

FACE RECOGNITION BASED BIOMETRIC ACCESS CONTROL USING IoT.

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ABSTRACT

A device which verifies Biometric for general-purpose Access Control for college, office and places where Visitor verification assumes a critical job. The device primarily focuses on verifying individual identification based on Biometric information like Facial and Fingerprint. In this System, we collect information of student or employee of an institute and generate UID associated to data and RFID UID is linked to a particular user, this provide institutes with a multi-level/Multi-factor security authenticates an individual with high accuracy & use them daily for the purpose of authentication of a user without a load on server and friendly UI. This User interface device will also help to collect attendance much easier while access authentications. In this system, we are using hardware consists of ESP8266 based micro-controller names as NODEMCU, LCD display, Web Camera module, RFID tags and RFID Reader.

Keyword: - ESP8266, RFID Reader, RFID tags, and Multi-factor security authenticates.

1. INTRODUCTION

Automatic identification and access control system has become necessary to overcome the security threats faced by many organisations in the country these days. By installing the system at the entrance will only allow the authorised persons to enter the organisation. The system can also be installed at various points inside the organisation to track the person's movement and to restrict their access to sensitive areas in the organisation. In such a way, suspicious persons can be caught which will surely improve the security level in the organisation.

This system uses three different authentication methods to verify the person. i.e. Face Recognition, Biometric and UID allocated to user. In this project we are focusing on ways to authenticating a person, here we are simulating a Aadhaar card database. Using such great innovation with a blend of the world's secured biometric and largest database aadhaar will be the greater efficiency to organisations and educational institutes.

1.1 Motivation of the Project

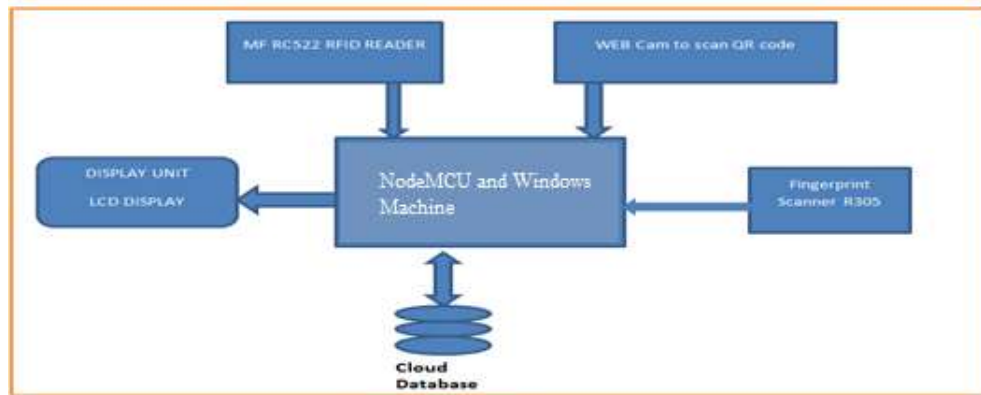
Every organisation/academic institution in recent time are adapting biometrics for authentication. Existing method is gathering biometric information in their own database this resulting same data replicating in a different database and storing data for a large-scale/huge organisation may be expensive with security warning/threats and no reusability of information makes the problem more serious. The existing method of aadhaar authentication follows keypad based input where user has to enter the last 5 digits of her/his aadhaar number. And then the system needs a fast speed internet connectivity to connect aadhaar authentication server which takes minimum of 30 seconds to 5 minutes per person. On a busy day due server issues entry/exit of person is delayed, this leads to anger and disappointment.

1.2 Objective of this paper

The objective of this paper is use to provide end to end identity of a person based on UID or Bio-metric. In this paper we are using 2 level authentications for a person and give access to him or reject him based on server response.

