RFID & FINGERPRINT BASE DOOR LOCKED SYSTEM

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ABSTRACT

In our day-to-day life securities become very serious issue. In that digital locker play an important role in it. In this world everything can be copy or can be hacked by the other person, but the only one thing is which is unique is the fingerprint every. Person have unique fingerprint which cannot be copy . Thus fingerprint sensor is considered as the safest loc lock is safest lock. The project is combination of biometric technology and embedded system. In this project we will learn how ESP32 fingerprint sensor will work. The ESP32 simple interference with R305 sensor model.

INTRODUCTION

Security has always been the first priority problem for the house and the office environment. to solve this problem many things are done many door lock systems have several problem need which make it's easy to anybody enter in dzire place those it become a in security lifestyle and working environment additionally terrorism and other rise access to place have become a major issue in our days to prevent a secure Life style and working environment it is necessary to have a perfect security system in our daily life all are busy in their work where human cannot find security to their confidential human find out the alternative solution on that which provide them reliable security as this is 21st century where all are connected to the network so everyone can hold info around the worldwide but their all also chances of hack of information too much on this basis there should be have some personal on info which can access by own among these we several time password or card but it can to overcome with this problem with their should we have some strong security which can access by owner only also some situation like rocking herself out of the house or working place area or forgot the keys anywhere also the thief can enter in Indore but if sometimes both are out of there not any emergency outline in that cause west of time we can see who needs the key overcome all this problems the main the main concept of the project is the finger print door lock system which can provide better security where people don't need to remember their password or to carry on the keys like this give the system is built on their home or offices people will not get time waste while emergency and they can go freely to the work.

26

OBJECTIVE

- To access the authorised person by the virtue of recognising their unique fingerprint.[9]

- To develop an access control system using the fingerprint technology and a demonstrated the use of the biometric and embedded system.[9]

- To ensure better safety and also at organisation to ensure authorized access.[9]

- To provide security to opening the door with the help of fingerprint and RFID card module [9]

LITERATURE REVIEW

A.Fingerprint Based recognition system:

In the Fingerprint based existing attendance system, a portable fingerprint device need to be configured with the students fingerprint earlier. Later either during the lecture hours or before, the student needs to record the fingerprint on the configured device to ensure their attendance for the day. The problem with this approach is that during the lecture time it may distract the attention of the students.[1]

B.RFID(Radio Frequency Identification) Based recognition system:

In the RFID based existing system, the student needs to carry a Radio Frequency Identity Card with them and place the ID on the card reader to record their presence for the day. The system is capable of to connect to RS232 and record the attendance to the saved database. There are possibilities for the fraudulent access may occur. Some are students may make use of other students ID to ensure their presence when the particular student is absent or they even try to misuse it sometimes.[1]

C.Iris Based Recognition System:

Number equations consecutively. Equation numbers, In the Iris based student attendance system, the student needs to stand in front of a camera, so that the camera will scan the Iris of the student. The scanned iris is matched with data of student stored in the database and the attendance on their presence needs be updated. This reduces the paper and pen workload of the faculty member of the institute. This also reduces the chances of proxies in the class, and helps in maintaining the student records safe. It is a wireless biometric technique that solves the problem of spurious attendance and the trouble of laying the corresponding network.[3]

D.Counterpart Approach to Attendance and Feedback System using Machine Learning Techniques:

In this paper, the idea of two technologies namely Student Attendance and Feedback system has been implemented with a machine learning approach. This system automatically detects the student

performance and maintains the student's records like attendance and their feedback on the subjects like Science, English, etc. Therefore the attendance of the student can be made available by recognizing the face. On recognizing, the attendance details and details about the marks of the student is obtained as feedback.[3]

E.Automated Attendance System Using Face Recognition:

Automated Attendance System using Face Recognition proposes that the system is based on face detection and recognition algorithms, which is used to automatically detects the student face when he/she enters the class and the system is capable to marks the attendance by recognizing him. Viola-Jones Algorithm has been used for face detection which detect human face using cascade classifier and PCA algorithm for feature selection and SVM for classification .When it is compared to traditional attendance marking this system saves the time and also helps to monitor the students.[3]

METHODOLOGY

1) ESP 32 Microcontroler:

ESP32 is series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. ESP32 is highly-integrated with in-built antenna switches, power amplifier, low-noise receive amplifier, filters, and power management modules. ESP32 adds priceless functionality and versatility to your applications with minimal Printed Circuit Board (PCB) requirements. ESP32 can perform as a complete standalone system or as a slave device to a host MCU, reducing **communication** stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.[7]

