

The Design and Implementation of a Teacher-Student Interaction System Using ZIGBEE and Finger Print

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Abstract

Some times faculty may not be available in the class room in that situation they may know the student details, for that we have implemented Teacher-Student interaction system using Zig-Bee and Finger Print. This system can be designed to improve teaching methods, combining teaching practices for the application of actual teaching. In this paper, Zig-Bee technology is used for wireless sensor data communication. It has great application potential. Finger print is the used to identify the student and store the finger image for verification.

Index Terms- wireless sensor networks module; Zig-Bee; Finger Print; teaching interaction system.

1.INTRODUCTION

In this system Zig-BEE is wireless sensor network. This system assembles the information acquisition, information transmission, information processing units. The Characteristics of this system are low cost, low energy consumption, self-organizing networks. Zig-Bee wireless sensor network is related to Zig-Bee technology. This network has high potential.

Finger print biometrics are for physical access control. It can be enhanced security and improved user convenience. It can be used for high security purpose. Finger print technology in the logistics field has been widely adopted, it is

recognized as one of the most important industry in this century. The function of finger print is enrolling, verifying, and store that particular finger image. It has mainly two functions as “Enroll” and “verification”.

In Section II, related work in finger print applications and Zig-bee technology are discussed. Software and Hardware implementations of the system is in Section III. System Implementation is in Section IV. Conclusion is given in Section V.

2. ZIGBEE, FINGER PRINT TECHNOLOGY AND THEIR CHARACTERISTICS

2.1. Zig-bee technology :

Zig-Bee technology for short-range wireless communication technology. This protocol stack is formed by the physical layer, medium access control layer, network layer, security layer and access control layer are IEEE802.15.4 format. Network layer and security layers are developed by Zig-Bee purpose, application layer for user's need. The system of Zig-Bee module of block diagram shown Figure1.

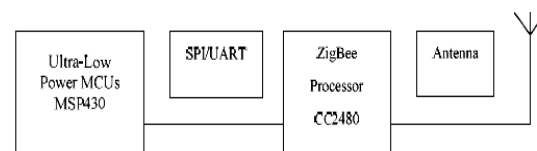


Figure 1. ZigBee module block diagram of the system

2.2. Finger Print Technology:

Finger print for physical access control are becoming increasingly clear enhanced security and improved user convenience. It reduces threats to traditional physical access controls such as picking locks, stealing and copying keys, re-entering PINs and faking swipe cards. For environments requiring an extra level of security is the fingerprint biometrics can be deployed inexpensively and in tandem with existing security measures such as swipe cards and tokens for multi-factor authentication.

2.2.1 Enrollment:

To enroll yourself, swipe or place finger on the sensor. When using optical sensor, full finger print image is captured at one time. When captured the image to create a template using unique features. A master template is created from templates. The master template is stored securely when finger print image is not stored.

2.2.2 Authentication:

To authenticate, just swipe or place finger. When using optical sensor, full fingerprint image is captured at one. The template is compared in this authentication.

2.2.3 Security:

The function of physical access control is security. For biometric finger print technology, security is determined by the sensors, It can be captured high quality images.

3. SOFTWARE AND HARDWARE ARCHITECTURE

3.1. Software Architecture:

In the software system the Zigbee wireless sensor network for embedded system software. This system provides operations are task transfer, time queue management and interrupt handling. Applications of the program include serial communication, finger print authentication, and signal strength detection.

3.1.1. Stack Design:

In Zig-Bee protocol stack design the layers can communicate through the service access point. This technology have the standard specification. The physical layer, link layer, network layer are same specifications. The basic structure as shown in Table

TABLE I THE STRUCTURE OF THE ZIGBEE STACK

Applications	ZigBee Device object
Application layer (APL.h/APL.c)	Application Support Sublayer(APS.h/APS.c)
Network layer (NWK.h/NWK.c)	
Link layer media (MAC.h/MAC.c)	
Physical layer (PHY.h/PHY.c)	

3.2. Hardware Architecture:

The teacher-student interaction system consists of Finger print systems with Zig-Bee subsystems, It is the learning interaction between students and teachers, it can manage the students in class room attendance and learning outcomes. In unfamiliar places also we can learn and ask questions at any time, to avoid face to face interaction this system can be used.

