

Development of Attendance System using Biometric Fingerprint Identification

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Abstract— Traditional style of managing class attendance in Universiti Tun Hussein Onn Malaysia (UTHM) by using handwritten signatures cannot avoid attendance sheet, spurious attendance and tends to be very time consuming for large classes. The paper presents the development of attendance system based on fingerprint identification. This system provides an efficient way for administrators and lecturers to manage and track student class attendance. To develop the system, the author uses Microsoft Visual Basic 6.0 for Graphical User Interface (GUI) design, Microsoft Access for database management system and Dreamweaver for online networking system.

Keywords: attendance, fingerprint, template, match, database

I. INTRODUCTION

BIOMETRIC recognition refers to the use of distinctive anatomical (e.g., fingerprints, face, iris) and behavioral (e.g., speech) characteristics, called biometric identifiers, or traits for automatically recognizing individuals. Fingerprints are fully formed at about 7 month of fetus development [1]. Finger ridge configurations do not change throughout the life of an individual except due to accidents such as bruises and cuts on the fingertips.

Fingerprint recognition systems have been deployed in a wide variety of application domains, ranging from forensics to mobile phones. Fingerprint is becoming an essential component of effective person identification solution because fingerprint identifiers cannot be shared or misplaced and it intrinsically represents individual's bodily identity. A biometric fingerprint system may be called either a verification system or an identification system, depending on the application context:

1. A verification system authenticates a person's identity by comparing the captured fingerprint characteristic with her previously captured (enrolled) fingerprint reference template pre-stored in the system. It conducts one-to-one comparison to confirm whether the claim of identity by the individual is true. A verification system either rejects or accepts the submitted claim of identity.

2. An identification system recognizes an individual by searching the entire enrollment template database for a

match. It conducts one-to-many comparisons to establish if the individual is present in the database and if so, returns the identifier of the enrollment reference that matched. In an identification system, the system establishes the subject's identity without the subject having to claim an identity.

II. SYSTEM DESIGN

The overview of system architecture is illustrated in Figure 1. During a particular lecture session, students will scan their fingerprints on the scanner every time they enter or leave the classroom. After verification and identification processes, if a student fingerprint template exists in the database, his or her attendance status for that corresponding class will be updated. The administrator and lecturers have the authority to access and update students' details in the database. The system can be accessed via the Internet thus more flexible in managing student attendance from various places.

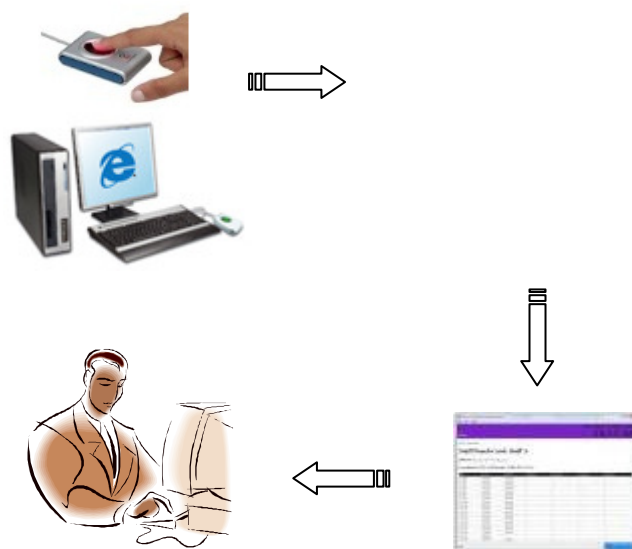


Figure 1 : System architecture

Several approaches have been identified and selected during the development of this work. The overall system implementation and development is depicted in Figure 2.

