

Fingerprint Database Management System

U. Siva Reddy¹, B.Rajasekhar², Dr.M.kamaraju³, Dr.B.Ananda Krishna⁴

¹Student, M.Tech, DECS, Gudlavalleru Engineering College, Gudlavalleru,

²Associate Professor, ECE Department, Gudlavalleru Engineering College, Gudlavalleru,

³Professor&H.O.D, ECE Department, Gudlavalleru Engineering College, Gudlavalleru,

⁴Professor, ECE Department, Gudlavalleru Engineering College, Gudlavalleru.

Email:¹sivareddygec@gmail.com,²surajb2000@gmail.com,

³madduraju@yahoo.com,⁴anand_bk@rediffmail.com

Abstract — This project aims at providing an easy and time saving attendance system that verifies the employee's attendance system at an organization using their fingerprint during the attendance time. When an employee is first enrolled in a fingerprint-based biometric attendance system, the software records a template of the employee's fingerprint using a scanner and associates that template with the employee's ID number. This template measures the relationship between various points in the fingerprint. At the time of attendance, the system verifies that the newly scanned fingerprint matches the template originally stored for that ID number. If there is a match, the punch is recorded. The fingerprints are matched using "minutia based fingerprint image matching" algorithm. The system will eliminate buddy punching. It will efficiently replace the manually maintained records and the conventional time consuming way of marking attendance. The system may also record the employee's outgoing and incoming time during the days, thus facilitating organizations. The basic inputs are obtained from user during the registration and verification stages.

Keywords — Biometric; Fingerprint; Recognition; Matlab.

I. INTRODUCTION

Biometrics is an automated method of recognizing a person based on a physiological or behavioural characteristic. Among the features measured are: face, fingerprints, hand geometry, handwriting, iris, retinal, vein, and voice. Fingerprint biometrics is a dynamic technology that is being adopted into new markets and applications at a rapidly increasing pace. Depending on the applications, users can simply touch or slide their finger over a sensor for access to their PCs, wireless devices, workplaces or home. These tiny sensors lock out any unauthorized individual while allowing a convenient way for the registered user to replace passwords for system login and grant access to the application. A biometric system can be operated in two modes: 1) verification mode and 2) identification mode. A biometric system operating in the verification mode either accepts or rejects a user's claimed identity while a biometric system operating in the identification mode establishes the identity of the user without claimed identity information. In this work, we have focused only on a biometric system operating in the verification mode.

An attendance system is designed to automate the employee attendance procedure in the organization using the automatic fingerprint verification technology.

Featuring an interactive, easy-to-use interface, the system dramatically reduces the number of days required to maintain records and the burden of organizations.

Fingerprint – an Overview

A fingerprint, as the name suggests is the print or the impression made by our finger because of the patterns formed on the skin of our palms and fingers since birth. With age, these marks get prominent but the pattern and the structures present in those fine lines do not undergo any change. Because of their permanence and unique nature, they have been used in criminal and forensic cases for a long time [2].



Fig. 1 Fingerprint Image

A fingerprint is composed of many ridges and furrows. These ridges and furrows present good similarities in each small local window, like parallelism and average width. The fingerprints are not distinguished by their ridges and furrows (valleys), but by features called Minutia. The Minutia refers to some abnormalities in a ridge. Minutia is an important characteristic of a ridge. The most prominent two minutia points are

- Ridge termination means the sudden or abrupt ending of the ridge.

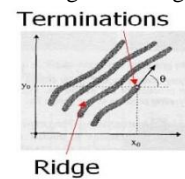


Fig. 2 Ridge Termination Minutia

- Ridge bifurcation is the point on the ridge where a ridge is divided into two separate ridges.

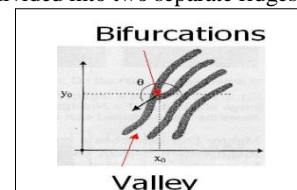


Fig. 3 Ridge Bifurcation Minutia

D. Fingerprint Recognition

The recognition procedure can be broadly sub grouped into

- 3) *Fingerprint Identification*: It refers to specifying one's identity based on his fingerprints. The fingerprints are captured without any information about the identity of the person. It is then matched across a database containing numerous fingerprints. The identity is only retrieved when a match is found with one existing in the database. So, this is a case of one-to-n matching where one capture is compared to several others. This is widely used for criminal cases [3].
- 4) *Fingerprint Verification*: It is different from identification in a way that the person's identity is stored along with the fingerprint in a database. On enrolling the fingerprint, the real time capture will retrieve back the identity of the person. This is however a one-to-one matching. This is used in offices like passport offices etc. where the identity of a person has to be checked with the one provided at previous stage [3].

II. EXISTING SYSTEM

Marking of attendance is a tedious and time consuming process. At present this is done manually. It is necessary to record details about every employee on a daily basis. Usually the management allots an in-time for the employee; say around 9P.M after which they can enter only if they had obtained permission. The registers have to be regularly updated when employee choose to go on a leave or seek permission for late arrivals Because of the huge strength of the organizations it is not possible for the organizations to personally identify every employee, thus proxies can occur. In an effort to maintain orderliness.

