than 25% and it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

We further declare that this project / dissertation report or any part of it has not been submitted for award of any other Degree / Diploma of this University or any other University/ Institution.

1.
2.
3.
4.

(Signature of the Students)
Signed on 14nd May 2022.

Certified that this project work submitted by Mr ***Mohith Das****(R20EN202),* ***Darshan AB*** *(R20EN180),* ***Harshavardhan S****(R20EN190),* ***Joyson K Sunny****(R20EN196), has been carried out under my / our guidance and the declaration made by the candidate is true to the best of my knowledge.*

Signature of Guide
Date: 14nd May 2022

Signature of Director
Date: 14nd May 2022 .
Official Seal of the School

ACKNOWLEDGEMENT

We feel it's my duty to acknowledge the help rendered to me by various persons. With immense pleasure, We express my sincere gratitude, regards and thanks to my project guide **Mr. NATARJ Urs H.D**Asst. professor, School of Electronics and Communication Engineering, REVA University, Bengaluru for providing me with enough technical guidance, motivation and all the support needed throughout the course of my project work. We can never forget hisvaluable guidance and timely suggestion given to me.

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ABSTRACT

From earlier times, security was and also till now is an issue of concern in our households and also in office, shops, etc. Everyone has a fear of unauthorized person entering to their home or office without their knowledge. The normal door can be fitted with locks which are capable of breaking with the use of an alternate key. Alternatives to this system can be found like the password or pattern system in the locks which again has the possibility of getting exposed and opening the lock. So, a solution to such problems can be by combining door lock with biometrics. Biometric verification is any means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures. Here we will use fingerprint for biometric verification as it is one such thing which is unique to every individual and the use of fingerprint as the key to door locks can overcome the security problem of unauthorized people trespassing to our homes, shops, offices, etc to a great extent as duplicacy in such key is not possible. From earlier times, security was and also till now is an issue of concern in our households and also in office, shops, etc. Everyone has a fear of unauthorized person entering to their home or office without their knowledge. The normal door can be fitted with locks which are capable of breaking with the use of an alternate key. Alternatives to this system can be found like the password or pattern system in the locks which again has the possibility of getting exposed and opening the lock. So, a solution to such problems can be by combining door lock with biometrics. Biometric verification is any means by which a person can be uniquely identified by evaluating one or more distinguishing biological traits. Unique identifiers include fingerprints, hand geometry, earlobe geometry, retina and iris patterns, voice waves, DNA, and signatures. Here we will use fingerprint for biometric verification as it is one such thing which is unique to every individual and the use of fingerprint as the key to door locks can overcome the security problem of unauthorized people trespassing to our homes, shops, offices, etc to a great extent as duplicacy in such key is not possible. Also, this system will not lead to problems like losing keys because we do not require carrying keys if this system is used instead of traditional locks. So, using arduino we will try to implement the system with features which will increase the security level.

CHAPTER 1

INTRODUCTION

This paper is about solving the problem regarding security of unauthorized people trespassing in our home, shops or offices. Security issues can be fixed using traditional locks but there is always possibility of someone opening the lock even without breaking it with the use of duplicate key. Using these kinds of locks also create problem if we lose keys and also we have to carry keys along with us always. Again, using patterns in the locks can increase security but again it can be opened if somehow the passwords or patterns are known. So, leaving every system in this project we will implement a system using biometrics. In case of biometrics, the pattern which will be used as key will be unique. Here, to implement the project we will use fingerprint as the key. This arduino project will make use of different devices for the implementation of the security lock. In simple words, we can say that we are implementing a door access system using arduino which make use of fingerprints to identify whom to allow and who not to allow inside our homes, offices, shops, etc. We are trying to implement it using a normal and simple door lock which is fitted in every home so as to minimize the cost of the device.

