STUDENT ATTENDANCE TRACKING SYSTEM USING BIOMETRICS

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Abstract - *Biometric Identification Systems are widely used for unique identification of humans mainly for verification and identification. Biometrics is used as a form of identity access management and access control. So use of biometrics in student attendance management system is a secure approach. There are many types of biometric systems like fingerprint recognition, face recognition, voice recognition, iris recognition, palm recognition etc. In this project, we use fingerprint recognition system. Biometric technology that involves the identification and verification of individuals by analyzing the human fingerprint characteristics has been widely used in various aspect of life for different purposes, most importantly as regards this study the issue of employee attendance. The main aim of this project is to develop an accurate, fast and very efficient automatic attendance system using fingerprint verification technique. We propose a system in which fingerprint verification is done by the system that automates the whole process of taking attendance. Managing attendance records of students of an institute is a tedious task. It consumes time and paper both. To make all the attendance related work automatic and on-line, we have designed an attendance management system which could be implemented in any college or school. This fingerprint identification system uses existing as well as new techniques in fingerprint recognition and matching*

KeyWords: **Fingerprint Identification, Attendance Management.**

1.INTRODUCTION

The Biometrics technologies are used to measure and analyze personal characteristics. These characteristics include fingerprints, voice patterns, hand measurements, irises and others, all used to identify human characteristics and to verify identity. These biometrics or characteristics are tightly connected to an individual and cannot be forgotten, shared, stolen or easily hacked. These characteristics can uniquely identify a person, replacing or supplementing traditional security methods by providing two major improvements: personal biometrics cannot be easily stolen and an individual does not need to memorize passwords or codes. Authentication by biometric verification is becoming increasingly common in corporate and public security systems and applications. Like biometrics gives an alternative and higher security compared to passwords or pin identification due to the fact that passwords and pin can easily be compromised. We propose a system where we use biometric as authentication. Biometric Fingerprint Attendance system is business attendance system for students. System records attendance data of students based

on registered fingerprints. It is interactive GUI for adding efficiency and for automating organization procedures. Fingerprint authentication refers to the automated method of verifying a match between two human fingerprints.

Every organization whether it be an educational institution or business organization, it has to maintain a proper record of attendance of students or employees for effective functioning of organization. Designing a better attendance management system for students is necessary, so that the records be maintained with ease and accuracy. This is the main aim of this project. This would improve accuracy of attendance records because it will remove all the hassles of roll calling and will save valuable time of the students as well as teachers. Image processing and fingerprint recognition are very advanced today in terms of technology. It is our responsibility to improve fingerprint identification system.

A fingerprint is the pattern of ridges and valleys on the surface of a fingertip. The endpoints and crossing points of ridges are called minutiae. It is a widely accepted assumption that the minutiae pattern of each finger is unique and does not change during one's life. Ridge endings are the points where the ridge curve terminates, and bifurcations are where a ridge splits from a single path to two paths at a Y-junction. When human fingerprint experts determine if two fingerprints are from the same finger, the matching degree between two minutiae pattern is one of the most important factors. Thanks to the similarity to the way of human fingerprint experts and compactness of templates, the minutiae-based matching method is the most widely studied matching method.

LITERATURE SURVEY

SURVEY FINDINGS

Biometric Attendance

By Meor Said, M.A. Centre for Telecommunication Res. & Innovation (CeTRi), University. Tek. Malaysia Melaka, Durian Tunggal, Malaysia
Published at Technology Management and Emerging Technologies (ISTMET), 2014 International Symposium

This paper is presented about a system of recording student attendance using fingerprint identification that allows students to monitor student attendance to class is a true electronically. It can reduce the presence of fraudulent students who are now mostly done by the students and the system can also reduce problems such as the presence of the

missing paper and easily damaged. With this system can replace the existing manual system to a more systematic and electronics. This attendance system will be displayed on a computer lecturer with more attractive and graphics and have students complete detail using Microsoft Visual Basic Studio and integrated using the Fingerprint Reader.

Biometric Attendance System

By Ujan, I.A. Inst. of Inf. & Communication Technology, University of Sindh, Jamshoro, Pakistan Ismaili, I.A. Published at Complex Medical Engineering (CME), 2011 IEEE/ICME International Conference

This research work has application for attendance system of employer's and students in general. The system will facilitate institutions/ organization to make attendance individual in time along with data information thumb impression will be taken as a signature for the system entry. Main design and challenge in this system is the design of database architecture and its business logic.