2. BLOCK DIAGRAM & HARDWARE DESCRIPTION

ESP8266 is core part of Project, ESP8266 integrate with Hardware like Fingerprint Module, Display unit, relay or Motor and RFID Reader. Windows Sever is Capable of capturing and Processing Video processed by web camera, It detect faces and recognise them using Python script



BLOCK DIAGRAM

Fig -1: Block Diagram

2.1 NODEMCU ESP8266 12E

NodeMCU micro-controller is IoT device which is open source. It is easy to learn and easy to implement IoT prototypes. It contains firmware operate with ESP8266 12E Wi-Fi SoC by Espressif, & hardware which is built on the ESP-12 module. The word "Node MCU" by default denotes to the firmware relatively than the dev kits. The firmware works on the Lua script. It is part of eLua project, & built on the Espresso if Non-OS SDK for ESP8266. It uses lots of open source projects, such as lua-cjson, and spiffs.

SPECIFICATIONS

- Sustenance STA/AP/STA+AP 3 operational modes
- backing multiple-channel TCP Client connection (max 5)
- Integral TCP/IP protocol stack, 0 ~ D8, SD1 ~ SD3: used for GPIO, PWM, IIC;
- the driven capacity can be arrived at 15mA;
- AD0: one-way ADC;
- Power input: 4.5V~9V(10VMAX), support USB powered and USB debug;
- Working current: $\approx 70\text{mA}$ (200mA MAX, continue), standby $< 200\mu\text{A}$;
- Transmission data rate: 110-460800bps;
- Support UART/GPIO data communication interface;
- Support update firmware remotely (OTA);
- Support Smart Link;
- Working temperature: $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$;
- Driven mode: double large-power H bridge driven
- Weight: 7g

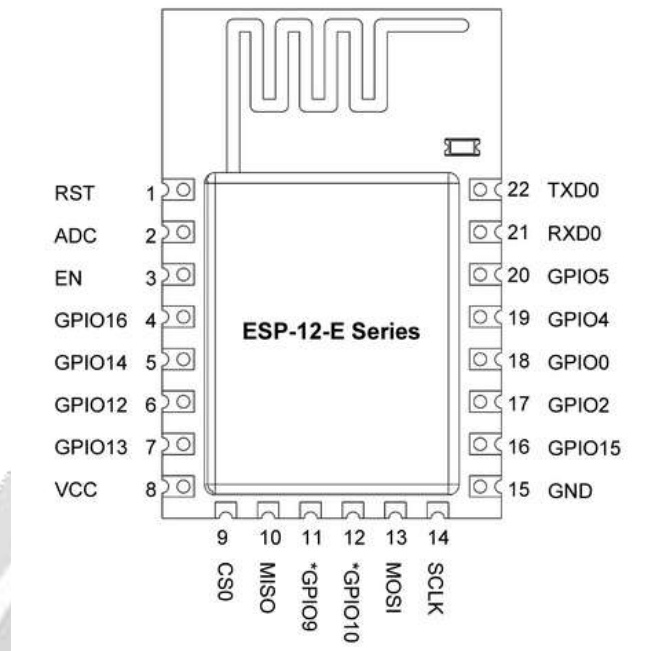


Fig-2: Esp 12-E pin Diagram

2.2 MF-RC522

MF-RC522 may be a extremely integrated reader/writer IC which use NFC (N=Near F=Field C= Communication) technology at frequency of 013.56M Hz. The MF-RC522 reader/scanner supports ISO/IEC 14443 NTAG and A/MIFARE The MF-RC522’s internal transmitter Tx is ready to enable a reader R/writer W antenna designed to talk with IEC/ ISO 14443 A/MIFARE cards & transponders while not further active electronic equipment. The receiver Rx module delivers a robust & economical implementation for cryptography & demodulating signals from IEC/ ISO 14443 A MIFARE companionable cards and transponders. Digital unit will manage the whole IEC/ ISO 14443 a error detection (CRC & parity) and framing practicality. The MF-RC522 supports MF1xxS70, MF1xxS50 and MF1xxS20 product. The MF-RC522 supports NFC (N=Near F=Field C= Communication) technology and uses MIFARE higher rate transfer accelerates to 848 kilo Bd in each directions



