DEVELOPMENT OF FACE RECOGNITION TIME MONITORING AND ATTENDANCE SYSTEM

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Abstract

This study marks the attendance without human intervention. Face Recognition Time and attendance software systems are tools for efficient management of resources and accurate labor reporting. This study attempts to solve the long queue of the employee in the conventional fingerprint methods and improve the accuracy of attendance information. Database management system has played a role for the normalization of the data flow of the system and assisted the organization of attendance diagrams of the employee,\ thus resulting to a more effective monitoring and attendance recording. To harness full potential in a networked environment, it is recommended to purchase additional face recognition device and immediate implementation of the developed system not only in the CSIT Department but also in SLSU Sogod Campus.

Keywords: *time and attendance systems, face recognition*

1.0 Introduction

In today's networked world, the need to maintain the security of information or physical property is becoming both increasingly important and increasingly difficult. From time to time media report of credit card fraud, computer breakings by hackers or security breaches in a company or government building.

In most of crimes today, the criminals are taking advantage of a fundamental flaw in the conventional access control system. None of these means to really define people. Rather, they merely are to authenticate. It goes without saying that if someone steals and duplicates the identity, then an access to a person's data or the personal property any time. Recently, technology became available to allow verification of "true" individual identity based in the field called "biometrics."

Nawaz (2009), biometric system had been widely used for the purpose of recognition, in many institutions and organization. The attendance is a very important factor for various purposes and it is one of the important criteria to be followed by employees (Saraswat 2010). The previous manual approach which was manually taking and maintaining the attendance record was very inconvenient. In the olden days, companies are using manual punch card to record the employee's attendance. Findings of the research study conducted (Kelly 1970), in punch card machine, employees can

easily do the proxy attendance for others. Also at the end of the month, the payroll officer needs to calculate the daily overtime for all the employees. It is very time consuming and lot of manual errors may happen.

Background

The Computer Studies and Information Technology (CSIT) Department, formerly known as Information Technology Department started in the year 2001. Today, CSIT department is one of the premier undergraduate programs of the Southern Leyte State University – Sogod Campus. It offers the following courses; Bachelor of Science in Information Technology Major in Programming, Bachelor of Science in Information Technology Major in Networking, Bachelor of Science in Computer Engineering, Associate in Information Technology and Diploma in Computer Systems Technician. As of the second semester academic year 2011-2012, the total student population is 850.

Attendance is one of the most important things that institution should monitor. Employee workload information is distributed to determine the time for employee is in the CSIT Department. The attendance log form holds what time the employee checks in and checks out from the department in the classroom assignments. Traditionally attendance is taken manually by using attendance sheet, buth the current attendance marking methods are monotonous & time-consuming. Manual recording of the attendance can be easily manipulated. Moreover, it is very difficult to verify one by one faculty in a large environment with distributed rooms/laboratories.

Review of Related Studies

Face recognition system is a technology for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database (Bouzalmat et. al 2011).

Face recognition offers a non-intrusive, and natural way of identification (Kong 2005). Although several biometric authentication methods based on other physiological characteristics (such as fingerprints, retina and iris patterns, hand geometry, and voice) can be used, such biometric identification systems mostly rely on the cooperation of the participants (Kong 2005).

The research findings by Jalal (2006), explained that face recognition technique regarding real-time pattern phenomenon creates a natural and useful interaction between intensity (database) and ubiquitous view.

The study entitled "Face Recognition using Gabor Jets for Images of Mass Disaster Victims by Dabke (2011), natural calamities affect a large number of people in a short time duration. After such

emergencies occur, people affected need medical aid and are admitted into hospitals. In such conditions, it becomes difficult to locate one's family members and friends.

The study entitled "Facial Recognition Surveillance System of Virginia State" described in this report conducted by RAND Public Safety and Justice for the Virginia State Crime Commission (Woodward 2002), defines biometric and discusses examples of technology, explaining how biometrics may be used for authentication and surveillance purposes.

An article entitled "Development of Academic Attendance Monitoring System Using Biometrics" by Nawas (2009), published in the International Journal of Computer Science and Network Security stresses that maintaining the attendance record is an important factor in people management. When considering academic institutes, manually taking the attendance and maintaining it adds to the difficulty of this task as well as waste of a lot of time.

Study of Naval et.al (2011) aims to overcome the limitations of traditional identification systems by providing a remotely accessible face recognition engine. Using a camera equipped and Multimedia Messaging Services (MMS)-capable mobile phone, any authorized user can send a query to the FROG engine anytime and from anywhere and receive results quickly.