SYSTEM ANALYSIS

EXISTING SYSTEM

Schools and colleges monitor the students' attendance the simple way by just using an attendance sheet in registers. Having a sign in attendance sheet can be very quick and convenient. But it takes long time for the lecturer to call out each student and mark attendance. There are chances of proxy attendance. However, this manual system could be outdated in a business organization and is difficult to maintain. It can easily get lost as there will be only one saved copy of it and it is inconvenient if it gets lost.

LIMITATIONS OF THE EXISTING SYSTEM

- Manual way of maintaining attendance in attendance sheets/registers.

- Registers can easily get misplaced or lost.

- Since only one copy is maintained, it is inconvenient if it gets lost.

- Time consuming process, as teacher calls out student and then mark attendance.

- Even if student is absent, friends can give proxy attendance.

- Lecturing time will be reduced, as time is spent more on taking attendance.

PROBLEM STATEMENT

Over the last couple of decades, technology has vastly improved leading it to be used by many businesses. As the manual way of maintaining attendance in sheets and registers is old technology, we need a system to maintain student attendance where only student present can get attendance.

PROPOSED SYSTEM

We need a system which can mark attendance based on the presence of students. For this purpose, biometrics is used. Fingerprint authentication is one of the best biometric authentications that can be used for this purpose. Fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Authentication by biometric verification is becoming increasingly common in corporate and public security systems and applications. We propose a system where we use biometric as authentication. Student attendance tracking system using biometric is a business attendance system for students used by the college and schools. System records attendance data of students based on registered fingerprints. It is interactive GUI for adding efficiency and for automating organization procedures.

We install the biometric scanner in each and every class which can scan the students fingerprint. This biometric will be connected to the system which the admin can access. The admin can manage all the data required like the course details, semester details, lecturers, subjects, time table and class details. If the students are allowed to give their attendance by their fingerprint, then there is a problem. The students will be wise enough to give their fingerprint before the lecturer comes and can easily bunk the classes to get attendance. To overcome this, we have developed a concept of lecturer fingerprint authentication. If a lecturer is taking a class at a given time, according to the time table, first the lecturer has to give their fingerprint impression. This will authenticate that the class has started and then students have to give their fingerprint to be validated. As the class finishes, the lecturer will again give their impression marking the closure of class. This will end the session indicating that all fingerprints scanned before and after the lecturer will be marked invalid. By this procedure, we can exactly get the attendance of students by their fingerprint impression. Proxy attendance is not possible as the fingerprint of a student cannot be replicated by their friends and in the absence of a lecturer. No two fingerprints are same. By this system, the lecturer will get more time for lecturing. The entire attendance will be maintained well and reports can be generated. Multiple copies can be maintained for administrative purpose.

ADVANTAGES OF THE PROPOSED SYSTEM

The system has some of the advantages listed below.

- All information student attendance is available at a single place.
- It is student friendly.
- It saves time and energy.
- Any student can view their particular attendance.

SYSTEM DESIGN

The purpose of the design phase is to plan a solution of the problem specified by the requirements document. This phase is the first step in moving from the problem domain to the solution domain. In other words, starting with what is needed; design takes us toward how to satisfy the needs. The design of a system is perhaps the most critical factor affecting the quality of the software; it has a major impact on the later phases particularly testing and maintenance.

The design activity often results in three separate outputs –

- Architecture design.
- High level design.
- Detailed design.

ARCHITECTURAL DESIGN

Architecture focuses on looking at a system as a combination of many different components, and how they interact with each other to produce the desired result. The focus is on identifying components or subsystems and how they connect. In other words, the focus is on what major components are needed.

As a developer, the .NET framework and Visual Studio present many choices for choosing the right architecture, from placing the data access code directly in the UI through datasets and data source controls, to creating a data access layer that talks to the database, all the way to creating an n-tier architecture approach that consists of multiple layers, and use data-transfer objects to pass data back and forth.

Layer:

A layer is a reusable portion of code that performs a specific function. In the .NET environment, a layer is usually setup as a project that represents this specific function. This specific layer is in charge of working with other layers to perform some specific goal. In an application where the presentation layer needs to extract information from a backend database, the presentation would utilize a series of layers to retrieve the data, rather than having the database calls embedded directly within itself. Now we will look briefly at the latter situation first.

There are two types

- Two Tier Architecture
- Three Tier Architecture

HIGH LEVEL DESIGN

DATA FLOW DIAGRAMS

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. DFD's can also be used for the visualization of data processing (structured design). A DFD shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored. It does not show information about the timing of processes, or information about whether processes will operate in sequence or in parallel. Data Flow diagrams in general are usually designed using simple symbols such as a rectangle, an oval or a circle depicting a processes, data stored or an external entity, and arrows are generally used to depict the data flow from one step to another.