Fig-3: MFRC522 (Source: Google)

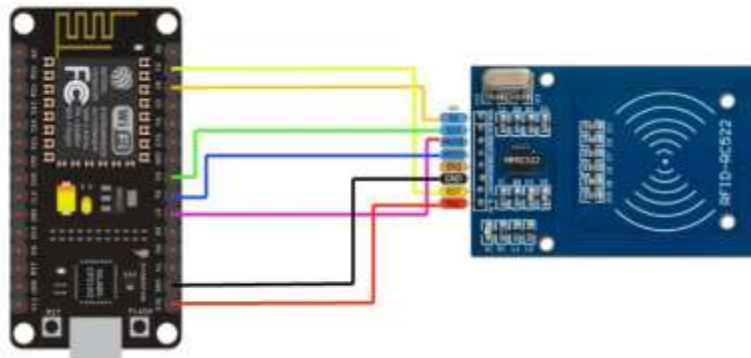


Fig-4: MFRC522 with NodeMCU (Source: Google)

2.3 Fingerprint image Scanner R305

Fingerprint is an optical type sensor with UART communication for direct contacts to PC or micro-controller UART over USB/ Max232 Serial connector. It can store the fingerprint data on board which help of inbuilt EEPROM and can organise it in 1:1 or 1: N mode for detecting and decoding the fingerprint images of person. A Fingerprint module connected directly with 3.3v or 5volts Micro-controller. A level converter TTL (like MAX232) is required for interfacing with computer serial port. Optical biometric image fingerprint scanner/reader with an great features and easily embedded into a range of end products, such as: attendance, access control, car door locks, safety deposit box

Features

- Algorithm chip together & Integrated image collecting , All-in-one
- Fingerprint reader can be embedded into a different end products
- Low power usage
- Low cost comparing to other modules
- Small size
- Brilliant performance
- Specialised optical technology
- Algorithm chip together & Integrated image collecting

2.4 LCD

- LCD of 16*2 matrix contains of 2 lines with 16 characters each.
- Every character contains of 5x7 pixel or dot matrix.
- LCD can be function in 2 modes 4-bit mode and 8-bit mode.
- Supply= 5V (4.7 to 5.3).
- Supply (I_{dd}) with max current 3.0mA Typical reaches 1.2mA.
- Contrast can be adjusted by modifying the voltage across VEE.

