Wireless Fingerprint Attendance Management System

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ABSTRACT

In today’s world where we have automation in all the areas, there is one field where even though technology has been entered but there is no recommendable achievements done is this area. It is the Attendance System for College Students. We have Identified the complexities and brought latest technology for teachers to take the attendance of the students through wireless attendance management system using zigbee. Which will be easy and time saving attendance management using the fingerprints of the students that will effectively reduce the load of storing papers for marking the attendance of the students and will completely remove the chances of doing proxy.

Keywords : ZigBee technology; Fingerprint identification; Attendance System; Wireless communication

Also, the fingerprint is fast biometric technique for more reliable and secure system.

Fingerprint identification is the method by which we can uniquely identify two persons. Identification is based on minute ridge formation and patterns found on the fingertips and no two persons will have exactly the same arrangement of patterns. Patterns of any one individual remain unchanged throughout life. Furthermore, other personal characteristics may change but fingerprint will not change throughout their life. In Section II we Discuss about the literature Survey. In Section III we Discuss about the Background Overview. In Section IV we Discuss about the Proposed System. In Section V we Discuss about the Scope and Application. In Section VI we Discuss the conclusion of the Project.

II. LITERATURE SURVEY

The paper “Wireless Fingerprint Attendance management System” [1]. This paper presents the design methodology of a simple and high real time Zigbee - biometric system for easy and time saving attendance management using the fingerprints of the employees at any organization along with the employee incoming and outgoing log maintenance. Firstly employee's fingerprints are scanned by software and an identity number is allotted as their enrollment. During the attendance time when employees impress their fingerprints, against the scanner, the system compares the new fingerprint patterns and the connection between various points in the fingerprint with the enrollment database. A match is recorded as a knock exercising acquisition, processing, transmission,
matching. Through this automatic system, time and manpower is reduced to the great extent.

The paper “Attendance Management System” [2], This paper presents a design and framework for taking attendance in schools and colleges, for making troublesome process of taking and compiling of attendance simple and efficient. As its targeted users are educational institutes where there is a requirement of affordable, user friendly, portable, energy efficient and secure automated system. Hence this prototype provides an amalgamated solution for replacing existing conventional attendance system with embedded attendance system. Main advantages are its very low cost, small size, efficient with low energy consumption.

The paper “Wireless Fingerprint Attendance System Based On Zigbee Technology” [3], This paper presents the system which includes terminal fingerprint acquisition module and attendance management module in computer. It can realize automatically such functions as information acquisition of fingerprint, processing, wireless transmission, fingerprint matching, and attendance management. Considering the fact and topology of ZigBee network, the system designs wireless local area network which is cluster tree network. To resolve the problem of time delay when the image is transmitted by ZigBee technology, the traditional transmission mode is improved. The experiment results show the transmission time is saved over one third and transmission efficiency is improved greatly. It realized low-cost and high-performance wireless fingerprint attendance function, which provided a new wireless fingerprint attendance system for enterprises and institutions.

III. BACKGROUND OVERVIEW

A. Existing System

Our existing system of attendance management is fully manual. In our system students are marking their attendance manually on papers. So, in this case there is lots of chances of doing proxies and for updating the attendance of the students the corresponding staff has to upload the attendance manually and this leads probability of mistakes in uploading the attendance which also takes the valuable time of the teaching staff.

- Limitations of Existing System

Proxy Attendance is the major disadvantage of existing system.

A lot of work increases for the Teachers, apart from the Teaching curriculum.

The data collected by the existing system is inaccurate.

B. Proposed system

In our system the Teacher will bring a Handheld Device to the class and will follow the following steps.

- Teacher will start the attendance procedure by enrolling his own thumb in the system,
- He will give this device to the students and start teaching,
- Every student will show their finger print on the scanner of the device and all those who are present will get the attendance for that lecture through zigbee module because it is used for wireless transmission of data.
- Teacher will again place the same finger to close the attendance procedure,
- The software at PC side will automatically mark the attendance of the respective Finger Print ID.
- At the end of semester the software can generate various types of reports for taking printouts.

C. Need of the system

- Present system takes lots of time for uploading the attendance.
- Present system includes lots of manual work to do.
- This method leads to the chances of proxy’s.
- Present system increase the chances of mistakes in uploading the attendance.
- This method also require managing lots of paper for storing the attendance of the students of a particular class.