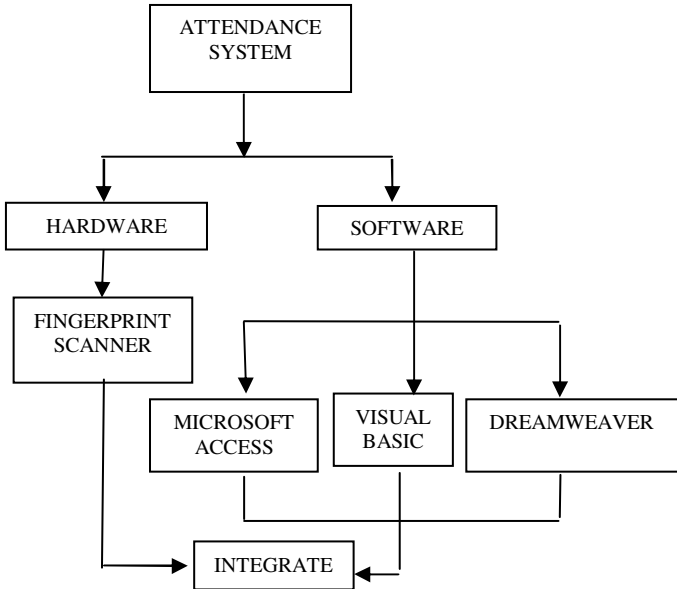
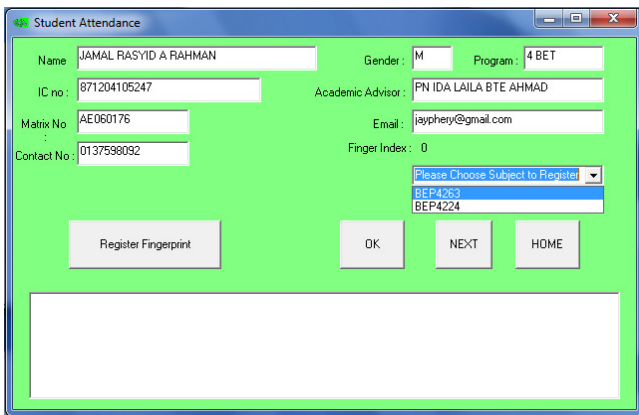


Figure 2 : Overview of system development

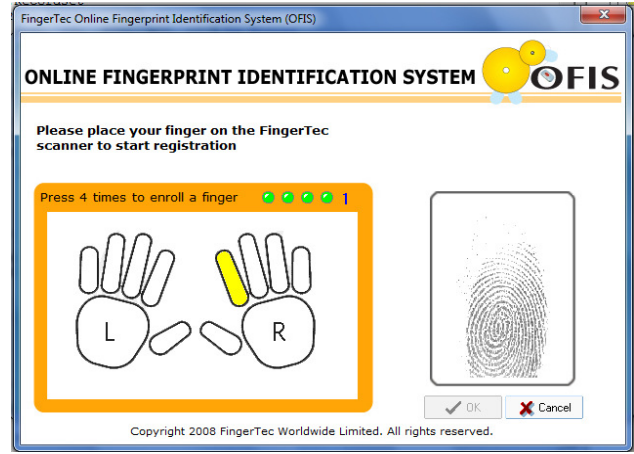
III. SYSTEM IMPLEMENTATION

A. Student Registration

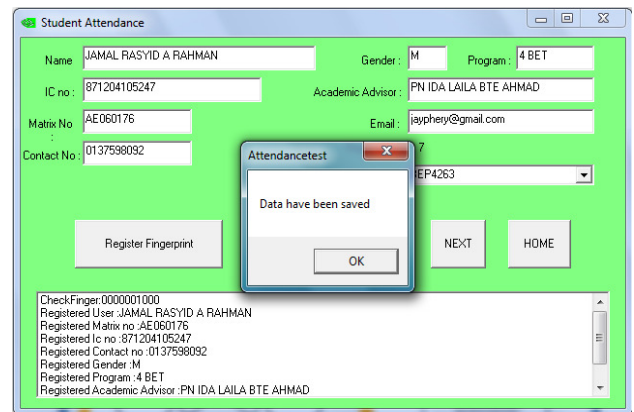
The database which was designed in Microsoft Access stores the information of each student registered for a particular course or class. The fingerprint image of each student is stored as fingerprint template in the database and will be used during the verification process. Some snapshots of the registration process are provided in Figure 3.



