

Fingerprint Based Lock System

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Abstract:

The fingerprint identification has been used widely due to its better security and easier access. A fingerprint locker system using microcontroller uses fingerprint sensor as a process of verifying the fingerprint image to open the electronic lock. Verification will be completed by comparing the data of authorized fingerprint image with incoming fingerprint image. The incoming fingerprint image will first go through the extraction and filtering processes through which the information about it is obtained. Then the information of incoming fingerprint image will be compared with the authorized fingerprint image. In this work, the fingerprint module will be trained to learn and identify whether the incoming fingerprint image is genuine or forgery.

Introduction:-

The conventional locks are subjected to many problems like poor security, slow operation, lock seizures, key problem and many more. The people around the world faces these problems often, so to overcome these basic issues we have proposed a system which can up with these effectively.

The proposed system consist of an Arduino Uno micro-controller, fingerprint module, solenoid lock, relay board and a transistor. After switching on the supply, when someone places the finger on the fingerprint module, a comparison process is done which compares the fingerprint image with the authorized image. If the image matches, then the Arduino will send a signal to the relay board which will unlock the solenoid lock. The lock will remain open for about 5 seconds and then it will close automatically.

Project Overview:

The Finger print based security system can be used at many places like Industries, Offices, and Colleges or even at our home. This project is a fine combination of “Biometrics technology” and “Embedded system technology”.

The Fingerprint sensor is the most important of the system as it matches the fingerprint image with the authorized image. In this project we have used optical fingerprint sensor. The main parts of this project are Arduino Uno Microcontroller, Fingerprint module, Relay board, transistor and solenoid lock. User has to place his/her finger on the optical sensor part of fingerprint module. The main feature or specialty of fingerprint is that it is unique. It gives this project the high level security than other security systems. Person recognition using the Fingerprint identification is used since a long time.

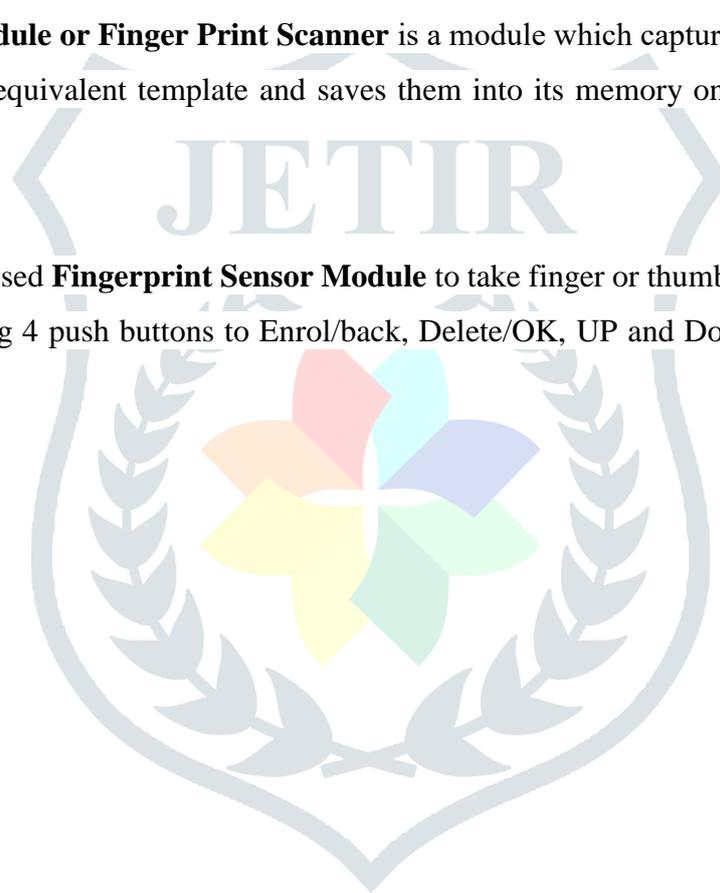
System Architecture:-

The Arduino micro controller contains the complete code which is required for the proper functioning of this system. The Arduino boards are equipped with set of digital and analog input/output pins that may be connected to different circuits.

A solenoid lock has been used to lock the handle of the lock. It is a very simple component that includes a coil of wire that is covered around a core made out of a metal. When a current is applied to the solenoid, it has the effect of assembling a consistent magnetic field. Electricity changes to magnetism then it changes to electricity and, therefore, these two forces are united into one. This mechanism has been used in this lock for locking process.

Finger Print Sensor Module or Finger Print Scanner is a module which captures finger's print image and then converts it into the equivalent template and saves them into its memory on selected ID (location) by Arduino.

In this **Project**, we have used **Fingerprint Sensor Module** to take finger or thumb impression as input in the system. Here we are using 4 push buttons to Enrol/back, Delete/OK, UP and Down. Every key has double features.





Enrol key is used for enrolling new finger impression into the system and back function as well. Means when the user wants to enrol new finger then he/she needs to press enrol key after which fingerprint module will start blinking and then the user have to place his/her finger on the module to enrol his fingerprint . Means enrol key has both enrolment and back function. **DEL/OK key** also has same double function like when user enrolls new finger then he/she need to select finger ID or Location by using another two key namely UP/MATCH AND DOWN/MATCH now user needs to press DEL/OK key (this time this key behaves like OK) to proceed with selected ID or Location. UP/DOWN keys also support Finger print match function.

Working:

The working of the system is quite simple. First we have to enter the data into the database of finger print sensor, for this we have to take impressions of fingerprints of that person whom we want to give access to our

security system. This can be done by using push buttons once or whenever a new entry has to be added in the system. Now when the user places the finger on the fingerprint module then the system compares the fingerprint input received at its optical plate with the previously stored fingerprint from its flash memory. If the entry matches with the memory then it gives out ok signal along with the identity number of that person. But if the entry does not match with the memory then it gives out error signal. The output received from fingerprint sensor is given to the microcontroller. Microcontroller then compares these output data. Function of microcontroller is to turn on the respective device depending upon the input received. In case of OK signal from fingerprint module, microcontroller turns on Relay which in turns on the solenoid lock and the lock will remain open for about 5 seconds, then it will close automatically.

Conclusion:-

The aim of the work is to design a fingerprint lock system that can be used to lock and unlock a door system but its use can be extended to other electronic locking systems such as vaults. Having realized the device and found it working properly according to its design specifications and couple with the facts that relatively cheap components were involved in its realization, the aim of the research can be said to be achieved. The system can be used as an effective security lock.

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