YVRIDIO-T ATTENDACE STSTEM

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Abstract:

The YVRIDIO-T attendance system is going to be the latest trend of the automatic centralized attendance system. 'YVRIDIO' means Hybrid in Greek. Moreover this attendance system is fool proof because of two way authentication i.e. biometric cum RFID authentication system. This attendance system is a wireless system using IOT thus this can be used anywhere and everywhere. There is no wiring problem in this system which makes the installation of the system easy and there is no need of any specialized technicians for the installation. The details of the system are uploaded to the cloud thus the database or the attendance of the specified branch or the individual can be viewed from anywhere thus this is centralized system i.e. this system uses cloud technology.

This contains three modes of power supply, which ensures it's continues working. The system uses Arduino which is compactable, easy to use, easy maintenance, low power consumption and many more. Arduino is interfaces with the RFID and Fingerprint Sensor, which makes the system YVRIDIO (Hybrid). The each individual's Aadhaar No. is linked with their profile which makes the system easy for tracking their discrepancies (If any). And by which the system calculates the salary using the no. days present and automatically deposits the cash in their respective accounts.

I. INTRODUCTION

RFID and Biometrics methods have been individually used to solve the problem of attendance in recent years. RFID has a major security and integrity problem known as buddy punching i.e. when a user presents a card on behalf of another user without the physical presence of that user. Although biometrics solves the security problem its complexity and longer execution time due to real time interaction with a central server which could be several kilometers away has created a major setback to its implementation. This paper developed hybrid RFID with biometric security attendance system which eliminate the need for a lot of paper work and help in tracking record of events such as employee's and students' absentee with

dates which can still help organizations to have a global look. It combined the flexibility of RFID technology and the security of fingerprint biometrics.

Fig 1: Hybrid Technology

The hybrid system developed consists of the following devices RFID reader, RFID tag, fingerprint scanner, system interfaces and databases. This system was developed to make sure that the devices capture accurate data, verify the integrity using biometrics and can interact with the information system accurately and efficiently. The necessary information was represented by meaningful data model suitable for application level interactions, including monitoring, tracking and application integration. The system was further investigated when the RFID card was inside and outside wallet. The read time was used to evaluate the performance of the proposed system. This system is well useful in the institutions and in business places.

II. SYSTEM MODEL

The proposed system model consists of coordinated hardware and software designs handshaking data communications among RFID tag, RFID reader and fingerprint scanner serially interfaced to the digital computer system.

A. HARDWARE ARCHITECTURE

Six major hardware's were used for the implementation of this system namely:

Arduino, GPRS Module, RFID Card Reader, PC, Fingerprint Scanner and RFID Tag. The fingerprint sensor used here is manufactured by Adafruit. The RFID card reader and the RFID Tags are also specially made for the Arduino. The GPRS module is also made for the Arduino are readily available. Thus the only thing is to interface these in a proper manner. The Arduino is interfaced with the Fingerprint Scanner, RFID card reader and GPRS module.

a) ARDUINO

Arduino UNO is the basic and cheapest Arduino with minimum requirements available in the market. The Arduino is connected with the Fingerprint scanner, RFID card reader and GPRS

Module. The Arduino provides the interfacing between each devices.

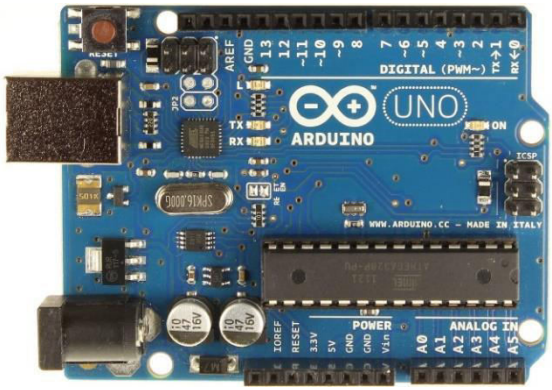

Fig 2: Arduino UNO

b) RFID CARD READER

The RFID card reader is interfaced with the Arduino and the RFID card reader is the first step of authentication. The RFID is the basic way of authentication and it is simple to use. This card reader emits the electromagnetic waves and gets back the signal from the RFID tag.

Fig 3: RFID Card Reader

c) RFID TAG

The RFID Tag is a small device which consist of the small IC setup with small induction coil and antenna setup. The induction coil is to receive the power from the RFID card reader and the data stored in the RFID tag is transmitted through the antenna. The RFID tag may be passive or active. The passive tag will receive power from the card reader by mutual induction. The active tag has a separate battery source for its operation.

