



# Attendance Management System for Industrial Worker using Finger Print Scanner

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**Abstract** - Attendance management is the act of managing attendance or presence in a work setting, which maximizes and motivates employee attendance thereby minimizing loss. Not only does it affect productivity, it can cost the company profits or even additional contracts. For the industrial sector attendance management system can develop alacrity among the workers to work regularly and also help them to motivate their co-worker to attend work regularly. Fingerprints are considered to be the best and fastest method for biometric identification. They are secure to use, unique for every person and do not change in one's lifetime. Fingerprint recognition is a mature field to-day, but still identifying individual from a set of enrolled fingerprints is a time taking process. This paper illustrates improvement of attendance management system based on fingerprint identification for implementation on large databases e.g. of an industry or a garments factory etc. In this project, many new algorithms have been used e.g. gender estimation, key based one to many matching, removing boundary minutiae. Using these new algorithms a new attendance management system has been developed which is faster and cheaper in implementation than any other available today in the market.

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**GJCST-F Classification** : I.5.4



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Md. Shakil <sup>α</sup> & Rabindra Nath Nandi <sup>σ</sup>

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## 1. INTRODUCTION

Attendance Management System (AMS) is the easiest way to keep track of attendance for community organizations such as industrial organization, business organizations and volunteer groups. Attendance Management System is useful in terms of manpower analysis, day-to-day monitoring of attendance, maintaining statutory registers, monitoring leave records, calculation of overtime and transferring information to the payroll system. Attendance Management System can be grouped into four categories namely Manual System, Biometric System, Card-based System and E-Commerce System:

### a) Manual System

This system makes use of a log book. Users arrive at a terminal where the book is placed. They write their names, the time of arrival and then sign against

their names. Some organizations provide clock for arrivals to use at the terminal. This system is limited by lack of user authentication. Users may write wrong time and the log book may even be stolen or destroyed.

### b) Biometric System

This system recognizes a person by his body parts such as face, voice, iris and fingerprint linking that to an externally established identity. The common type is the use of fingerprints. Fingerprint system can either be minutiae-based, image-based or textured-base systems. In the minutiae-based, ridge endings and ridge bifurcations are extracted forming the feature vector to be used for identification. This system has small size but it requires large processing power for image identification and enhancement. The image-based system uses raw pixel intensity information in its operation. It uses optical matching and correlation-based matching. Though this system is prevalent among the recognition systems, it is however, affected by brightness variation, image quality variation, scars and global distortions in the image. It also requires much storage. The textured-based system matches features of fingerprint extracted in a transform domain generating sequence distribution. This system has smaller size of feature vector and it does not need pre-processing. Hence reduces computational overload and saves time.

### c) Card-based System

Cards are inserted into a machine which records the exact time when the user has arrived. Paper cards have eventually been replaced by sturdier cards that are sized just like the bank card which can also be used for time keeping. An issue with the attendance card is that some workers will ask co-workers to time-in for them. Some have attempted to remedy this dilemma through the use of signature logs that are attached next to the attendance recorder.

### d) E-Commerce System

This is a performance based attendance keeping system. This is increasingly utilized to ensure not only users' attendance but also their productivity and efficiency as well. This system captures user logs into the organizational website alongside other activities such as mouse clicks and keyboard taps. This system is in the experimental phase.

This paper presents attendance management system for the industrial worker using fingerprint

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identification. Biometrics refers to the automatic identification of a person based on his or her physiological or behavioral characteristics. It includes fingerprint, iris, facial and retinal. Biometrics technologies are becoming the foundation of an extensive array of highly secure identification and personal verification solutions. Today, biometric is being spotlighted as the authentication method because of the need for reliable security.

Fingerprint authentication has been in use for the longest time and bears more advantages than other biometrics. It has been verified through various applications. In 1924, Federal Bureau of Investigation (FBI) is already known to have maintained more than 250 million civil files of fingerprints for the purpose of criminal investigation and the identification of unknown casualties. It now is being used in numerous field including financial, medical, e-commerce and customer application as a secure and effective authentication method.