CHAPTER 2

LITERATURE SURVEY

"Arduino Based Smart Fingerprint Authentication System."- In today's world Home, offices, shops, banks need excessive security measure for safety motive. To supply security for these area, smart lock system is initiated. There are numerous innovational smart door locks are created to lock and unlock the system. These type of locks has fingerprint, RFID card, pin, password or IOT by unlocking the system using mobile phone. User using these kinds of bolting system either utilize pin number or fingerprint or RFID card to unlock the system. These system does not have security pecking order to grow the security. To grow the security the user should unbolt the system by minimal two security order. Nowadays office/corporate territory security is a vital problem faced by everyone when far from home or at the home. When it comes to the security systems, it is one of the key worries in this occupied-merciless world, where people cannot get ways to provide security to their important possessions manually. Instead, they finds a different solution that provides better, dependable and atomized security.This is a time, where everything is attached through network,where anyone can get hands on information from any place around the globe. Thus possibilities of one's information being hacked are a serious affair. Due to these chaces, it's very crucial to have some kind of personal recognition to enter one's own info. These days personal identification is becoming an principle affair all around. Among normal personal recognition techniques we mostly see password and identification cards methods. But it is easy to hack password now, and identification cards may get loose, thus making these methods quite unreliable. The blueprint and execution of fingerprint based lock system is customizable and adjustable. This door locking apparatus is comparatively cost-effective than the already made lock systems in the conventionl market.

Our fingerprint based lock system has high correctness rate and is also rapid to identify fingerprints which authorize flawless combination with the users and gives away tighter security. The design of security door lock using the finger print technology was built around a Micro Controller Unit (MCU), PIC16F628A, which reads in finger prints from finger print scanner and grant access, to a protected compartment, only to pre-registered finger prints. The finger print scanner serves as the main input into this embedded security system. Finger prints read are compared to those ones pre-programmed into the memory of the microcontroller. When a match is made, the microcontroller outputs a HIGH which activates the transistor-relay switching stage that controls opening and closing of the modelled motorized door granting access into the protected building. An alphanumeric liquid crystal display (LCD) is used in this design to show the operating status of this embedded embedded security.

CHAPTER 3

METHODOLOGY

Methodology

The basic idea behind our project is shown in the diagram above. Let, us understand the diagram in details with:

1. The finger is first scanned.
2. The scanned fingerprint if matches with the fingerprint stored in the system unlocks the door hook with the help of servo motor.
3. The scanned fingerprint if do not match with the fingerprint stored in the system then the unauthorized person will not be allowed to enter but still if again unauthorized person tries to access the door more than three times then two things will happen to data i.e fingerprint and photograph are stored in the system. A message will be send to the owner to notify about the unauthorized access.
4. The door automatically locks again after 6 seconds.

So, to carry out the mentioned functionalities, the basic devices we will require are

1. Fingerprint Scanner- This scans the finger for fingerprint.
2. GSM Module- Used to send messages to the owner.
3. Camera- Used to capture images if unauthorized access is tried.
4. Servo Motor- Used to lock or unlock the door.
5. Adapter- To provide power source to the system.
6. Jumper Wires- To connect all devices with each other.

