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STUDENTS AUTOMATION SYSTEM USING RFID

V.Bharani[#1], S.Janani[#2], Mr.A.Kanagasabapathy[#3]
[1,2]Department of ECE, SNS College of Engineering Coimbatore - 107.
[3]Assistant Professor, Dept of ECE, SNS College of Engineering, Coimbatore – 107
Email ID: bharaniv92@gmail.com, sjanani.sundarraj@gmail.com

Abstract— Students automation system has become more important part for any organizations/ institutions. This paper presents the integration of ubiquitous computing systems in classrooms for managing student's attendance using RFID. RFID is a powerful tool which helps to manage student's attendance throughout the working day. RFID is used to solve problems where it is necessary to automatically record the student's attendance in classrooms of university environment. A real time intelligent system is implemented in conjunction with RFID hardware to record student's attendance at lectures in a university environment. RFID tag is affixed on identity card to communicate wirelessly with a reader in order to the identify the students .

Index Terms— IR Sensor, Counter, ATMEGA 162V, RFID, Fingerprint, GSM, PC.

I.INTRODUCTION

Student's attendance automation system deals with maintenance of student's attendance automatically using RFID. It is used to describe a system that transmits the identity of a student wirelessly, using radio waves. First step begins with the module of RFID which provides wireless identification of students. A RFID tag is attached to an object and contains information about that object and it leads to the second stage of IR detection which is used to determine the increment and decrement of students inside the classroom with help of IR Transmitter and IR Receiver. Additionally the module for Fingerprint and GSM has been designed.

Thumb recognition is used for authentication purpose and it can record 50,000 to 1,00,000 attendance information. LCD Display is used to display the increment and decrement count of students inside the classroom.

GSM was designed with a moderate level of service security. The system was designed to authenticate the subscriber using a pre-shared key and challenge-response. GSM is used to provide communication between administrative of the institutions and the parents by sending message regarding students attendance report. If a particular student comes late to class continuously for three days, then all his concerned details will be sent as message to the Head of the Department. Then in hardware side an ATMEGA Controller(atmega164) has been used to receive the signals from RFID reader and Fingerprint.

II.EXISTING SYSTEM

Barcode has been used in student identity card for attendance purpose. It is a visual representation of data that is scanned and interpreted for information. At the same time, the conventional method of taking attendance in every lecturer / lab by calling names / roll numbers or signing on paper is very time consuming, unsecured, inefficient, difficult and monotonous for faculty. Their valuable time is wasted in taking attendance. Therefore many times proper attendance is not taken by the faculty. Also proxy attendance is always a problem in most of the campuses. Government & statutory bodies are also insisting Institutions for full proof attendance system. Further compilation of attendance reports and communication with parents is further a tough activity for Institute Administration. Even if a student is missing the classes for almost 15 days, in-time communication in the existing manual attendance system without any software is difficult task. Since Institute do not have a full proof attendance automation & monitoring system, there is a tendency of missing the classes by students which affects his Academic performance seriously.

2.1 BIOMETRIC PROCEDURE

Biometric technology is one of the popular method that have been used to recognize a person identity based on the biological and behavioural characteristic, which reliably distinguishes one person from another, used to recognize the identity, or verify the claimed identity of an enrolee and enrolled into a template and store in a system database (Boatwright & Luo, 2007; Gil, et al., 2003).

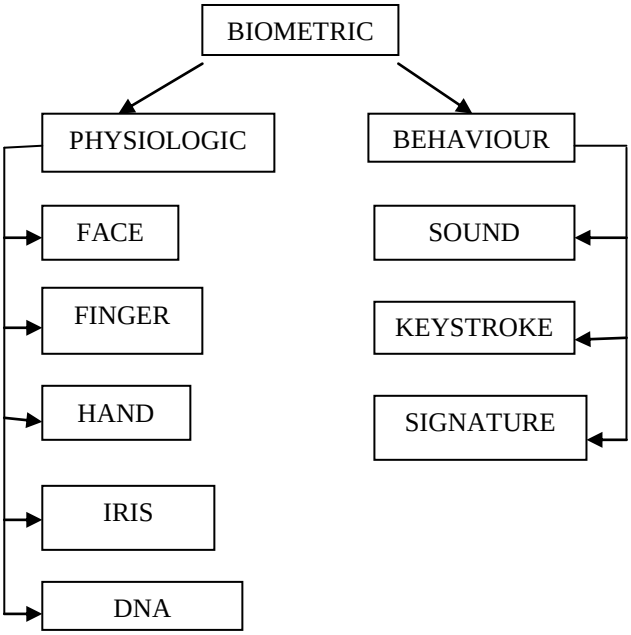

Fig.1 Biometric Characteristic Classifications

2.2 BARCODE

Barcode technology is a method of identification which is used to retrieve in a shape of symbol generally in bar, vertical, space, square and dots which have different width with each one. A reader or scanners are needed to identify the data that are represented by each barcode by using light beam and scan directly to barcode. During scanning process, a scanner measured the intensity of reflected light at black and white region. A black region will absorb the light meanwhile white region will reflected it.