(a)



(b)



(c)

STUDENTNAME	ICNO	MATRIXNO	CONTACTNO	EMAIL	GENDER	PROGRAM	ACADEMICADVISOR	FINGERTEMPLETE
JAMAL RASYID B A RAHN	871204105247	AE060176	0137598092	jayphery@	M	4 BET	PN IDA LAILA BTE AHM	mspZVmGjagkRgRkI38DDK
NASIRUDDIN B TUMIRAN	871128235	AE060181	0137909125	siput_sumi	M	4 BET	PN RAFIDAH BTE NGADI	mspZlJ9djjSARDQMz08F5yc
MOHD KHUZAIRI B CHE K	870907035	AE060149	0137922911	confirm_ka	M	4 BET	PN IDA LAILA BTE AHM	mspZfmxuI009ASd6Tz0i3fC
MOHAMMAD FAISAL B N	870101065	AE060149	0137449144	halo_band	M	4 BET	PN IDA LAILA BTE AHM	mspZlXhTmT4AQe+uB98DcE
MUHAMMAD HAFEZ B N	870407565	AE060118	0137911727	one_comp	M	4 BET	PN HERDAWATIE BTE AI	mspZloWajq18AQ9Ar3Y8EEg
AINUL HAZIM B ISMAIL	871217085	AE060213	0195939550	manjung_1	M	4 BET	PN RAFIDAH BTE NGADI	mspZfnd8rSrQQ8twG19HjTC
AHMAD FATHI B ABDUL F	870310465	AE060092	0129484827	fathi@yah	M	4 BET	PN HERDAWATIE BTE AI	mspZVlRghjVwQQIKWnBcC
RIJALLUR RAHIMI B MOHC	870128075	AE060137	0137592309	rijalur@yal	M	4 BET	PN IDA LAILA BTE AHM	mspZfmbUjppYwQpCK2IBBTj
KHAIRUL AMAR B AZIZ	870316025	AE060125	0137007515	kruI_amar	M	4 BET	PN IDA LAILA BTE AHM	mspZVmdZjyZZAR4yqFa8Dzc
MOHD AZALIZUL B HASH	860113465	AE060135	0137046388	force_bte	M	4 BET	PN IDA LAILA BTE AHM	mspZllxukCV8gu4UVXBPjM

(d)

Figure 3 : Some snapshots taken during registration process

B. System Login

Visual Basic is used to create the graphical user interface between users and database. Figure 4 shows the main menu display for the attendance system.



Figure 4 : Main menu display for the attendance system

There are three modes of operation to choose from which are Administrator, Lecturer and Student as shown in Figure 5. Administrator mode is used by staff at the administration office who will take the responsibility to manage student registration process for all courses. Administrator is also given authority to access to the database directly during add and drop period which is normally happen in the middle of each semester.

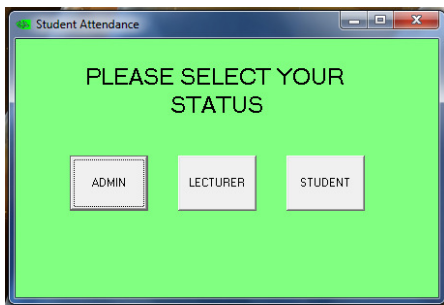


Figure 5 : Three modes of operation; Administrator, Lecturer and Student

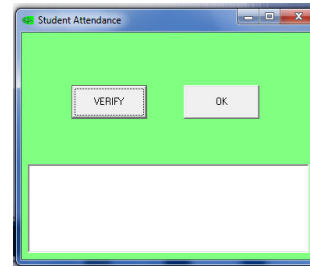
Lecturers and instructors may login to Lecturer mode which allows them to check and track student attendance instantly during lecture sessions. Besides that, lecturer can easily spot students who are late for lecture as the system will display the time when student scan their fingerprints for verification process.

As for the students, they must login to Student mode which requires them to scan their fingerprint before the system performs the verification process.

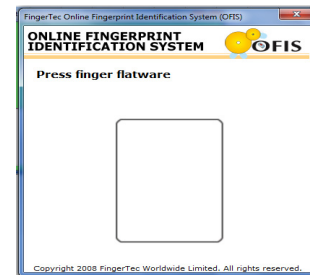
C. Verification Process

When a student puts a finger on the sensor in order to be verified or identified, a verification template is created. The fingerprint matching process uses a proprietary algorithm to calculate the probability that a verification template and a registration template come from the same finger. If the verification process is successful, student attendance status

for that corresponding class will be updated as 'PRESENT', otherwise their status is considered as 'ABSENT'. Figure 6 shows some snapshots on student verification process.



