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Digital Attendance System

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***Abstract*— Attendance recording in educational institutions is an imperative task. Most present systems provide database management but still involve laborious manual data entry procedures. The design presented in this project offers a twofold solution to the problem. It relieves from handling paper records of attendance taken in the class by providing firsthand entry into a portable gadget. The attendance entered is transferred to application software residing on a computer through the serial port.**

- **Providing data such as date, department name, roll number of absentees, period, name and thumb impression of the faculty on duty**.
- **The data are entered through keypad within the device.**
- **The entered data are transferred to the proposed system of the main authority through zigbee.**

I. INTRODUCTION

Electronics engineers are making various inventions to reduce the human effort. One of such innovation is our project "DIGITAL ATTENDANCE SYSTEM". This project aims at digitalizing the attendance taking system. In our proposed system data are transmitted wirelessly to the authorized system. In the transmitter section we have provided a slot for entering data such as name of the faculty, department, and roll number of absentees, date, and period and thumb impression of faculty. Biometric data of authorized person is given for the security. Through our project the need for paper in taking attendance is completely eliminated. The faculty needs to enter the data in the system from where it is transmitted wirelessly to the authorized system. The system starts working only when the captured biometric data matches with the stored biometric data. Thus security is ensured. This project also reduces the human effort in collecting attendance from each classroom. Thus time and human effort is conserved by this project.

II. RELATED WORKS MANUAL STUDENT ATTENDACE SYSTEM

Most of the attendance systems use paper based methods for taking and calculating attendance and this manual method requires paper sheets and a lot of stationery material. Previously a very few work has been done relating to the academic attendance monitoring problem. Some software's have been designed previously to keep track of attendance. But they require manual entry of data by the staff workers. So the problem remains unsolved. Furthermore idea of attendance tracking systems using facial recognition techniques have also been proposed but it requires expensive apparatus still not getting the required accuracy.

This is the same old method of taking attendance of students in schools, colleges and universities where the attendance is listed in a sheet or a book called attendance register. Till now, many of the schools and colleges use this method. The institution creates the list of all students who are there in a particular class. The instructor marks appropriate signs in front of student's name like if a student is present, instructor may put 'P' or ' ' and if a student is absent, the instructor may put 'A' or ' ' in front of the student's name. At the end of each month every student's attendance status is calculated manually.

ADVANTAGES AND DIADVANTAGES

Advantages

- It is helpful in maintaining the information about each and every student's attendance easily.
- No power consumption since computer is not involved in it.

Disadvantages

- It consumes a lot of time to take attendance.
- It does not look nice when the lecturer scratches the attendance sheet, if some problem occurs and corrects it.

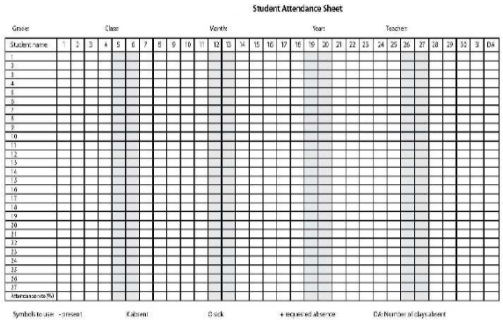

Fig.1 Manual Attendance Sheet

III. SYSTEM DESCRIPTION

A. Block Diagram

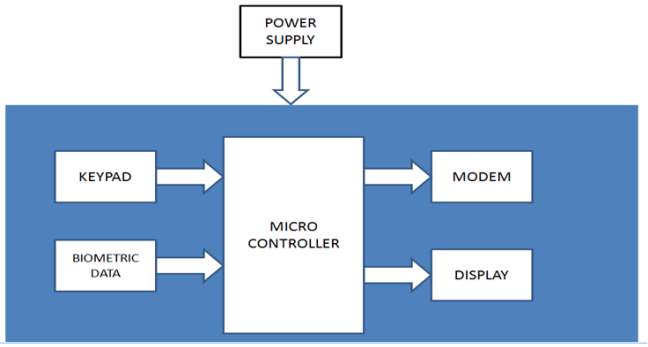

Fig.2 Block diagram of transmitter

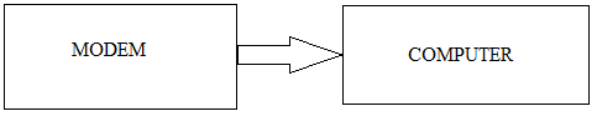

Fig.3. Block diagram of receiver.

B. Block Diagram explanation.

This is a campus based project which mainly aims to reduce the complexity of attendance taking process in institutions. The current existing attendance taking system is mainly based on the attendance book .the system we are introducing here will convert the attendance taking book in to a portable device. Here the process starts when the faculty enters the fingerprint to the finger print module. Then the controller will get the notificationthat the information that entered after this must be send to the proposed system through Zigbee.