Objectives of the study

The objectives of the study were:

1. To develop a computerized monitoring and attendance system
2. To incorporate Face Recognition technology to the attendance system
3. To design an efficient and effective approach in management decision making.

Work done

Figure 1. Diagram of Agile software systems

The term 'agile' refers to a philosophy of software specific development. Under this broad umbrella sits many techniques such as Extreme Programming, Scrum, Lean Development, and others. Each of these more particular approaches has ideas, communities and leaders.

Agile methods are people-oriented. Agile methods assert that no process will ever make up the skill of the development team, so the role of a process is to support the development team.

2.0 Theoretical Framework

In this research, the researcher aime to provide a better way of monitoring the attendance of CSIT Department. The system provides a reliable and efficient way of monitoring and record keeping activity as shown in Figure 2.

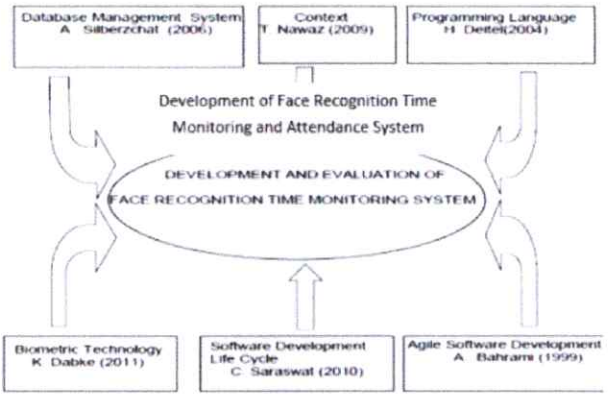

Figure 2. Theoretical framework

The system needs input, process, and output stages in monitoring and checking attendance. Data and information are important so that the whole system becomes functional. Figure 3 shows the paradigm of the study of the system.

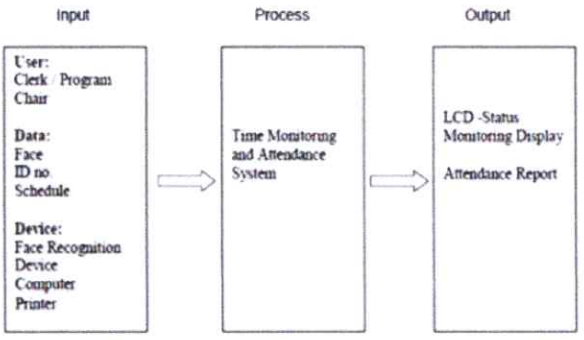

Figure 3. Paradigm of the study.

Technical Aspects

The use of face recognition technology eliminates the usage of the buddy punching method and emphasizes on capturing the facial details along with the time. These data are then stored in the database of the computer so that these could retrieve anytime. With the usage of the face recognition attendance system, it eliminates the need of a paper register which was in used earlier for recording the attendance along with the time.

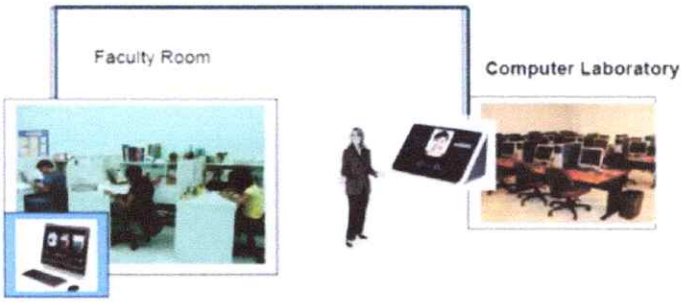

Figure 4. The architectural lay-out of the study

The unique features that the developed face recognition time monitoring and attendance system are:

1. It is the simplest technology for managing the time related data.
2. It achieves utmost accuracy in noting the timing data.
3. The easy installation procedure of this system is relatively simple.
4. It reduces the amount of data loss as it emphasizes on electronic data storage.

Figure 7 shows how the face identification associates with face identification, extraction algorithm and storing procedure algorithm.

The data converted into the database are three-dimensional shape data of surfaces of faces and color image data. Different conditions (an angle and lighting directions) of the inquiry image are supplied to the data, and thereby a color image of each person's face from the database in accordance with the shooting conditions is generated. By comparing the color with the inquiry image, the collation is implemented.