D. Objective of the System
Our proposed system will effectively reduce the time taken to upload the attendance.

Our system will improve the accuracy of the attendance management system.

It will effectively reduce the chances of doing proxy’s.

It will remove the essentiality of preserving the bunch of papers for uploading the attendance.

Our system significantly reduces the manual work done by the corresponding staff for uploading the attendance of the students.

IV. PROPOSED SYSTEM

A. System Overview

The overview of the proposed system is as shown in the figure 1:

![Block Diagram of System]

B. Explanation of Blocks

- **ARM7 LPC2148**
The ARM7 LPC2148 will be the main processing system. The overall working of the system will be depended upon the LPC2148 microcontroller. The capturing of scanned images of fingerprint of a student and passing it to the server for marking the attendance of a particular student is goes through via ARM7 LPC2148.

- **LCD**
This unit is used to display all the system messages.

- **Fingerprint Module R303A**
Unit is the heart of the complete system. This Unit is used for scanning the Fingers of the different Users. Optical fingerprint scanners provide robust fingerprint scanning, scratch resistance, long life and no effect of electrostatic current. They are suitable for large scale use and support thousands of scans per day. Support for chip based sensors is also available if required.

- **Power Supply**
This unit will supply the various voltage requirements of each unit. This unit will be consists of transformer, rectifier, filter and regulator. Two types of power supply will be there One will be 5 volt and second one is 3.3 volt. As LCD, Fingerprint module and interfacing circuit which is used to interface ARM7 LPC2148, Fingerprint Module, Zigbee is working on 5 volt power supply and ARM7 LPC2148 is working on 3.3 volt power supply.

- **XBEE Module**
Zigbee 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.

- **Database Manager**
Databases are designed to offer an organized mechanism for storing, managing and retrieving information. They do so through the use of tables. We will use SQL server 2005 for storing the database.

- **SQL server 2005**
SQL Server 2005 makes it simpler and easier to deploy, manage, and optimize enterprise data and analytical applications. It enables you to monitor, manage, and tune all of the databases in the effective way. Failure of the primary system, applications can immediately reconnect to the database on the secondary server using Database Mirroring. SQL Server 2005 provides a new capability for the partitioning of tables across file groups in a database. Has Features of XML, Multidimensional Expressions (MDX), and XML for Analysis (XMLA). Integration with the Visual Studio development environment provides more efficient development and debugging of line-of-business and business intelligence (BI) applications SQL Server 2005 provides a lot of benefits over SQL Server 2000 including within the replication feature set.

C. Features

The Following are the prominent features of the above discussed system.

- NO Proxy at all
- Accuracy in Attendance Data
- Various types of Reports
- Time Saver for teachers
- Hand Held device for easy mobility
- Increases Attendance of students
- Increases college goodwill

D. Technology & Programming Languages

As microcontrollers are the core of these days digital circuit design in industry, this system uses it for the centralized operation and digital processing. The technology used here is embedded technology which is the future of today’s modern electronics.

The followings are the various Programming Languages & Technologies that are going to be used in the proposed system

For Embedded System
- Embedded Technology
- Embedded C - Keil Compiler
- Eagle Software for PCB Designing

For PC System
- VB.net 2008 Based Application Software
- Serial Communication Protocol
- SQLServer2005 Based Database
- Crystal Reports

F. Project Development Methodology Or Steps

The following will be development steps so as to achieve the working Prototype Model of the above proposed system…

- Defining the Problem
- Understanding the Need & Usability in industry and society (Market Analysis)
- Developing Block Diagram
- Designing Circuits of individual blocks
- Testing circuits in LAB & Finalizing
- Developing PCB on PC
- Getting the PCB printed from market
- Soldering the components
- Performing various Basic Experiments to test the PCBs
- Developing Flowchart for the entire process
- Writing actual Software Program
- Compilation & Burning
- Testing and Debugging
- Developing Flowchart for PC Side Software
- Developing Data Flow Diagram
- Writing actual code
- Finally Running the system and
- Documentation

G. Algorithm

Fingerprint matching can be done using three algorithms:

- Direct matching algorithm
- Minutiae based algorithm
- Ratio of relational distance matching algorithm

Experimental Analysis
For our analysis, in the enrollment process, we stored 80 images with their minutiae features. A Pilot election is conducted with the help of the novel EVM (Electronic Voting Machine) Each person is asked to vote for the candidates they wish by checking their identity through fingerprint and allowing them to vote by giving thumb impression against the fingerprint scanner of candidate. The Table1 shows the analysis of the election for 80 voters in terms of time for all the three methods. The equivalent chart is shown in the Figure 2.

