Wireless Based Monitoring System For An Advanced Class Room

Manisha Toppo[#1], Sweety Kumari [*2], Ekta Kumari[#3]
#Electronics and Communication, Bharath University
Selaiyur, Chennai-73
[1]mini0390@gmail.com
[2]umailpihushukla@gmail.com
[3]ekta.lado@gmail.com

Guide: Mrs. SWATI KUMARI M.Tech
Bharath University
[2]swati.ks1987@gmail.com

Abstract:

Proper monitoring and Data Security is primary concern for every field such as in corporate world, hospital, school, colleges, defense etc.. There are many ways to monitor and provide security data that is being communicated. However, what if the security is assured irrespective of the unauthorized are from the noise. This Project explains a design of effective security for data communication by designing standard algorithm for encryption and decryption. ZigBee is the only standards-based wireless technology which is designed to address the unique requirement of low-cost, need a low-power wireless sensor and to control networks in any market. It can be used anywhere. It is easy to implement and needed little power for operating, the opportunity for growth into new markets. In existing markets, innovation is limitless. This technique allowing the short range of an individual node to be expanded and multiplied, to cover a much larger area. The source information is generated by a key pad and this will be encrypted and is sent to destination through zigbee. The receiving system will check the data and decrypt according to a specific algorithm and displays on the LCD.

1. INTRODUCTION

A fingerprint sensor is an electronic device which is used to capture a digital image of the surface layer of fingerprint. The captured image of finger is called a live scan. This live scan will digitally processed to create a biometric template (a collection of extracted features) which will be stored and used for matching.

A sensor reads the surface of finger and it converts the analogue reading into the digital form through an A/D (Analog to Digital) converter. An interface module is responsible for communicating the messages with an external device such as personal computer (PC). The Fingerprint sensing device which is one of the Automatic Identification technologies that is commonly using nowadays. There is a wide research in ZIGBEE Technology and development. In this area trying to take a maximum advantages of this technology, and in coming future many new applications and research areas will continue to appear .This interest in fingerprint sensing device also brings about some concerns, mainly about the security and privacy in everyday life.

2. EXISTING SYSTEM:

Existing system only displayed the location (monitoring) of students, but the location of staff was not known. Moreover the information regarding the availability of HOD was not known. However the RFID was used in existing system. In RFID malware practice cannot be stopped since anyone can use the RFID tag.

3. PROPOSED SYSTEM:

The proposed system consists of zigbee module for communication. Moreover to overcome the drawback of RFID we use finger print sensing device for entering the classroom. The smart class system has given us a base, in which we have added and enhanced the project further by implementing it with new innovative ideas and concept to make it more effective by using wireless based monitoring system to make a smart class

The project contain two models: the transmitting model which is for the class room and the second is the receiving model which is for the HOD's room.

3.1. First model: - Classroom Model

In first model, i.e. for the class room, we have used a fingerprint sensing device, which will check the finger print of student as well as for the staff. Before entering to the class the student will have to put his thumb on the device. Once the thumb is placed, the device will start checking for the finger print data which will already be stored in the microcontroller.

Once it matches with the data, the student's ID no. and the time of arrival will be displayed on the LCD & if the student is on time, then the LCD will display "YOU CAN ENTER". Then only the student will be able to enter into the class room. The process will be same for the staffs also when they enter the class room.

Once the teacher enters the class room, the student who fails to enter before the teacher comes, will not be allowed to enter. When they keep their finger on the finger print sensing device, the LCD will display "YOU ARE LATE" and hence the student will not be allowed to enter the class room.

Through the finger print sensing device, the attendance will be taken and it will display the intime of the students. Also it will display the status of the student whether the student is INTIME or LATE. And the entire data will be stored in the form of database in the PC which is present in the HOD's section.