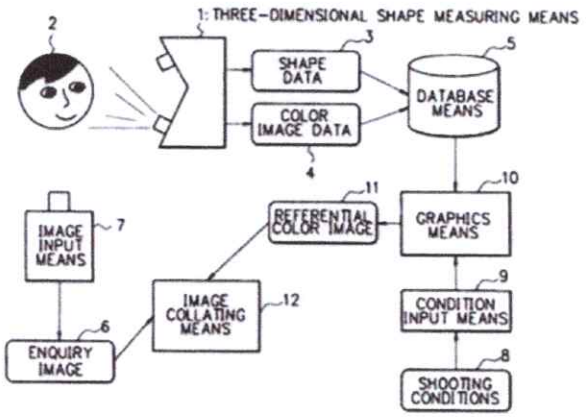

Figure 5. The block diagram showing constitution of a face image recognition system according to an embodiment of the device

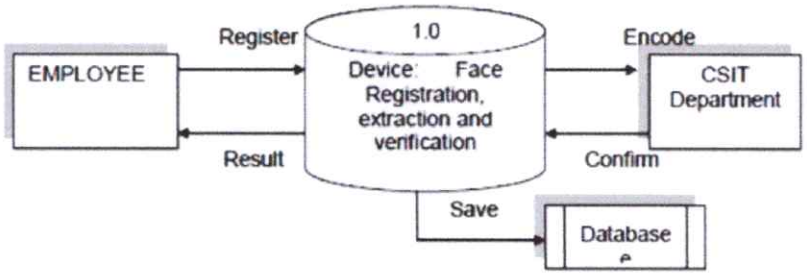

Figure 5. The block diagram showing constitution of a face image recognition system according to an embodiment of the device

Screen Shots

Since the Face ID device is an embedded system, a database for face template and face vector are stored in Firebird database system because of portability and flexibility. The operating platform of the system is Local Area Network (LAN) connected; there is a server and client for the developed system. The following are the modules use in the system: employee maintenance module, basic information module, attendance report module, time scheduling module, time monitoring module, security level maintenance module, and time recorder module

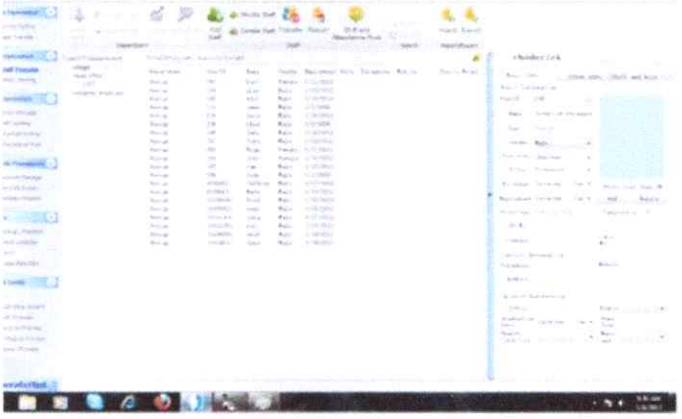

Figure 9. Employee maintenance module

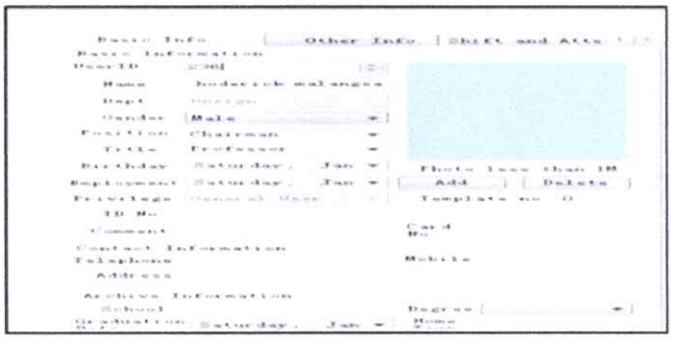

Figure 10. Basic information module

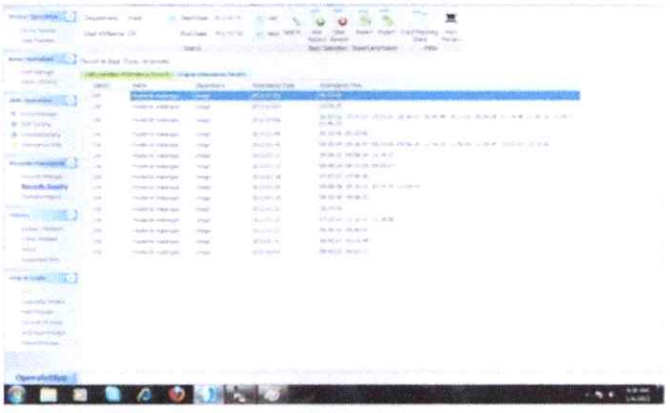

Figure 11. Attendance report module

Figure 12 shows the Time Monitoring Module. This module handles the current status of the laboratory by displaying the faculty user, subject description, course and section, and logging time