IV. MICROCONTROLLER

The controller used here is PIC16F877A .This is the powerful yet easy to program (only 35 single word instructions)CMOS FLASH based 8-bit microcontroller .This is upward compactable with the PIC16C5X,PIC12CXXX AND PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory ,self programming, an ICD,2 comparator,8 channel of 10 bit analog to digital converter ,2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire serial peripheral interface or the 2-wire inter integrated circuit.

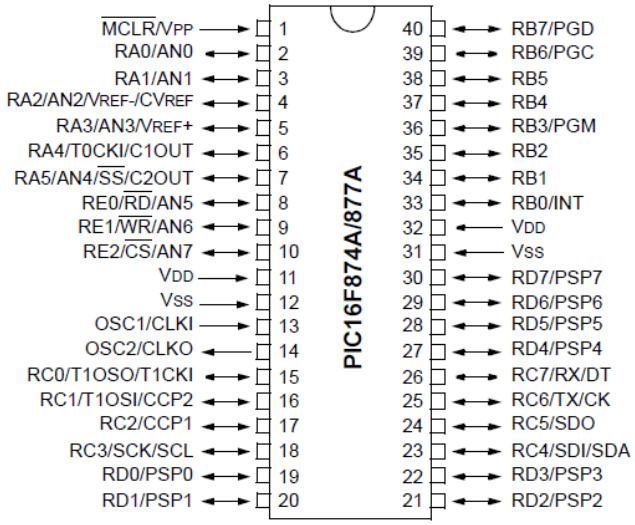

Fig 4.Pinout of PIC 16F877A

V. DISPLAY

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. A liquid crystal display (LCD) is a flat panel display that uses the light modulating properties of liquid crystals (LCs). LCD Modules can present textual information to user. A 16×2 LCD module type number JHD162A is used in this project to display student's USN. It consists of 16 rows and 2 columns of 5×7 or 5×8 LCD dot matrices. It is available in a 16 pin package with back light, contrast adjustment function and each dot matrix has 5×8 dot resolution .VEE pin is meant for adjusting the contrast of the LCD display and the contrast can be adjusted by varying the voltage at this pin. The JHD162A has two built in registers namely data register and command register. Data register is used for placing the data to be displayed, and the command register is used to place the commands. The 16×2 LCD module has a set of commands each meant for doing a particular job with the display. High logic at the RS pin will select the data register and Low logic at the RS pin will select the command register, the pin diagram is shown in

figure 6. If we make the RS pin high and the put a data in the 8 bit data line (DB0 to DB7), the LCD module will recognize it as a data to be displayed. If we make RS pin low and put a data on the data line, the module will recognize it as a command. R/W pin is meant for selecting between read and write modes. High level at this pin enables read mode and low level at this pin enables write mode. E pin is for enabling the module. A high to low transition at this pin will enable the module.DB0 to DB7 are the data pins. The data to be displayed and the command instructions are placed on these pins. LED+ is the anode of the back light LED and this pin must be connected to Vcc through a suitable series current limiting resistor. LED is the cathode of the back light LED and this pin must be connected to ground.

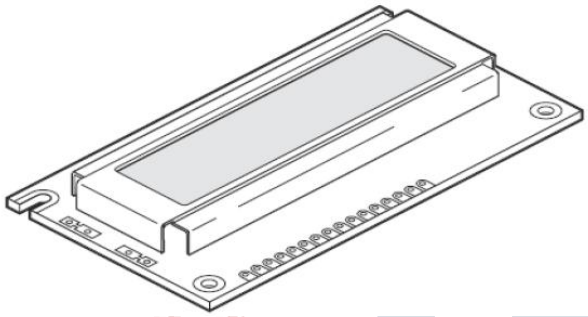

Fig 5.LCD Display.

VI. KEYPAD

A keypad is a set of buttons arranged in a block or "pad" which usually bear digits, symbols and usually a complete set of alphabetical letters. If it mostly contains numbers then it can also be called a numeric keypad. Keypads are found on many alphanumeric keyboards and on other devices such as calculators, push-button telephones, combination locks, and digital door locks, which require mainly numeric input.

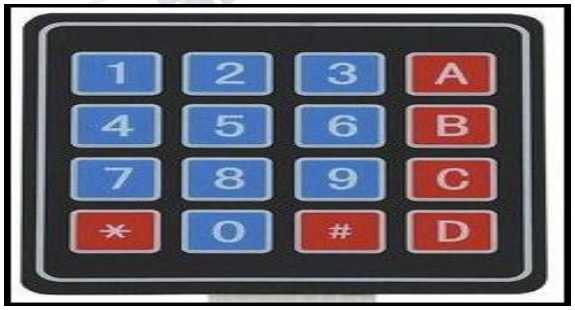

Fig 5.4*4 Matrix Keypad

VII. ZIGBEE

Zig Bee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios.

The technology defined by the ZigBee specification is intended to be simpler and less expensive than other wireless personal area networks (WPANs), such as Bluetooth or Wi-Fi. Applications include wireless light switches, electrical meters with in-home-displays, traffic management systems, and other consumer and industrial equipment that requires short-range low-rate wireless data transfer.