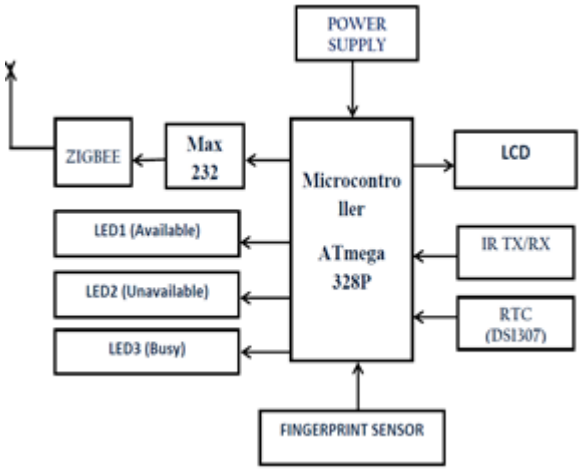


Fig. 01.a: Class room section

In class room section consist of Power supply unit, Fingerprint sensing device, Microcontroller ATmega328p, LCD, RTC, IR TX/RX sensor, Zigbee, LED and Max 232.

3.1. Second model: - HOD's ROOM

The second model is for the HOD's room. The HOD can send the information regarding his availability in his room and that respective LED will glow accordingly in the class room model. The HOD can also send any circular from his cabin which will be displayed on the LCD of class room section. This information will be transmitted through the ZIGBEE.

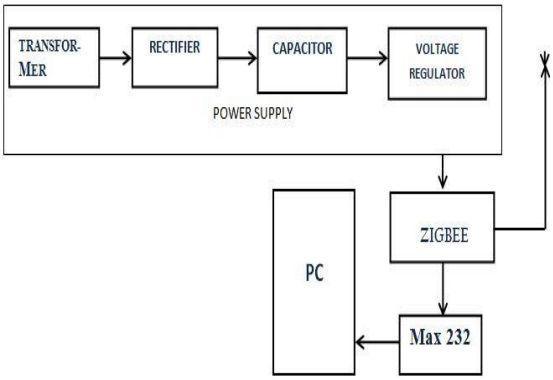


Fig.01.b HOD'S section

In HOD section consist of power supply unit, Zigbee, serial port RS 232, Max 232 and PC.

Both models that is CLASSROOM section & HOD's section they can receive the data as well as they can send the data also. For both sections 5 volts is required as a power supply. For successful working of the project, it should deliver the constant output regulated power supply. LCD is using to display the data of the student & staff.

4. IMPLANTATION

Fingerprint is a basic part of the project that identifies the student identity & teacher's identity. In this project AS601 Processor is used. AS601 is a member of the Synochip's Cordis 5+ family which is targeting for Fingerprint Identification and Digital Certification and it can be used in a wide range of embedded applications. It features with the Symmetric Encryption Algorithm / Rivest-Shamir-Adelman accelerator engines, the embedded non-volatile memory (Flash/OTP), the fingerprint processed an accelerator and its algorithm firmware.

Cordis 5+ is the 32-bit RISC core which is featured with 16-/32-bit ISA and Harvard bus architecture. The enhanced Digital signal processing instruction extensions and accelerators are supported by this core. In addition, to increase the amount of operational parallelism a 5-stage pipeline is used, giving the most performance out of each clock cycle. The typical frequency range of AS601 is 120 MHz It provides a sets of high-performance peripheral components including 128KB SRAM,

64KB ROM, 4Kb OTP memory, USB 2.0(FS) Device, 2xUSARTs , LOCSC(Limited Optical CMOS Sensor Controller), APC(Asynchronous Parallel Controller), SEA(Symmetric Encryption Algorithm) accelerator, RSA engine. For providing this complete feature, the SoC designers will have to concentrate on design issues which are unique to their system.