Fig 4: RFID Tag

d) FINGERPRINT SCANNER

The fingerprint scanner is the device which scans the fingerprint and encodes it and sends to the Arduino. The Arduino validates the fingerprint and marks the attendance for the user. The fingerprint scanner we are using here is the optical fingerprint scanner. The optical fingerprint

scanner is the cheapest and has the moderate efficiency.

The other type of scanner that can be used are ultrasonic fingerprint sensor, thermal fingerprint sensor and capacitive fingerprint scanner.

Fig 5: Fingerprint Scanner

e) GPRS MODULE

The GPRS module is also specially available for Arduino. The GPRS module allows the Arduino to interact with the main database and the attendance registering system. The GPRS module provides the internet connectivity to the Arduino. The sim is need to be inserted into the GPRS module for the internet access. The GPRS module makes the normal attendance system to an IOT i.e. Internet Of Thing. This also makes the system from wired to wireless. For faster connectivity 3G and 4G module also can be used.

Fig 6: GPRS Module

f) RTC (Real Time Clock)

The RTC is a real time clock which is used for the live time feed for recording the date and time of the registered attendance. This can be used in case of the daily upload of the data to the database. In the case of instant upload of the data to the database there is no need for the RTC the server time will be recorded during the entry.

Fig 7: Real Time Clock

The real time clock works on the I2C technology. It consists of 5v, Gnd, SDA and SCL.

SDA – Serial Data
SCL – Serial Clock

g) SERVER

The server may be a normal pc that is connected to the internet for 24 X 7. The server has all the details of all the users their history of attendance and all the data about the user. There is also a need of the website for the feeding of the Arduino into the server. This also enables the administrator to view the attendance register of the individual or the branch from anywhere in the world. This can be also termed as cloud technology. The administrator can also feed any changes to the data in the database at anytime from anywhere. This is the specialty of the cloud technology.

Fig 8: Cloud Technology

B. SOFTWARE ARCHITECTURE

This is the application architecture which shows how to transform the logical design in to basic system coding to create the system. The result of this phase is application interface, database and system design specification. Microsoft Visual Basic .NET was used as the programming language and MySQL as the Database. The webpage is developed using the HTML. This makes the page simple and easy to design. For some graphics or styling of the page CSS can also be used.

C. DATABASE STRUCTURE

Any attendance system needs a place where its data will be saved or edited called Database of the system. The database is a very simple and efficient structure that supports easy modification and maintenance. It contains tables that represent a single subject which consists of relatively distinct fields, keeping the redundant data to an absolute minimum. Data integrity was imposed at the field, table, and relationship levels. These levels of integrity guarantee the validity of the data structures and their values accurately at all times. The database along with the details of the user it also contains the Aadhaar card number and the bank account

number in case of the office and workplaces where salary is need to be paid to the users.

III. INTERFACING CIRCUITRY

In the below section the brief description about interfacing of the Arduino with different module is given.

A. WITH RFID READER

Power supply requirement of RFID Readers vary from product to product. The RFID reader I used in this tutorial is a 12 Volts one. There are 5 Volts and 9 Volts versions available in the market. The RFID Reader and RFID Tags are frequency compatible. Generally they are supposed to be 125 KHz. There are two possible outputs from an RFID Reader. One is RS232 compatible output and other one is TTL compatible output. A TTL compatible output pin can be connected directly to Arduino.

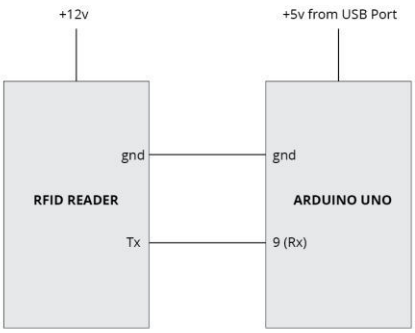

Fig 9: Interfacing RFID card reader with the Arduino UNO

Each RFID tag is a 12 character unique number. We read this 12 characters serially using Arduino. We need a two dimensional array to store multiple RFID tags. To store 10 RFID cards, we need an array of 10 rows and 12 columns.

B. WITH FINGERPRINT SENSOR

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. Here all the process is commanded by Arduino like taking an image of finger print, convert it into templates and storing location etc.