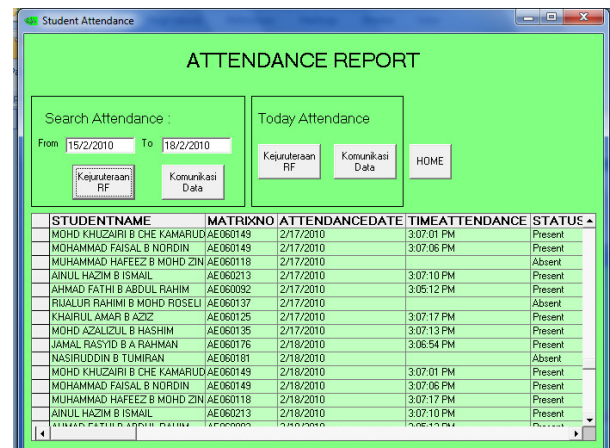
(a)



(b)



(c)



(d)

Figure 6 : Some snapshots of the verification process

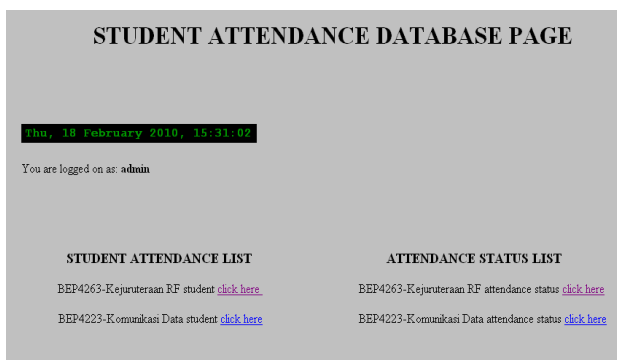
D. Online System

The web based application was implemented, thus

provides ease and flexibility in monitoring student attendance using online networking (e.g : wireless or Local Area Network). The web server registers student information and monitors the student attendance list. Figure 7 shows some snapshots of the online networking system which was designed in Macromedia Dreamweaver environment.



(a)



(b)

BEP4263 Kejuruteraan RF Attendance Status List

STUDENTNAME	MATRIXNO	ATTENDANCEDATE	TIMEATTENDANCE	STATUS
JAMAL RASYID B A RAHMAN	AE050176	2/16/2010	3:23:04 PM	Present
NASIRUDDIN B TUMIRAN	AE050181	2/16/2010	3:22:47 PM	Present
MOHD KHUZAIRI B CHE KAMARUDIN	AE050149	2/16/2010		Absent
MOHAMMAD FAISAL B NORDIN	AE050149	2/16/2010	3:23:01 PM	Present
MUHAMMAD HAFEEZ B MOHD ZIN	AE050118	2/16/2010	3:23:09 PM	Present
AINUL HAZIM B ISMAIL	AE050213	2/16/2010	3:05:03 PM	Present
AHMAD FATHI B ABDUL RAHIM	AE050092	2/16/2010	3:05:12 PM	Present
RJALUR RAHIMI B MOHD ROSELI	AE050137	2/16/2010		Absent
KHAIRUL AMAR B AZIZ	AE050125	2/16/2010	3:05:16 PM	Present
MOHD AZALIZUL B HASHIM	AE050135	2/16/2010	3:05:55 PM	Present
JAMAL RASYID B A RAHMAN	AE050176	2/17/2010	3:05:54 PM	Present
NASIRUDDIN B TUMIRAN	AE050181	2/17/2010	3:05:58 PM	Present
MOHD KHUZAIRI B CHE KAMARUDIN	AE050149	2/17/2010	3:07:01 PM	Present
MOHAMMAD FAISAL B NORDIN	AE050149	2/17/2010	3:07:06 PM	Present
MUHAMMAD HAFEEZ B MOHD ZIN	AE050118	2/17/2010		Absent
AINUL HAZIM B ISMAIL	AE050213	2/17/2010	3:07:10 PM	Present
AHMAD FATHI B ABDUL RAHIM	AE050092	2/17/2010	3:05:12 PM	Present

(c)

Figure 7 : Some snapshots of the online networking system

IV. CONCLUSION

This paper presents the development of class attendance system in Universiti Tun Hussein Onn Malaysia (UTHM) based on fingerprint technology. As for future expansion, the application of the system can be accomplished with payment management system to collect the university account transactions at the university point of sale terminals such as restaurants, library, recreation center and medical center.

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