Fig. 01.c Fingerprint sensing device

But in this project fingerprint sensing device needed sensor to interface, without sensor it will not work. The sensor will sense the movement of the student. The sensor is a pair of IR transmitter and IR receiver can detect the obstacle (student) between IR transmission and IR reception. If it will detect the obstacle then" KEEP YOUR FINGER "will be displayed in the LCD. Otherwise the finger print sensing device will not be able to read the surface of the finger. Before entering into the class the student will have to put his thumb on the fingerprint scanner device. Fingerprint sensing device will convey the message to the microcontroller. In the transmitting section there is LCD screen, on which the student ID number & his entering time will be displayed. Then this data which will be stored with the help of the fingerprint sensor in the microcontroller is sent through the zigbee, the standard takes full advantages of the Institute of Electrical and Electronics Engineers (IEEE) 802.15.4 physical radio specification and it operates in unlicensed bands worldwide at the following frequencies of 2.400–2.484 GHz. The power levels (down from 5v to 3.3v) to power the zigbee module, The communication lines (TX, RX, DIN and DOUT) to the appropriate voltages. The Rx and TX pins of ZIGBEE are connected to TX and Rx of ATmega 328p microcontroller respectively. Wireless communication range is 10 – 100 meters in general.

In classroom section RTC (Real time clock) is used. It is an important component for this section. The DS1307 serial real-time clock (RTC) is a low-power, full binary-coded decimal (BCD) clock/calendar plus 56 bytes of non-volatile Static-RAM. Address and data are serially transferred through an Inter integrated circuit (I2C), bidirectional bus. The clock/calendar providing information about seconds (sec), minutes (min), hours (hrs.), day, date, month, and year . At the end of the month the date is automatically adjusted for months with fewer than 31 days, including corrections for leap year. With the help of RTC the student & staff entered timing will be known.

In first model, the data or any circular information received from the second model will display through LCD. A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals (LCs). It has the advantages of low power consumption typically1 mA with powerful command set and user-produced characters which is compatible with TTL and CMOS compatible. The LCD standard requires 3 control lines and 8 I/O lines for the data bus.

8 data pins D7:D0

It is a Bi-directional data/command pins. The Alphanumeric characters are sent in an ASCII format.

RS: Register Select

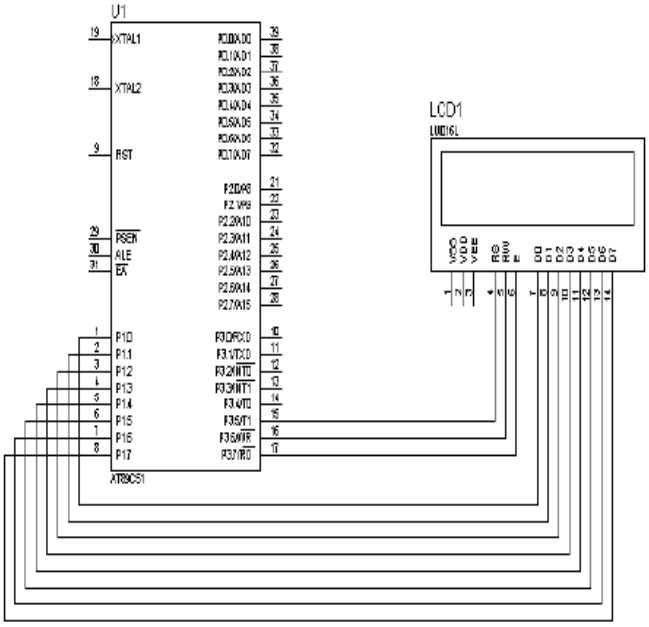
If RS=0-> then Command Register is selected. If RS=1-> then Data Register is selected.

R/W: Read or Write

For 0-> it will be Write & for 1-> it will be Read.