ESP32 Module

Features:

- Uses less than 5uA

- On board CP2102 USB to TTL converter

- Voltage Requirement : 3.3V

- Memory: 520 KB SRAM

- Wi-Fi + BLE module

2) Fingerprint Scanner Module:

Biometric sensors are used to capture the biometric characteristic of an individual. First, sensors are used to capture the biometric data to be stored as templates. After that, each template is tagged with the corresponding name. This is the R307 Optical Fingerprint Reader Sensor Module. R307 fingerprint module is a fingerprint sensor with a TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The FP module can directly interface with 3.3 or 5v **Microcontroller**. A level converter (like MAX232) is required for interfacing with PC serial port. Integrated image collecting and algorithm chip together, ALL-in-One Fingerprint reader can conduct secondary development, can be embedded into a variety of end product.[8]

29

R307 Fingerprint Scanner Module

Features*:*

- Supply voltage DC 4.2 – 0.6V
- Supply Current 50 mA
- Low power consumption
- Search method (1:N)

3) RFID Reader:

A. What is RFID (radio frequency identification)?

RFID (radio frequency identification) is a form of wireless communication that incorporates the use of electromagnetic or electrostatic coupling in the radio frequency portion of the electromagnetic spectrum to uniquely identify an object, animal or person[11]

B.How does RFID work?

Every RFID system consists of three components: a scanning antenna, a transceiver and a transponder. When the scanning antenna and transceiver are combined, they are referred to as an RFID reader or interrogator. There are two types of RFID readers -- fixed readers and mobile readers. The RFID reader is a network-connected device that can be portable or permanently attached. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data.The transponder is in the RFID tag itself. The read range for RFID tags varies based on factors including the type of tag, type of reader, RFID frequency and interference in the surrounding environment or from other RFID tags and readers. Tags that have a stronger power source also have a longer read range.[11]

Features:

- Support wide voltage : 3.3 V - 5 V
- Color- Blue
- Size: 0.96 inch

- Resolution: 128 x 64
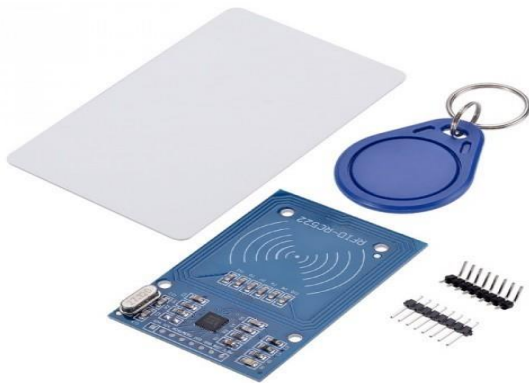
RFID READER

4) Keypad 4x3

The keypad is implemented for third person who wants the access. It will open only if the correct password or pin is entered.[13]

Keypad 4X3

5) LCD16x2:

This board has a PCF8574 I2C chip that converts I2C serial data to parallel data for the LCD display. The I2C address is 0x3F by default, but this can be changed via 3 solder jumpers provided on the board. This allows up to 3 LCD displays to be controlled via a single I2C bus (giving each one its own address). [12]

Realy

Flow Chart:[9]

LCD 16x2

Features:

- mm 5V power supply

- Serial I2C control of LCD display using PCF8574

- Back-light can be enabled or disabled via a jumper on the board

- Contrast control via a potentiometer

- Can have 8 modules on a single I2C bus (change address via solder jumpers)address, allowing

- Size : 41.6mm x 19.2

6) Relay:

Relays are output devices which are used to control or operate some external devices. This is a 5 volt Isolated relay module which means that there is a optocoupler used in between your control circuit and the relay thus protecting your circuit in case of any short circuit issues on the relay side. The relay is driven safely by BC547 transistor which is triggered via an Optocoupler IC which serves as isolator between your microcontroller and the relay.[9]
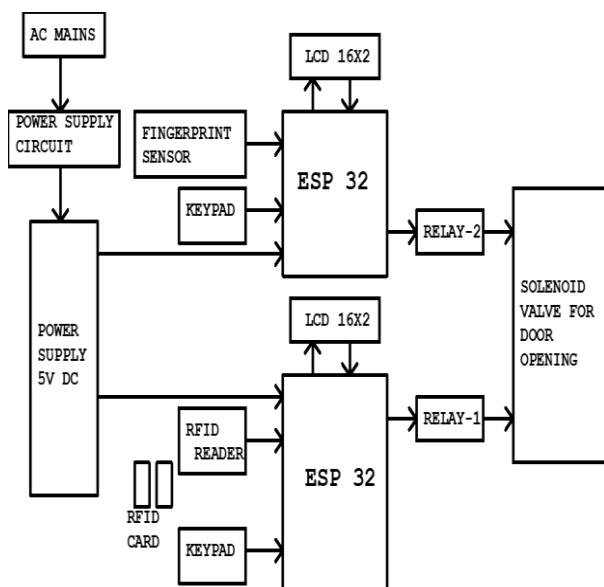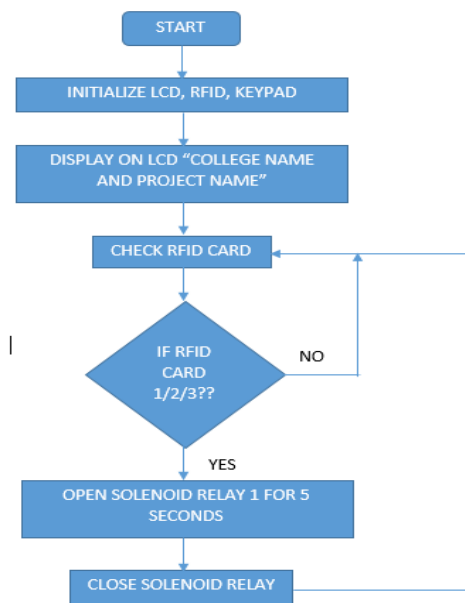
Circuit Diagram

ADVANTAGES:

- To access the authorised person by the virtue of recognising their unique fingerprint.
- To develop an access control system using the fingerprint technology and a demonstrated the use of the biometric and embedded system.

- To ensure better safety and also at organisation to ensure authorized access..
- To provide security to opening the door with the help of fingerprint and RFID card module

DISADVANTAGES

- The system has inability to enroll some users
- The accuracy and working of system is affected by skin condition of people.
- The system is associated with forensic application.
- There are health issue involved due to touching of single scanning sensor device by counting number of individuals.

CONCLUSION

In this work, a model of an IoT-based fingerprint-controlled door system that uses multi access authentication method is presented. We have implemented a digital security system contains door lock system using passive RFID and Biometric as well. A centralized system is being deployed for controlling and transaction operations. The door locking system functions in real time as when the user put the tag in contact with the reader, the door opens if the card is of authorized person and the door will also open after successful submission of the biometric. The system provides the ease of solution and provide high security for door lock system

REFERENCE

[1] By Sarah Amsler, Managing Editor Sharon Shea, Executive editor.

[2] Programming languages, frameworks, platforms, and environments used for ESP32 programming.

[3] Visual Studio Code with the officially supported Express if Integrated Development Framework (ESP-IDF) Extension.

[4] Arduino IDE with the ESP32 Arduino Core Micro Python A lean implementation of Python 3 for microcontrollers.

[6] Espruino – JavaScript SDK and firmware closely emulating Node.js Lua Network/IoT toolkit for ESP32-Wrove.

[7] Mongoose OS – an operating system for connected products on microcontrollers; programmable with JavaScript or C. A recommended platform by Espressif Systems, AWS IoT, and Google Cloud IoT.

[8] Mruby for the ESP32NodeMCU – Lua-based firmware Zerynth – Python for IoT and microcontrollers, including the ESP32.

[9]International Journal of Engineering and Advance Technology. ISSN: 2249-8958, Volume-8, Issue-3S.

[10] Chao, C.C.; Yang, J.M.; Jen, W.Y. Determining technology trends and forecasts of RFID by a historical review and bibliometric analysis from 1991 to 2005.

[11] Amendola, S.; Lodato, R.; Manzari, S.; Occhiuzzi, C.; Marrocco, G. RFID Technology

[12] Reddy, B. M. M., & Srihari, D, 2015, RFID Based Biometric Voting Machine Linked To Aadhaar For Safe And Secure Voting. International Journal of Science, Engineering

[13] Mansingh, P. M. B., Titus, T. J., & Devi, V. S. S, 2020, A Secured Biometric Voting System Using RFID Linked with the Aadhar Database. 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), Coimbatore, India, 2020. 1116-1119.