Symbols used in DFD's:

Processes:

A process transforms data values. The lowest processes are our functions without side effects.

Data Flows:

A data flow connects the output of an object or process to the input of another object or process. It represents the intermediate data values within the computation. It is draws as an arrow between the procedure and the consumer of the data value. The arrow is labeled with the description of the data, usually its name or type.

Actors:

An actor is an active object that drives the data flow graph by producing or consuming values. Actors are attached to the inputs and the outputs of a dataflow graph. In sense, the actors lie on the boundary of the flow graph but terminate the flow of data as sources and sinks of data, and so are sometimes called terminators.

Data Store:

A data store is a passive object within a data flow diagram that stores data for later access. Unlike an actor, a data store does not generate any operations on its own but merely responds to requests to store and access data.

LEVEL 0 – CONTEXT DATA FLOW DIAGRAM

It is common practice to draw a context-level data flow diagram first, which shows the interaction between the system and external agents which act as data sources and data sinks. On the context diagram (also known as the 'Level 0 DFD') the system's interactions with the outside world are modeled purely in terms of data flows across the system boundary. The context diagram shows the entire system as a single process, and gives no clues as to its internal organization.

This context-level DFD is next "exploded", to produce a Level 1 DFD that shows some of the detail of the system being modeled. The Level 1 DFD shows how the system is divided into sub-systems (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must be present in order for the system to do its job, and shows the flow of data between the various parts of the system.
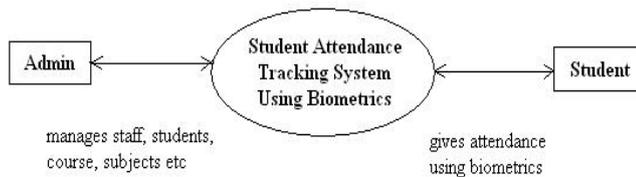

Fig: Context Data Flow Diagram. (Level 0)

LEVEL 1 – DATA FLOW DIAGRAM

This level (level 1) shows all processes at the first level of numbering, data stores, external entities and the data flows between them. The purpose of this level is to show the major and high-level processes of the system and their interrelation. A process model will have one, and only one, level-1 diagram. A level-1 diagram must be balanced with its parent context level diagram, i.e. there must be the same external entities and the same data flows, these can be broken down to more detail in the level1.
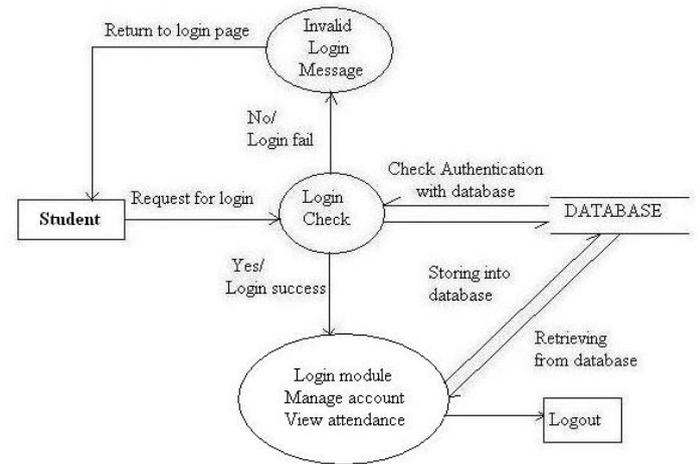

Fig: DFD of Admin

Fig: DFD of Student.

Conclusion

This fingerprint attendance system is elegant and efficient way to track the presence of students in the class over an entire semester for various courses. It also gives easy interface to get detailed information of relevant queries. Using this attendance system, the admin can get the attendance of a particular student throughout whole semester, attendance of whole class for a particular day and attendance of whole class throughout the semester in a tabular form within few seconds. The results show that fingerprint biometric identifier was found suitable for the student attendance management system of the organization.

FUTURE ENHANCEMENT

This project can be enhanced in many ways for future. Some are listed below.

- At present there are two actors. We can add another actor called the department or lecturer who can add classes and view attendance in their subjects.

- We can enhance this project by adding mobile registration and email registration.

- We can enhance security by sending OTP – one time password to both email and mobile for registration purpose.

- We can enhance this project and develop an android app, which will be extremely helpful for students in searching information.

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