Table 1: Comparison of Different Algorithms.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Time taken for casting a vote (Seconds)</th>
<th>Total Time Taken for Voting (Hr)</th>
<th>Local Movement Time Per Voter (sec)</th>
<th>Total Election Time (Hr)</th>
<th>Memory Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Image Enrolment</td>
<td>3.64854</td>
<td>0.1746</td>
<td>30</td>
<td>0.0593</td>
<td>7.21 MB</td>
</tr>
<tr>
<td>Minutiae Feature matching</td>
<td>3.5085</td>
<td>0.145</td>
<td>30</td>
<td>0.0402</td>
<td>564 KB</td>
</tr>
<tr>
<td>Distance based Ratio Matching</td>
<td>3.1031</td>
<td>0.0612</td>
<td>30</td>
<td>0.0478</td>
<td>1.63 MB</td>
</tr>
</tbody>
</table>

Figure 2: Equivalent Chart of the Experimental Analysis

Depending upon the survey we are using minutiae based algorithm for fingerprint scanning because it takes less time for fingerprint storage and also takes less time for identification and verification process.

Minutiae Based Algorithm

- **New User Enrollment Mode**
  The new user can be registered into transmitter module by means of New Enrolment key on the keyboard. During the enrolment mode, a fingerprint sensor scans the person’s fingerprint to create a digital representation. The preprocessing algorithm and feature extraction algorithm processes the digital representation to generate a more compact and expressive representation called a template. The template for each user is stored in a recognition system database (SDRAM) for the purpose of future comparison.

- **Noise removal and image segmentation**
  The image acquired from the fingerprint sensor is temporarily stored in the SDRAM. The noises introduced into the image during fingerprint acquisition process, so the image is first subjected to noise removal process. After removing the noise, image is segmented. In a fingerprint image there are foreground regions and the background regions. Without segmentation process, if the image is directly subjected to the minutiae extraction algorithms then extraction algorithm extracts noisy and false minutiae along with genuine minutiae points.

- **Local normalization**
  Normalization is performed on the segmented fingerprint image to homogenize the grey-level intensity values in an image.

- **Block Orientation Estimation**
  The block direction estimation defines the local direction of the ridges enclosed in the fingerprint. The block direction is obtained through the least mean square estimation algorithm.

- **Image Enhancement using Gabor filter**
  The Gabor filter based enhancement requires direction O(i, j) and ridge frequency F(i, j). If the normalized image is passed through a Gabor filter with appropriate values of O(i, j) and F(i, j), enhanced version of the image is produced at the output of Gabor filter.

- **Image Binarization**
  The original image is an 8-bit grey scale image. The binarization process converts a grayscale image into binary image by assigning pixel values ‘1’ for furrows and ’ 0’ for ridges.

- **Minutia Extraction and False Minutia Removal**
  The concept of Crossing Number (CN) is most extensively used method for extracting the minutiae from fingerprint image. Along with genuine minutia points some false minutia points are also present in the fingerprint image. So identify where these points are located and remove those points.

Removal of After extracting the minutia points, form the
template corresponding to new input user fingerprint and then stored in a specific memory location of SDRAM.

Matching Mode

The matching mode is responsible for identifying individuals at the point of access. Matching Process is shown in Fig. The matching algorithm calculates the Percentage Matching Score (PMR). If the matching score satisfies the specific condition then match is declared as successful match otherwise it is considered as the Failure match. Here the matching algorithm used is elastic match algorithm. Based on the minutia match count, percentage matching score is calculated. Now the calculated value of percentage match score is compared against the threshold value. If the percentage match score is greater than threshold value then the match is declared as the successful match.
V. SCOPE AND APPLICATION

- Student Attendance system in colleges.
- Employee attendance system in companies.

VI. CONCLUSION

The proposed system will enhance the student attendance management system. It will reduce the time required to upload the attendance of the students. The proposed will remove the chances of proxy’s. Our system will reduce the need of carrying bunch of papers for uploading the attendance.

REFERENCES


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