Hardware and Software Description

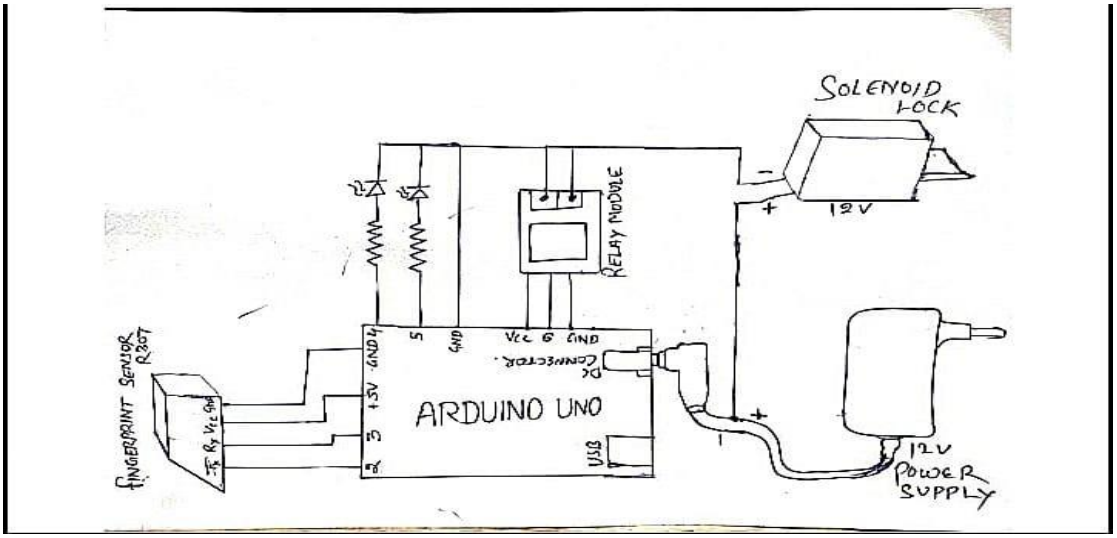
Hardware Description

Hardware requirement

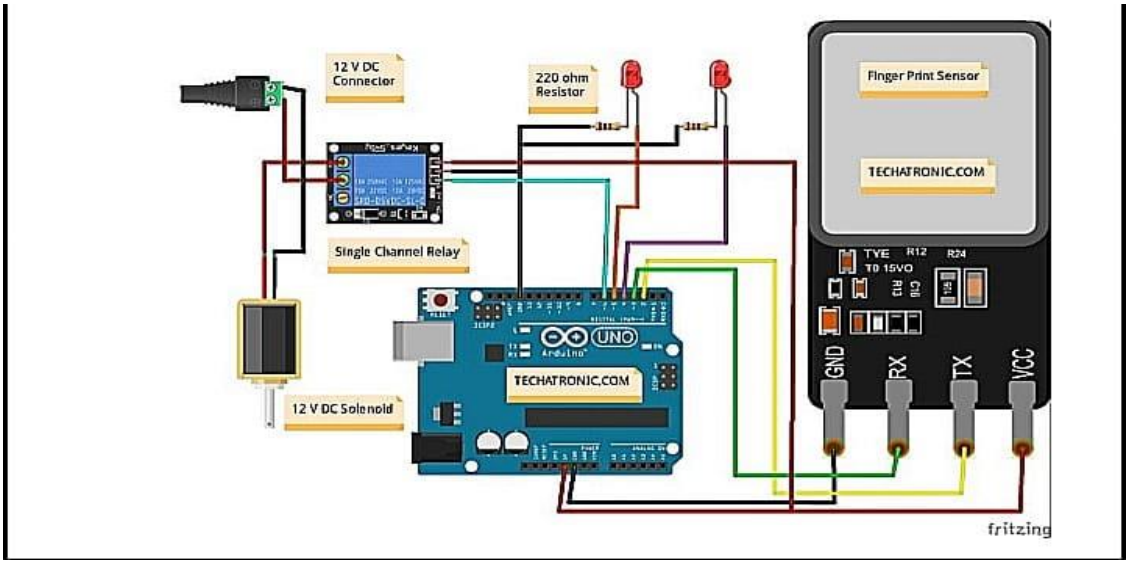
Components	Specification	Description
1. Arduino UNO 	1. Operating Voltage: 5 Volts 2. Input Voltage: 7 to 20 Volts 3. Digital I/O Pins: 14 (of which 6 can provide PWM output) 4. PWM Pins: 6 (Pin # 3, 5, 6, 9, 10 and 11) 5. Power Sources: DC Power Jack and USB Port	Arduino UNO is an open source microcontroller board. The board is set of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE(Integrated Development Environment) through a type B cable.
2. Solenoid 	1. L106 32-bit RISC microprocessor core 2. Memory: • 32KiB instruction RAM • 80 KiB user-data RAM • 16 KiB ETS system-data RAM 3. 17 GPIO pins 4. 10-bit ADC 5. Power: 3.3V DC	This wifi module is a low cost wifi-micro chip with built-in tcp/ip networking software and it has microcontroller capability. This module allows microcontrollers to connect to a wifi network and it makes TCP/IP connections using Hayes-style commands.