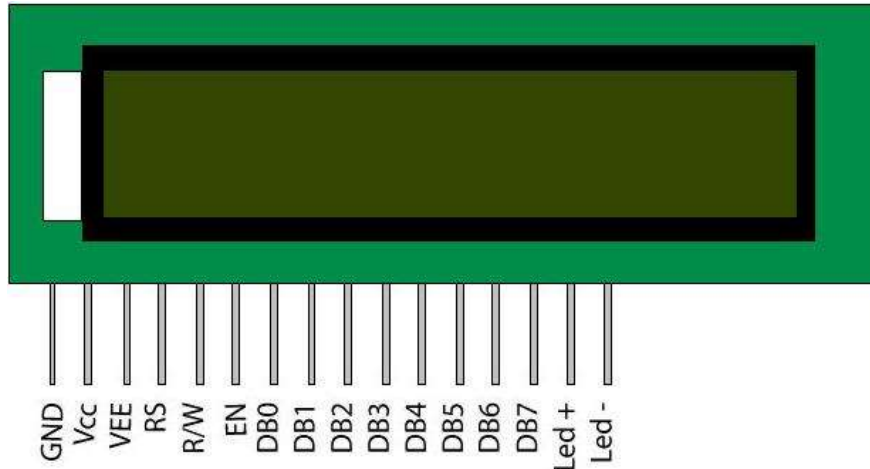


Fig-5: LCD

LCD interfacing with NodeMCU

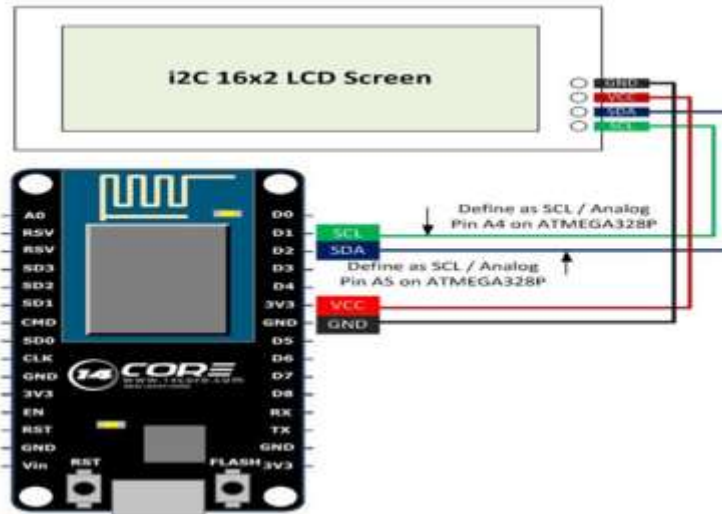


Fig-6: LCD Interface with NodeMCU (Source: Google)

3. Proposed work

In this system, It has 2 level authentication at each level we use MFA (M=Multi F=factor A=authentication) to identify an individual in a unique and fastest way.

1. Identifying the user with help of QR code or RFID UID which is generated while linking details to system
2. Biometric verification of user with UID dataset and storing information or record in database

In the first level proposed system uses an MFA (M=multi F=factor A=authentication) between RFID OR QR Code while user scan's QR-code provided by the user or alternatively RFID an NFC technology ID or tag which will identify particular user and dataset of biometric to identify the user for authentication. QR-Code and RFID both have a unique way of identification using their own of decoding data further details of working will be discussed in hardware components chapter. Second stage of MFA will be Bio-metric verification in this system we are using finger print or Face Recognition. Later data captured will be matched with dataset and records the data and stored for future calculation.

3.1 Workflow of Proposed System

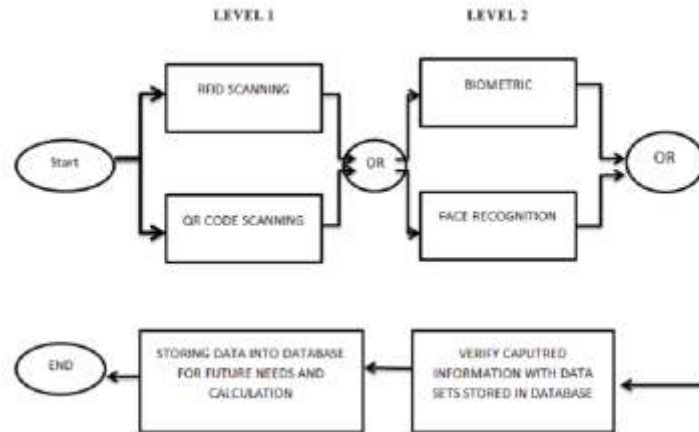


Fig -7: Workflow of Proposed System

3.3 RESULT ANALYSIS

The project is successfully working in various environments. “Students entry and exit details monitoring system” is performed successfully. The project is tested for college entrance access control. The working is successful; it has certain drawbacks when there is fluctuating power and constant internet connectivity



Fig-8: Decoding QR code with web application hosted by Windows

4. CONCLUSIONS

In this paper, an automatic UID based biometric access control system is successfully designed and implemented. Using this project genuine entry/exit of the person is recorded, monitored and maintained without any mismanagement and human intervention. entry and exit reports can be automatically mailed directly to admin and key persons smartphones through common shared cloud database thereby providing transparency. Also these reports can be accessed online through the website. Project uses NodeMCU along with single board computer for processing the information and saving it to the attendance module system. Web camera to decode QR code and MFRC522 RFID READER are used for communicating information of student UID card details and Display them

on LCD after successful biometric authentication of student the attendance will record in cloud database and saved for future uses.

5.. REFERENCES

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