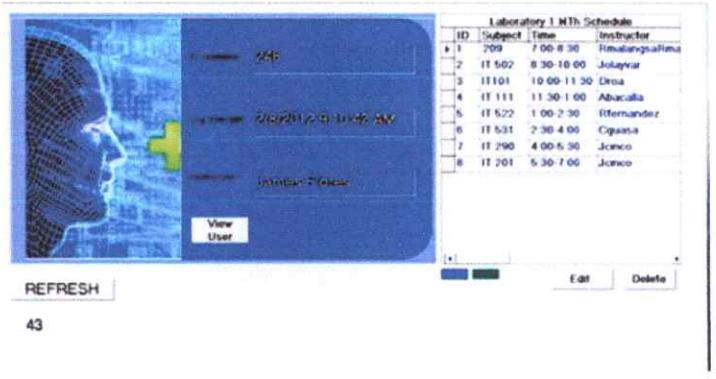

Figure12. Time monitoring module

Figure 13 shows the Time Recorder Module. This module will record the logging in and out of the employees, and handles the connection between the face identification device and system database.

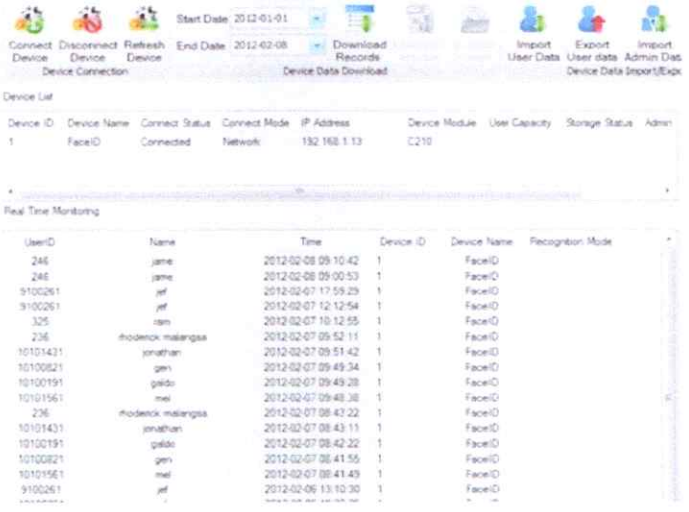

Figure 13. Time recorder module

Networking Considerations

Networking is the practice of linking two or more computing devices together for the purpose of sharing data. Networks are built with a mix of computer hardware and computer software.

Since the face identification device is an embedded system, it can also act as server or as client likewise with the personal computer too. The principle of TCP/IP (Transmission Control Protocol / Internet Protocol) , a unique IP address is needed to allow the two devices to communicate with each other via wireless or wired connection.

Hardware Requirements

The developed system has been designed and implemented using the following hardware requirements:

- 1 unit of Hanvon Face ID F710 Device embedded system
- 1 unit printer
- 1 unit Personal Computer
- 1 gigabyte of RAM
- UTP Straight through cable

Software Requirements

The proposed system needs the following operating system and application software:

- Windows XP or Windows Vista operating system
- Firebird Database Server
- Microsoft Visual Basic 6.0
- Flame Robin Inter Base Provider

Database Schema

Department

Field Name	Data Type
DeptID	Number
Department	Text
DateCreated	Date/Time

Employee

Field Name	Data Type
EmpID	Number
Name	Text
Address	Text
Gender	Text
Designation	Text
Department	Text
Photo	Text
Date Employed	Date/Time

Individual

Field Name	Data Type
EmpID	Number
Name	Text
Date	Date/Time
Log Details	Number

Schedule1

Field Name	Data Type
ID	AutoNumber
Time	Date/Time
Subject	Text
Instructor	Text

3.0 Conclusion and Future Works

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 stationery material with electronic apparatus.

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