There are several types of code bar scanner:

I. Pen Reader

Ii. Laser Reader

Iii. Charge Coupled Device (CCD) Reader

Iv. Camera Reader

2.3 SMART CARD

Smart card is built with variety of chip with a simple memory consisting of byte of information that may have range from 1K up to 64K of microcontroller or multi-application memory (Carr, 2002). Smart card are used as individual identification, building access and network access which are part of a multi-tiered program that is in the final stages of rolling out. The data in smart card can be read when there is a physical contact with a reader. Smart card has been used in a wide range of application such as to store operation history, medical record or telemetry (Hendry, 1995) as well as student identification in most organization with a multipurpose of usage (Omar & Djuhari, 2004). Based on Halawani and Mohandes (Halawani & Mohandes, 2003), smart card has been developed at campus environment as identity cards for students and employees to grant access to certain data, equipment and departments according to their status. Meanwhile, a similar project has been implemented by Mustafa and Kyng (Mustafa & Kyng, 2007) which utilized MyKad Touch N Go features for student web-based attendance system. This system could be accessed by teachers, headmaster and parents via internet and intranet facilities. Because the smart card need physical contact to the reader before the data in the smart card can be transfer, the implemented attendance record system for huge amount at wide area using smart card will take a long time.

2.4 BLOCK DIAGRAM

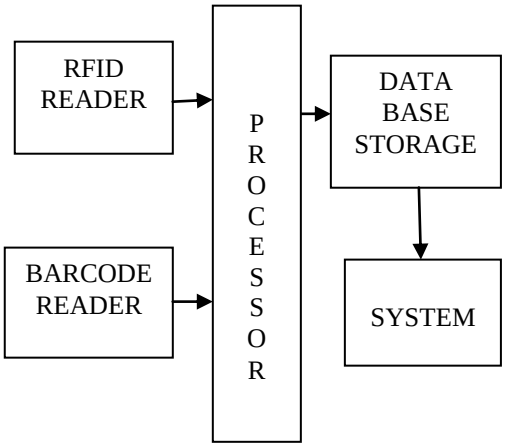

Fig.2 Block Diagram

2.5 DRAWBACKS

The existing system in the Barcode based student attendance system which would prone to few drawbacks that includes

- Less security
- It can be easily reproduced or forged.
- If a barcode is damaged, there is no way to scan the product.
- Very limited data can be stored in barcode.

III.PROPOSED SYSTEM

In the proposed system, the student automation system project has been developed as an important application in order to maintain the attendance automatically using rfid along with thumb recognition .atmel controller with rs232 serial communication port is used in the hardware section. Additionally, gsm is used for conveying the students

attendance report to their respective parents and ir sensor is used to detect the number of students.