Its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics. ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128 bit symmetric encryptionkeys.) ZigBee has a defined rate of 250 kbit/s, best suited for intermittent data transmissions from a sensor or input device.

Zig Bee was conceived in 1998, standardized in 2003, and revised in 2006. The name refers to the waggle dance of honey bees after their return to the beehive.

Zig Bee devices are of three kinds:

- Zig Bee Coordinator (ZC): The most capable device, the Coordinator forms the root of the network tree and might bridge to other networks. There is precisely one ZigBee Coordinator in each network since it is the device that started the network originally (the ZigBee LightLink specification also allows operation without a ZigBee Coordinator, making it more usable for over-the-shelf home products). It stores information about the network, including acting as the Trust Center & repository for security keys.
- Zig Bee Router (ZR): As well as running an application function, a Router can act as an intermediate router, passing on data from other devices.
- Zig Bee End Device (ZED): Contains just enough functionality to talk to the parent node (either the Coordinator or a Router); it cannot relay data from other devices. This relationship allows the node to be asleep a significant amount of the time thereby giving long battery life. A ZED requires the least amount of memory, and, therefore, can be less expensive to manufacture than a ZR or ZC.

The current ZigBee protocols support beacon and non-beacon enabled networks. In non-beacon-enabled networks, an unspotted CSMA/CA channel access mechanism is used. In this type of network, ZigBee Routers typically have their receivers continuously active, requiring a more robust power supply. However, this allows for heterogeneous networks in which some devices receive continuously while others only transmit when an external stimulus is detected. The typical example of a heterogeneous network is a wireless light switch The ZigBee node at the lamp may constantly receive, since it is connected to the mains supply, while a battery-powered light switch would remain asleep until the switch is thrown. The switch then wakes up, sends a command to the lamp, receives an acknowledgment, and returns to sleep. . In such a network the lamp node will be at least a ZigBee Router, if not the ZigBee Coordinator; the switch node is typically a ZigBee End Device

In beacon-enabled networks, the special network nodes called ZigBee Routers transmit periodic beacons to confirm their presence to other network nodes. Nodes may sleep between beacons, thus lowering their and extending their battery life. Beacon intervals depend on data rate; they may range from 15.36 milliseconds to 251.65824 seconds at 250 Kbits/sec, from 24 milliseconds to 393.216 seconds at 40 kbit/s and from 48 milliseconds to 786.432 seconds at 20 kbit/s. However, low duty cycle operation with long beacon intervals requires precise timing, which can conflict with the need for low product cost.

In general, the ZigBee protocols minimize the time the radio is on, so as to reduce power use. In beaconing networks, nodes only need to be active while a beacon is being transmitted. In non-beacon-enabled networks, power consumption is decidedly asymmetrical: Some devices are always active while others spend most of their time sleeping.

Fig 5.Zigbee module

B. Proposed system explanation

The proposed system consists of PIC16F877A, fingerprint module, 4*3 keypad, LM016L LCD and Zigbee module. The operation of the system starts when it captures the biometric data of the authorized person. Using the UART serial communication, the controller checks for the match between the captured fingerprint and the stored fingerprints. When there is any match found the system starts to work or else reenter the fingerprints till any match occurs. Now we can enter the data through the keypad and at the same time LCD displays it. After the verification the switch throws to next pole .Then the entered data can be transmitted via Zigbee protocol.

The fingerprint module mainly consists of a scan area for scanning fingerprint image. It is serially communicated with the UART port of the controller through the pins TX, RX.The keypad here used is a 4*3 matrix keypad. In this technique the keys are connected in a matrix (rows/columns) style. The rows and columns of the keypad are connected to port B of the controller. The PIC16F877A is a 40 pin IC which consists of five I/O ports. The LCD is connected through the port D of the controller. The LM016L LCD has 16 pins including 8 data pins. Among those only 4 pins (D4 to D7) are used to communicate with PIC. Then the wireless communication incorporated is zigbee. It is a protocol which gives more security to data. The transmission through zigbee starts when the switch drops to next pole.

C. Algorithm.

Step1: Start.
Step2: InitializeUART
Step3: Check for matching.
Step4: If yes go to step 5
Else go to step 2.
Step5: Initialize general purpose input output pins for Keypad
Step6: Enter data such as finger print, date, department, period, facultyCode, roll number of absentees etc.
Step7: Send data.
Step8: Wait for acknowledgement. If it comes go to
Step9: Else go to step 7.
Step10: stop.

VIII. CONCLUSIONS.

It can be concluded from the above discussion that a reliable, secure, fast and an efficient system has been developed replacing a manual and unreliable system. Results have shown that this system can be implemented in academic institutes for better results regarding the management of attendance. This system will save time, reduce the amount of work the administration has to do and will replace the book with electronic apparatus. Hence a system with expected results has been developed but there is still some room for improvement

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