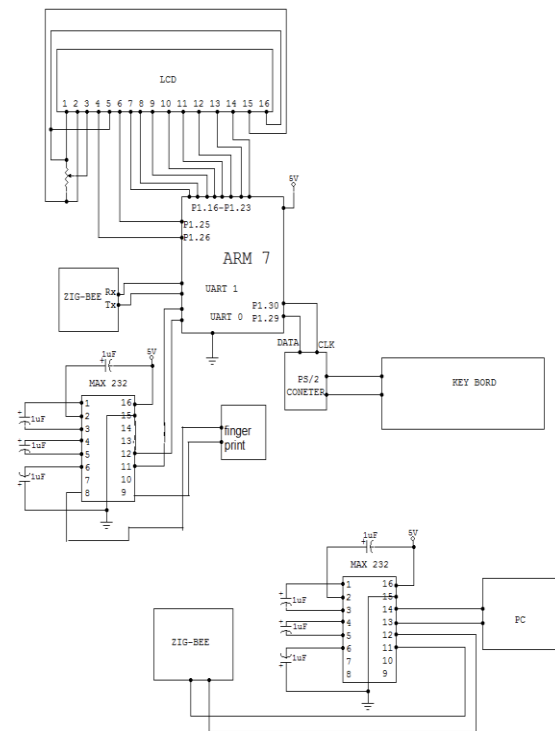


Fig2:circuit diagram

4. SYSTEM IMPLEMENTATION

In this paper, FINGER print and Zig-Bee combination is used to implement teacher student interaction system. The use of Zig-bee for wireless data communication, to achieve the interaction between students and teachers, such as questions, answers, voting, attendance, assignment and other functions.

Student sub system can have the finger print module when student enter into the class room they can enrolling their finger prints. The system can be displays the enrolling on LCD display. In the verification process the particular student ID can be displayed in LCD. At the time of verification the particulars can be display in the teacher’s as well as the student’s systems. The data can be transferred and received between main and subsystems through Zig-bee. While the communication running between these systems the LED’s will glowing.

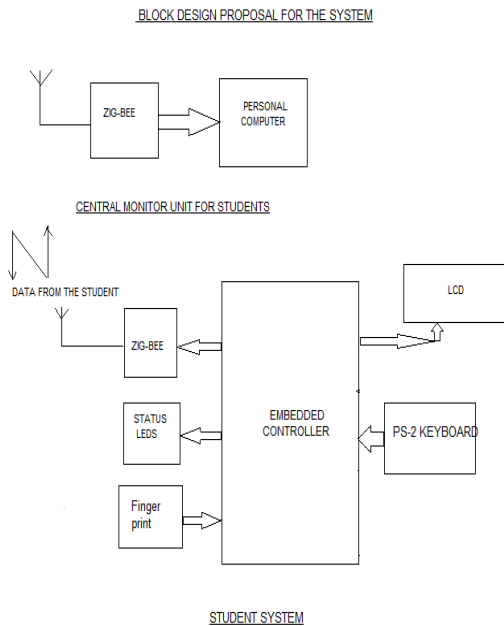


Fig3: Block Design Proposal

Teacher and Student sub systems are equipped with PS/2 Keyboard to answer the Teacher’s questions. The answer back to the main system on the podium by using Zig-Bee wireless network. The main system with a LCD monitor for displaying student details and subsystem also can have the display with the corresponding keyboard keys. The student status and location can be displayed on the sub system display. Teachers can monitor the students in real-time and they can give supplement according to the situation through the key board. Student’s and teacher can be communicated through a chat using their keyboards. While communication we disconnect the student by using the negation(~). The data can be replace in same line in data transferring we can use the escape (esc).

4.1. Teacher end system architecture design:

Function :

The teacher system can have monitor for the the student. To ask questions, polls, check attendance numbers, record class attendance and list of the persons who did not attendance. All the results from the LCD monitor display.

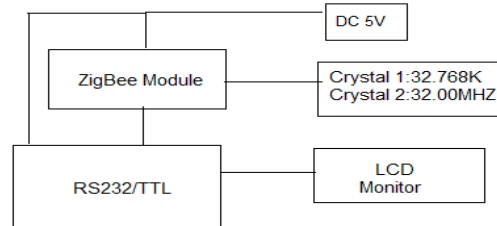


Fig4: Teacher end system architecture

4.2. Student’s End system Architecture design:

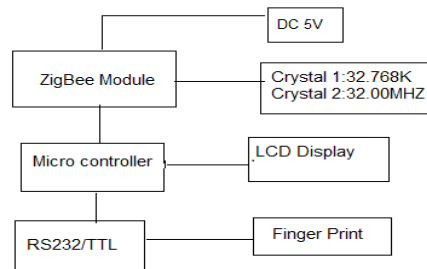


Fig5: Student’s End system Architecture

Function:

In the student system can have the finger print module to enroll and verify the student details. These details can be display in the LCD display.