3.1 BLOCK DIAGRAM

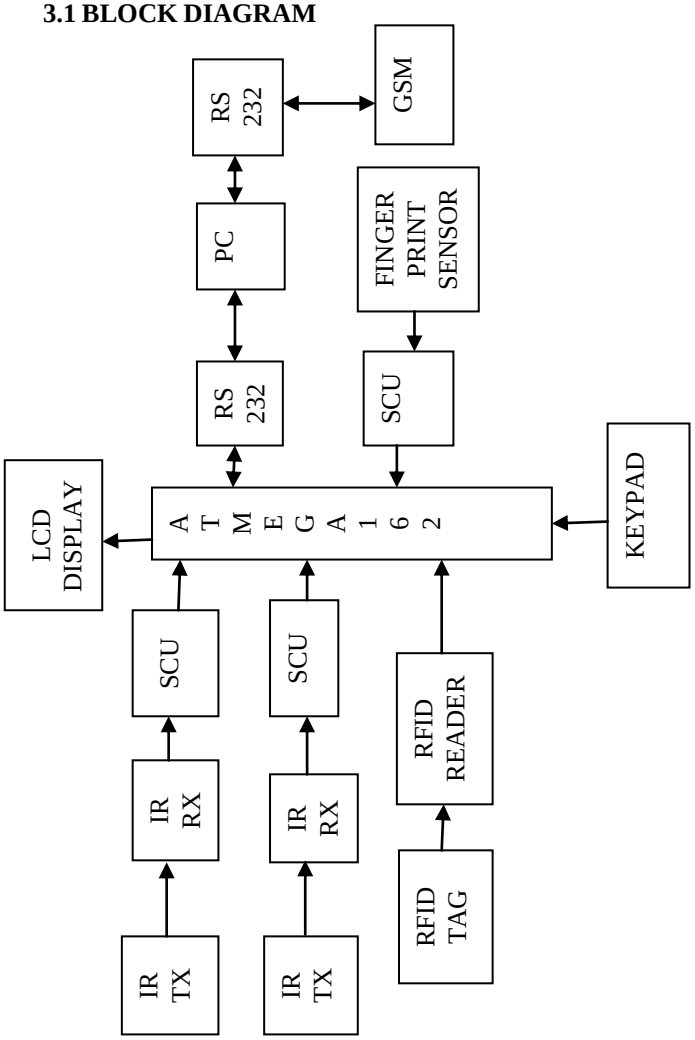

Fig.3 Block Diagram Of Proposed System

3.2 IR SENSOR

Infrared detection devices are sensors that detect radiation in the infrared portion of the electromagnetic spectrum (>10^{12} to 5×10^{14} Hz). Often, such devices form the information they gather into visible-light images for the benefit of human users; alternatively, they may communicate directly with an automatic system.

3.3 WORKING

Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter.

One important point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is constructed with LM358 operational amplifier. In the comparator circuit the reference voltage is given to non inverting input terminal. The inverting input terminal is connected IR receiver. When interrupt the IR rays between the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher then inverting input. Now the comparator output is in the range of 0V. This voltage is given to microcontroller and LED will OFF. When IR transmitter passes the rays to receiver, the IR receiver is conducting due to that non inverting input voltage is higher than inverting input. Now the comparator output is +5Volt so the output is given to microcontroller so LED will glow. This circuit is mainly used to for counting application, interrupt detector etc.

3.4 RFID (RADIO FREQUENCY IDENTIFICATION)

semiconductors such as transponders and transceiver circuits. Many system house companies with main forces in software or hardware design become more interested in that new technology. The high integration of RFID circuits allows a relatively easy implementation into any customer specific application. Nevertheless, you will need some basic knowledge of RF theory to achieve the maximum performance in your system. The aim of this RFID Design Guide is to give you the relevant guidelines for your design using standard integrated circuits.

3.5 FREQUENCY SPECTRUM

RFID systems are regarded as radio emitting devices and therefore the international an domestic radio regulations are relevant. This means that the frequency selection is restricted to a number of fixed frequency bands. The most common frequencies used are 0...135kHz, 400kHz, 6.78MHz, 13.56MHz, 27.125MHz, 40.68MHz, 433.29MHz, 869MHz, 915MHz, 2.45GHz, 5.8GHz and 24.125GHz .

f= 125kHz. Of course the theory covers also higher frequencies, but parasitic effects will be more delicate.

3.6 SYSTEM SETUP

A basic RFID system setup consists of three parts:

- A single or multiple identification labels (transponders or tags),
- A transceiver interface to communicate between uC

  And the transponder
- A data processing unit, such as a microcontroller.

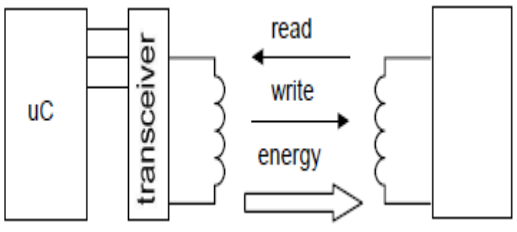

Fig.4 Basic RFID System Setup

The reader (transceiver) is usually a fix mounted system, whereas the transponder is the moving part, e.g. in access control, or animal tagging. The reader and the transponder are working as a wireless, magnetic coupled communication system, each with a resonance circuit tuned to the field. By modulating this field, the reader can

transmit (write) data to the transponder. The transponder will power up and return its on-chip data to the reader.