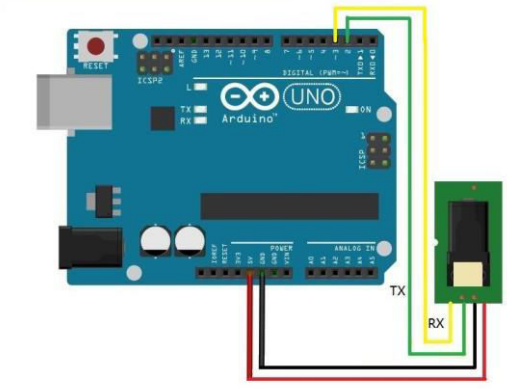

Fig 10: Interfacing Fingerprint Scanner

The fingerprint sensor consist of four wires, among them two are for the power supply and the other two are for data receiving and transmission. The power

wires are connected to the +5v supply and the gnd. The data wires are connected in the digital pins of the Arduino i.e. in pin 2 and 3.

C. WITH GPRS MODULE

SIM900 enables GPRS connectivity to embedded applications. We can implement TCP Client protocol using SIM900 TCP function AT Commands. The Transmission Control Protocol (TCP) is standard transport layer internet protocol which used in establishing and maintaining communication in between server and client. It is widely used in IoT (Internet of Things) embedded applications, where every sensor is connected to a server and we have access to control them over the internet. The GSM/GPRS module uses USART communication to communicate with microcontroller or PC terminal. AT commands are used to configure the module in different modes

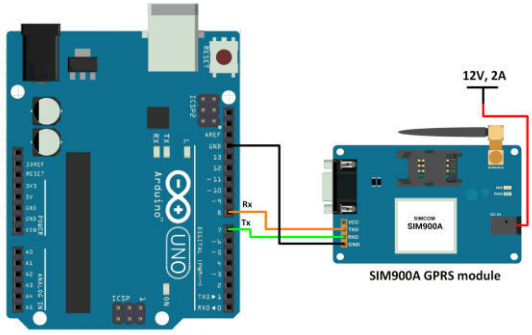

Fig 11: Interfacing with GPRS Module

The GPRS module also contains 4 wires among them two are for power and the other two are for transmitting and receiving data. The power wires are connected to the power that are requires for the module. The data wires are connected to the digital pins of the Arduino i.e. 7 and 8.

D. WITH RTC (Real Time Clock)

Real Time Clock (RTC) is used for monitoring time and maintaining a calendar. In order to use an RTC, we need to first program it with the current date and time. Once this is done, the RTC registers can be read any time to know the time and date. DS1307 is an RTC which works on I2C protocol. Data from various registers can be read by accessing their addresses for reading using I2C communication.

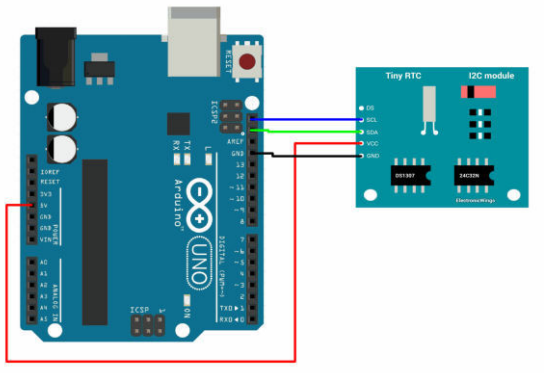

Fig 12: Interfacing with RTC

The RTC also contains 4 wires among them 2 are for power and the other two are for the data transfer. The power wires are given to the power supply and the

data wires are given to the Arduino's I2C pins i.e. SDA and SCL. Where SDA is for clock

IV. APPLICATION FLOW

This describes the operations of the main modules of the software application and their connections. It consists of three main phases namely: Enrollment, encoding, and attendance phase.

The different flow of application is are briefly explained below.

A. USER ENROLLMENT

The Enrollment phase provides the user with a form to register a student on the software's database and prepare the data for encoding onto the RFID tag. This system was equipped with necessary error trapping method to avoid saving invalid data on the database and to maintain the integrity of the data on the database. Below figure shows the flowchart of the enrollment system.

Along with this the Aadhaar card number and the bank account number is also entered into the system for the future use. The RFID tag number and the fingerprint of the user are scanned while enrolling. The Aadhaar number is used to link the user data with the Aadhaar. The Bank account number is an optional field this is only required for the automatic salary depositing system. This details are to be maintained confidentially.