3.Fingerprint sensor 	1. Operating voltage: 3.3V to 6V DC 2. Operating current: 120mA	Fingerprint scanners are used for recognizing and authenticating the fingerprint of an individual. Fingerprint sensors are safe reliable devices for any security authentication
4. Single Channel Rellay 	1. Operating voltage: 3.7-6V DC 2. Operating Current:2mA	Relay is an electromechanical device that uses an electric current to open or close the contacts of a switch. The single-channel relay module is much more than just a plain relay, it comprises of components that make switching and connection easier and act as indicators to show if the module is powered and if the relay is active or not..

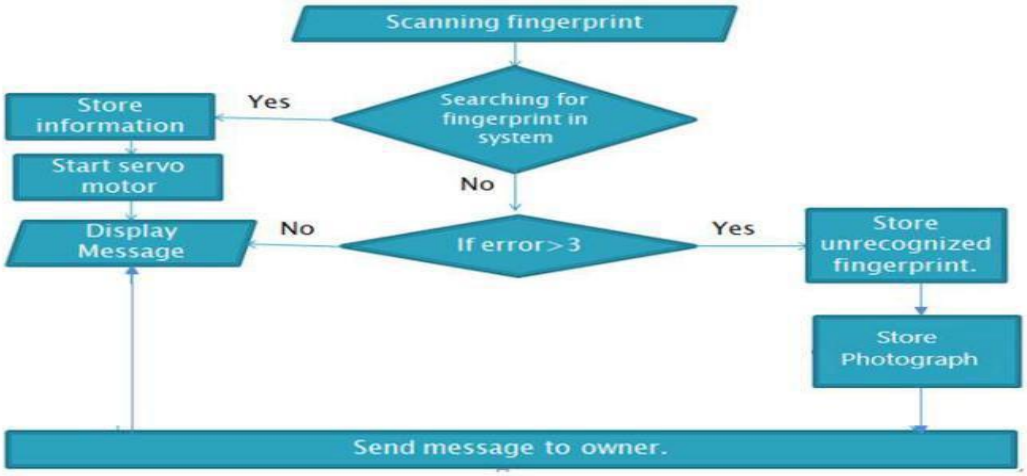
3.1 Circut Diagram:



Online Stimulated Diagram:



Flowchat:



Step1: The fingerprint is scanned.
Step2: The fingerprint is put in a condition where it scans for the match of the fingerprint.
If match is found, it moves to step 3. Else it moves to step 6.
Step3: The information of the person is recorded like name, time of entry/exit.
Step4: The servo motor is started and accordingly the hook lock connected to the servo motor does its work of locking or unlocking.
Step5: A welcome message is displayed.
Step6: It will check if the unrecognized fingerprint is tried more than 3 times.
If such attempt is made, it will move to step 7. Else, it will move to step 10.
Step7: Store the unrecognized fingerprint.
Step8: Store photograph of unauthorized user.
Step9: Send message to the owner.
Step10: Display error message.
Step11: Repeat Step9.

CHAPTER 5

CONCLUSION

We have tried to solve the security matter in door by bringing the concept of biometrics along with the door lock. So, for that purpose we are using finger prints as unique key to implement a device so as to lock or unlock a door. We have discussed about the different components using arduino we would require to implement our project i.e we have given the hardware and software requirements in the project. We have gone through different research papers and then given a brief about the papers and after studying the papers we have come with an algorithm as to how our system will work. We have also given a project description diagram and also a cost structure so as to get to a price if it is sold as a product. We have shown a block diagram and a probable connected diagram of the components and also given the future possibilities in our project.

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