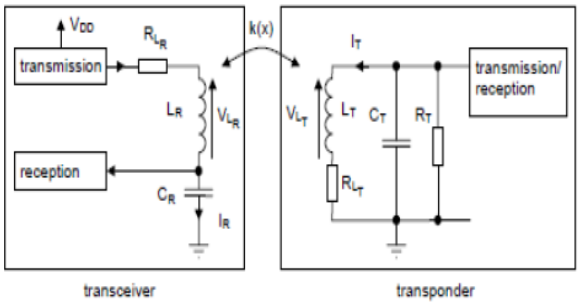

Fig.5 RFID Frontend Setup

The above figure shows the more detailed analog frontends of the transceiver and the transponder. Both circuits have to be tuned on a resonance frequency e.g. f=125kHz. The reader is working in series resonance, the transponder with a parallel resonance circuit

3.7 FINGER PRINT

Fingerprint processing includes two parts: fingerprint enrollment and fingerprint matching (the matching can be 1:1 or 1:N). When enrolling, user needs to enter the finger two times. The system will process the two time finger images, generate a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the finger and compare it with templates of the finger library. For 1:1 matching, system will compare the live finger with specific template designated in the Module; for 1:N matching, or searching, system will search the whole finger library for the matching finger. In both circumstances, system will return the matching result, success or failure.

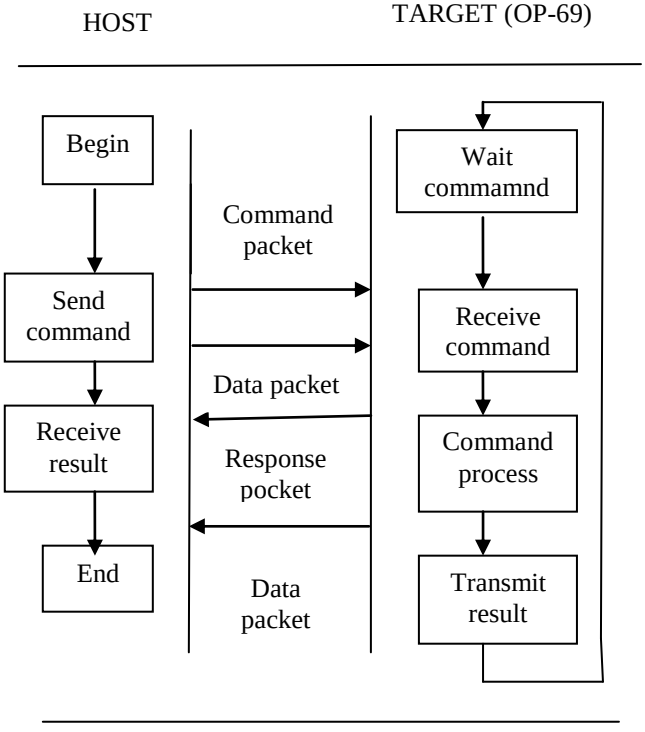

Fig.6 Process of Communication

3.8 GSM

This is a plug and play GSM Modem with a simple to interface serial interface. Use it to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from micro controllers and computers. It uses the highly popular SIM300 module for all its operations. It comes with a standard RS232 interface which can be used to easily interface the modem to micro controllers and computers. The modem consists of all the required external circuitry required to start experimenting with the SIM300 module like the power regulation, external antenna,SIMHolder,etc.

Features:

- Uses the extremely popular SIM300 GSM module
- Provides the industry standard serial RS232 interface for easy connection to computers and other devices
- Provides serial TTL interface for easy and direct interface to microcontrollers
- Power, RING and Network LEDs for easy debugging
- Onboard 3V Lithium Battery holder with appropriate circuitry for providing backup for the modules' internal RTC
- Can be used for GSM based Voice communications, Data/Fax, SMS,GPRS and TCP/IP stack
- Can be controlled through standard AT commands
- Module's operation mode can be controlled through the PWR Switch connected to the PWR pin (refer the SIM300 datashet for more information)
- Comes with an onboard wire antenna for better reception. Board provides an option for adding an external antenna through an SMA connector
- The SIM300 allows an adjustable serial baud rate from 1200 to 115200 bps (9600 default)
- Modem a low power consumption of 0.25 A during normal operations and around 1 A during transmission

Operating Voltage: 7 – 15V AC or DC (board has onboard rectifier)

RESULTS AND DISCUSSION

The experiments were conducted to evaluate the performance of the proposed method. In this paper the students attendance were monitored , latecomers were identified and it was informed to the head of the department automatically. If a student continuously takes leave for three days then the details regarding the student was sent as

message to the parents using GSM.

CONCLUSION

In this chapter, we discussed the integration of RFID with biometric technology to enhanced the security level in the Institution. First we discussed the technologies used to develop monitoring systems. We found that by adding the second layer of authentication to the system enhanced the security level. Finally, based on the application scenario proposed we develop a monitoring system and discussed the flow of the overall system. The application will improve management procedure. It is mainly used to avoid the proxy attendance.

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