E. Disadvantages

- Time consuming.
- Difficult to update in cases where students vacate or shift to other room/hostel because registers are used to record attendance and are renewed only on a monthly basis.
- Error prone and susceptible to proxy.
- Difficulties in supervision.

III. PROPOSED SYSTEM

We propose a three module system where a database in MS access is already created. It stores the student details such as ID, name, department, college name etc along with their fingerprint template. ID is used as primary key which uniquely identifies each student. The system database consists of a collection of records, each of which corresponds to organizations. Each record contains the following fields: Name of the person, ID, number of leaves, department ,college name, contact number, address etc. along with templates of the person's fingerprint and other personal details of the students. There are two users for this system

1. Administrator.
 2. Employee.
- Administrator login is password protected.

The supervisor acts as administrator. Administrator has the privileges to add, view and delete employee records. He can also view the reports of attendance marked .He has to provide details of employee who have applied for leave/permission. Thereby such employee's login is blocked during the period of their leave.

During the attendance time, each employee has to provide his/her ID number and the fingerprint template. The template stored corresponding to the ID number and the one provided are matched using a fingerprint matching algorithm that extracts features from both the templates. If there is a match the attendance is recorded. Administrator can check the list of employees who have not mark their attendance within the stipulated time.

F. Advantages Of Proposed System

- Easy and time-saving
- Provides complete administrative control, monitoring, enrollment, record management and reporting functions
- Eliminates buddy punching
- Reduces administrative costs associated with issuing attendance registers

G. Block Diagram of proposed system

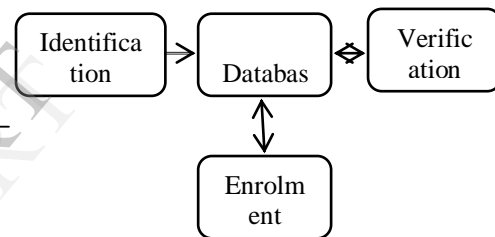


Fig. 4 Block Diagram of Proposed Fingerprint Database Management System

- 1) *Identification Module*: It refers to specifying one's identity based on his fingerprints. The fingerprints are captured without any information about the identity of the person. It is then matched across a database containing numerous fingerprints. The identity is only retrieved when a match is found with one existing in the database. So, this is a case of one-to-n matching where one capture is compared to several others. This is widely used for criminal cases [3].
- 2) *Verification Module*: This phase involves identifying the employee. Using a minutia based algorithm that captures both local and global features of the fingerprint, the registered image retrieved from database against the id provided by the employee and the one provided during the attendance time is matched and the attendance is marked by setting a flag. For those on leave, the flag remains unset during the period of their absence. This flag helps in obtaining the attendance reports.
- 3) *Enrolment module*: All the employees have to register with the system in order to use it. Under the administrator login, every employee registers himself i.e. he provides all his details such as his ID, name ,department ,room

number ,college name ,contact number, address etc. then the fingerprint is chosen from the database of images from fingerprint scanner and loaded into the employee database.

IV. ALGORITHM DESIGN FOR DATABASE MANAGEMENT SYSTEM

This section describes the step by step instruction of the system developed for Database Management System used for the fingerprint images.

Step 1 START

Step 2 IF record present in database

- (a) preview record as table or as detailed view
- (b) or update record
- (c) or Delete record
- (d) or print record
- (e) or preview employee fingerprint image in a maximized window
- (f) or count record in database

ELSE GOTO step 3

Step 3 Register new employee

- (a) Supply employee's profile
- (b) Load employee's photograph
- (c) IF med image is in binary, load it ELSE
- (d) Convert med image to binary and load it
- (e) Save record in database

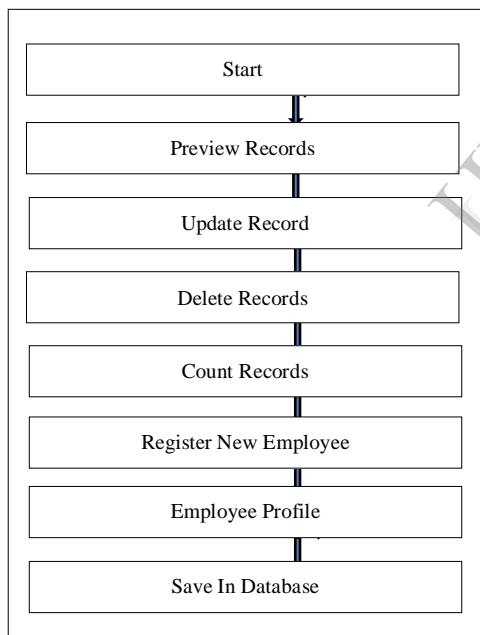


Fig. 4 Fingerprint Database Management System

V. CONCLUSION

In this paper we proposed the implementation of fingerprint database management system. Thus, the project to automate employee attendance is completed successfully in four modules using "Matlab" as front end, and MS access as backend, with the functional components of the project and the minimum requirements satisfied. Monitoring can be done easily with this system as any details about the employee is available easily. The project reduces the time consumption and the stress of attendance marking manually

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