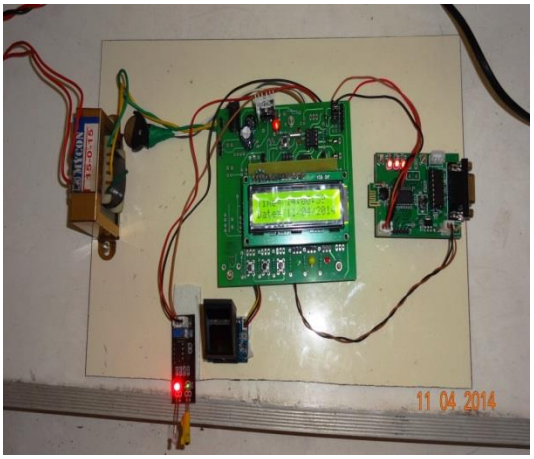
E: Enable (Latch data)

Used to latch the data present on the data pins. To latch the data a high-to-low edge is needed. The 8 data lines are connected to PORT B of 16, 17, 18 and 19 respectively of ATmega 328p microcontroller. The control lines (RS and EN) are connected to PORT B of 14and 15 respectively.



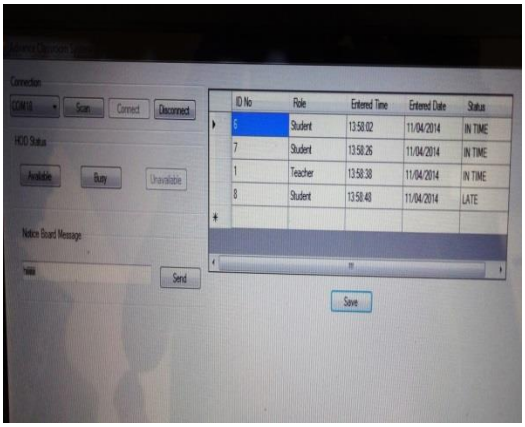
5. THE FINAL FIGURE OF THE PROJECT

- **CLASSROOM section**

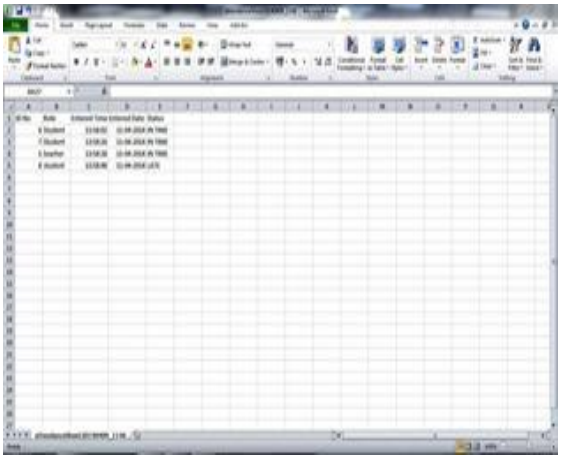


- **HOD section**

- **Data received from CLASSROOM section**



- **Data automatically saved in MS EXCEL**



6. ADVANTAGES

- The working of this entire system takes very little time hence contributes in saving our valuable time.
- Man power is reduced since all the information will be directly displayed on the notice board.
- Malpractices of students will be avoided and proper monitoring of staff will be done by using this proposed system.
- Communication over through the ZIGBEE module will take less time and is easy to access.
- The HOD can keep close observation regarding the student's activity as well as for the teacher's.

7. CONCLUSION AND FUTURE WORK

This demonstrates how a generic architecture can be used in order to create an intra-connected network of finger print sensing device within an educational institution. We can say that it is as generic as possible, due to this project. With the full development of this project, it is possible to create solid foundation that can be easily put into service in another institution of education, thus automating the process of recording and reporting student's attendance and also the availability of HOD in his cabin. Even the information given by the HOD will directly get displayed on the LCD.

Thus the Wireless Based Monitoring System for Advanced Class Room is implemented successfully using a microcontroller and arduino compiler and visual C # .

For future work we are lacking the implementation and validation to the whole architecture with one communication part for every classroom in a building and the use of the server of the institution directly as data source. In the future it is also necessary to implement all kinds of advanced methods in different area of institution and as providing services so the institution's applications may automate its processes.

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