Finger Print Based Security System

Abstract

Security is a major concern in our day to day life, and digital locks have become an important part of these security systems. There are many types of security systems available to secure our place. Some examples are PIR based Security System, RFID based Security System, Digital Lock System, bio-matrix systems, Electronics Code lock. In this post, we will Interface a Fingerprint Sensor Module with Microcontroller and will build a Fingerprint based Security System with door locking. Finger Print is considered one of the safest key to lock or unlock any system as it can recognize any person uniquely and can't be copied easily.

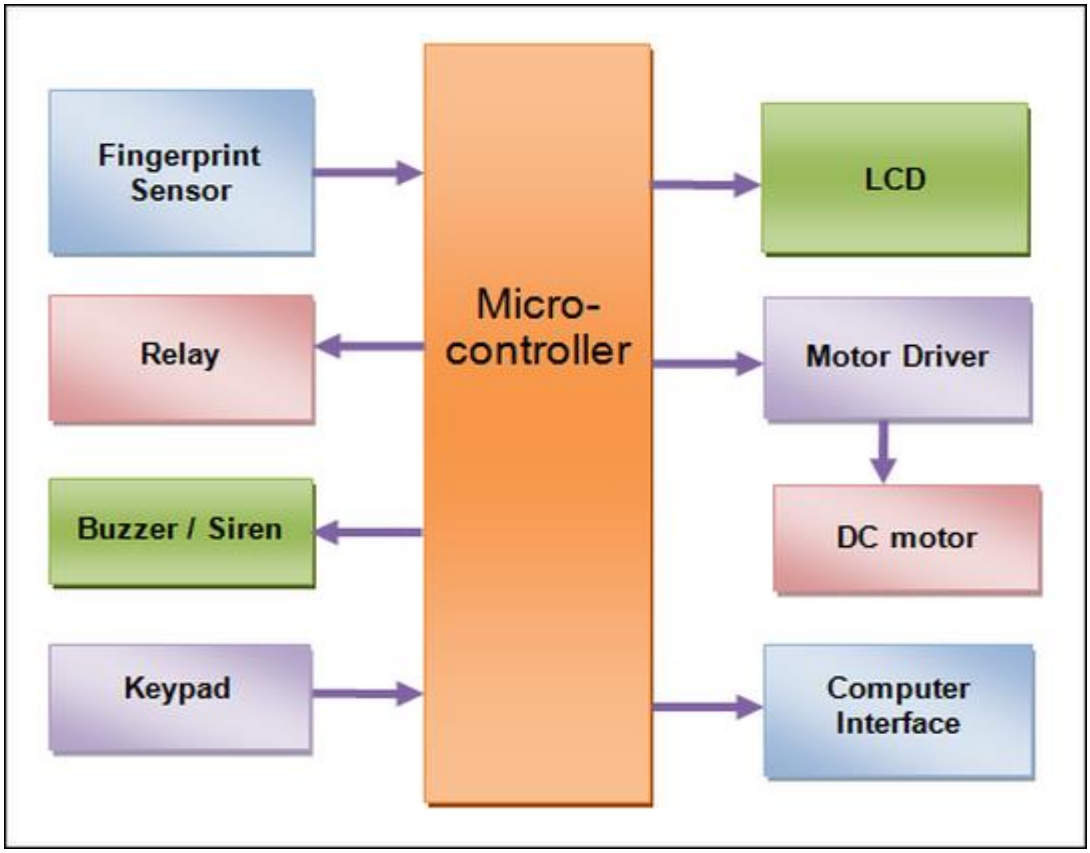
.

Introduction

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". Fingerprint sensor is the main part of this system. It makes use of Biometric sensor to detect fingerprint. It is also called as Biometric sensor. Fingerprint sensor uses various types of techniques like ultrasonic method, optical method or thermal technique. In this project we have used optical fingerprint sensor. Main blocks of this project are Microcontroller, Fingerprint module, Buzzer, Relay, Keypad, LCD display and Motor. User has to place his/her finger on the optical sensor part of fingerprint module. We have seen Password based security system RFID based security

system. 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. Most common example is use in the criminal cases.

Block Diagram



Component

1) Fingerprint sensor: We have used R305 Finger Print Sensor. It has an Optical biometric fingerprint reader. It also has inbuilt flash memory. It performs the function of image processing and gives out data on its output pin.

2) Microcontroller: This is the CPU (central processing unit) of our project. We are going to use a microcontroller of 8051 families. The various functions of microcontroller are like: I. Reading various digital input signals from fingerprint sensor II. Sending this data to LCD so that the person operating this project should understand the status. III. Giving the respective signal to the various output devices. Relay and DC motor for valid access and buzzer for the invalid access. IV. Sending the data to the computer using the serial port. This data consists of the status of valid or invalid access

3) LCD Display: We have used 16×2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters.

4) Buzzer: We are going to use a buzzer to indicate the invalid access to open the door.

5) Keypad: User will enter various commands using the keypad. Various keys of the keypad are as following, I. Add fingerprint entry II. Search fingerprint III. Empty the database of fingerprint module

Application

1. Industrial application: *"Fingerprint-based security system"* project can be used by the employees, staff or workers in various industries like Automobile industries, manufacturing industries, Software development companies.

2. Home or domestic application: This project can be used to automate the door locking process at our home, so the user needs

not to carry the door lock keys along with him, he can just use his/her finger to open the door

3. Bank Lockers or security safes: Many of the banks use key based or password based locks for their lockers or safes. We can implement Fingerprint based bank locker system using this project.

Advantage

1. **Fingerprint based security system** is the most secured system as compared to other systems. Reason is that RFID card or Keys of lock can be stolen, password may be leaked. However thumbnail of every human being is unique, so lock will not open unless the same person is present to give the impression of fingerprint.

2. No need to carry the keys to open the lock. Or even there is no need to remember the password or any Pin number.

3. One of the main advantages is that this system remembers the stored password even if the power supply is turned off.

4. Scientific research and studies have proved that **fingerprints do not change** as you grow up.

5. Using Fingerprint **saves time** to gain access as compared to other methods like RFID card, Password or Key.