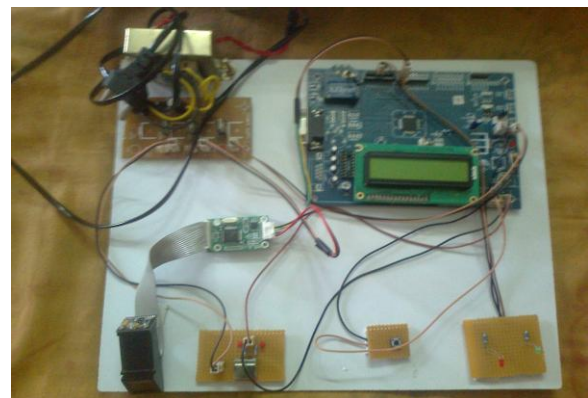


Fig6: Student’s end system display captured

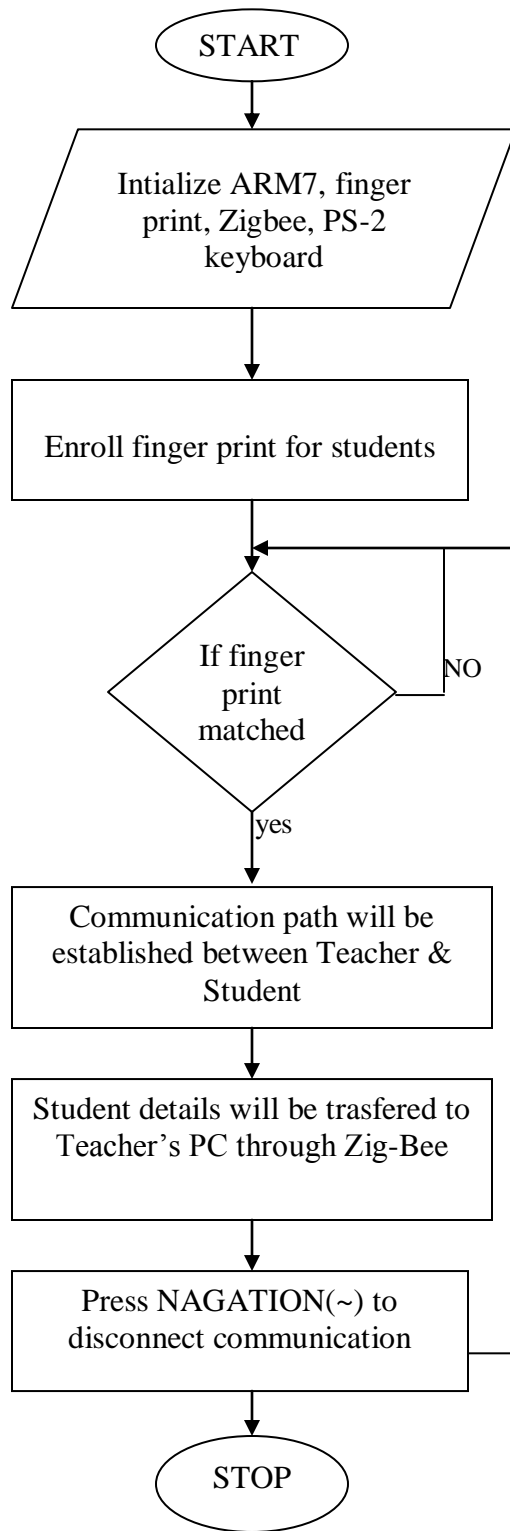


Fig7: The design flow of teacher-student interaction system.

5.CONCLUSION

In this paper, the combination of Finger print and Zig-Bee is used to achieve the interaction between students and teachers. Zig-Bee wireless transmission module using a star network topology is used to achieve the data from students end node to teachers end node for wireless transmission. The system has low energy consumption, large communication range, high stability characteristics. By using the teacher-student interaction platform practical teaching is formed. In this the finger print module can be used for high security purpose and can enroll and verify the student in the sub system. To modify this application we can use the different sub systems for Future Knowledge.

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