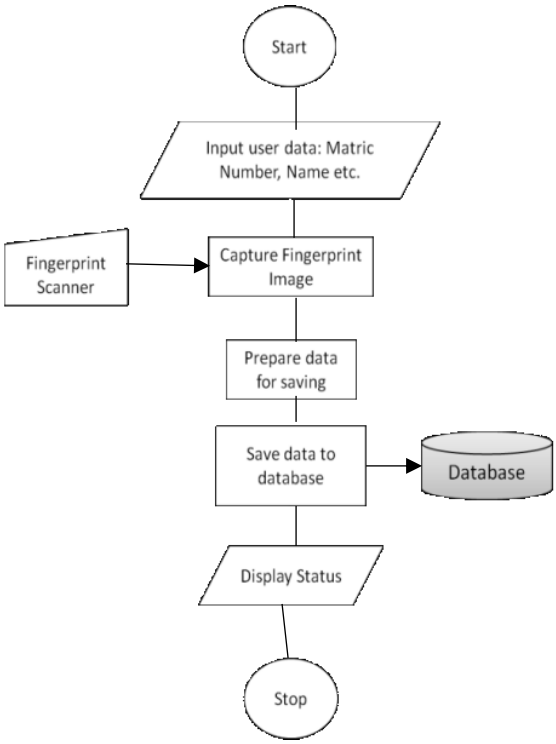

Fig 13: Enrolling User Data

B. WORKING OF APPLICATION

The attendance phase is the most functional part of the software where a new attendance instance is created and properly recorded on the database. This phase keeps tracking the activity of each student as regards to their attendance in a particular class and provides a detailed report for the user in charge at the end of the academic period. The fingerprint data stored on the RFID card along with other details was read into the computer memory. The stored data was used to authenticate the fingerprint of the user that was captured in real time by

the fingerprint scanner. This system is fully automated from the data collection to the reporting with little or no effort from the user. The flowchart of attendance system is shown in Figure

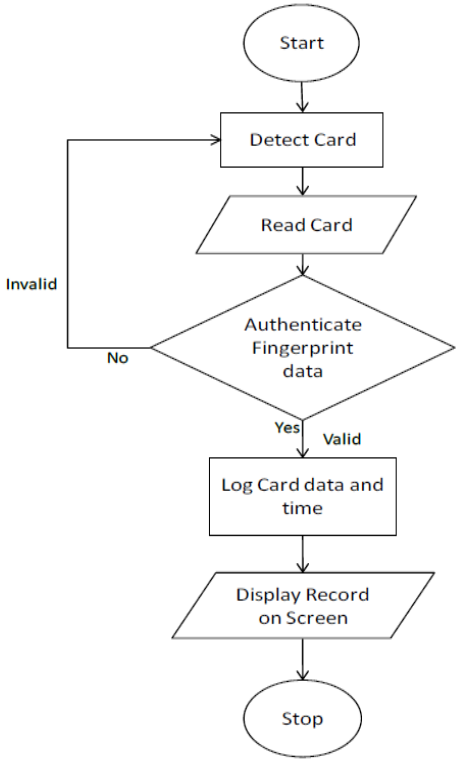

Fig 14: Application Flow Chart

C. SALARY SYSTEM (Optional)

In the end of the month the total number of days present for an individual is calculated. The database has the total number of working days in the month. The difference of them is the no. of days absent. Then the no. of days absent is cross checked with the no. of days allowed for leave with salary. The no. of days absent is subtracted with the no. of days allowed for leave with salary. Then the net no. of days absent is obtained and it is multiplied and subtracted with the total salary. Thus the net salary is obtained. The salary is deposited in the bank account of the user.

V. ADDITIONAL FEATURES

The additional features of this system are as given below.

A. THREE MODES OF POWER

The system contains three modes of power they are as follows

i. AC Powered
ii. Rechargeable battery
iii. External Battery

B. ON WALL DETECTION

As this system is the wireless system there is a hazard of theft. For this there is a sensor placed at the back of the system this ensures that the system is mounted in the wall. In case of any emergency it alerts the nearby security.

C. AADHAAR LINKED

The user data is linked with the Aadhaar. So the person external and internal affairs can be monitored. This also makes the enrollment easy.

VI. CONCLUSION

Conclusively, a hybrid (Radio-frequency Identification and Biometric Security) attendance system using students for the investigation has been developed. The system model which consists of the coordinated hardware and software design was also developed. The performance was evaluated in terms of read time with and without wallet; the work has provided a convenient and secure method of attendance compared to the traditional method of attendance system. By using database, the data was more organized. Using fingerprint data header structure provides high security and high speed performance

.

This system was also a user friendly system because data manipulation and retrieval can be done via the interface, making it a universal attendance system. Thus, it can be implemented in academic institutions or organizations.

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