## II. PROBLEM STATEMENT

Traditionally, worker's attendance is taken manually by using attendance sheet. With this manual system, there are some cases that worker can cheat. This occurs because the worker's just wanted to fulfill the 100% of the attendance so that they can get the full salary on this month. Management can't monitor for all workers in the organization and it is difficult for management to record the attendance of worker accurately and efficiently. Managements are responsible to monitor the entire worker's attendance for the whole month. For that worker that fails to meet the 100% of their attendance rate will be given a reminder as a warning from company.

Because of this problem, a system may be needed in order to records the attendance of the workers more accurately without have to trace manually. The attendance management system will record the attendance of worker in industry when the work began and at the end of work. This is to ensure that the workers have attended the work.

## III. OBJECTIVE

The main objective of this paper is to develop an attendance management system for the industrial worker by using fingerprint scanner so that workers of the industry does not get any opportunity to give fake attendance. The top management of the industry can always get the update information of their attendance. Another objective is to ensure the efficiency of this system by comparing this attendance management system with the manual system and it's important to ensure that proposed system will provide more efficiently than the manual system.

## IV. METHODOLOGY

This project is based on hardware and software. Required hardware used should be easy to maintain, implement and easily available. Proposed hardware consists following parts:

- Fingerprint Scanner,
- LCD/Display Module (optional),
- Computer.

Fingerprint scanner will be used to input fingerprint of worker into the computer software. LCD of the computer will be displaying the attendance of the worker. Computer Software will be interfacing fingerprint scanner and LCD and will be connected to the server. It will input fingerprint, will process it and extract features for matching. After matching, it will update database attendance records of the workers. For this system continuous internet connection is necessary because updated data is directly transferred to the server.

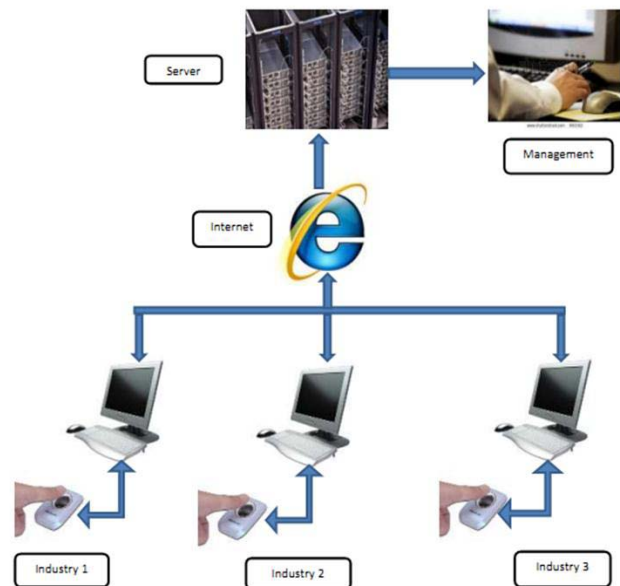


Figure 1 : Network Diagram of Attendance Management System

From this figure there is three industry's branch where workers of the industry will give the fingerprint by using fingerprint scanner and data will be uploaded to the server through the internet. Top management can enter the server by giving user id and password. They will get the every worker's attendance from the server.

### a) Fingerprint

Fingerprint identification, known as hand print identification, is the process of comparing two instances of friction ridge skin impressions from human fingers or toes, or even the palm of the hand or sole of the foot, to determine whether these impressions could have come from the same individual. The flexibility of friction ridge

skin means that no two finger or palm prints are ever exactly alike in every detail; even two impressions recorded immediately after each other from the same hand may be slightly different. Fingerprint identification, also referred to as individualization, involves an expert, or an expert computer system operating under threshold scoring rules, determining whether two friction ridge impressions are likely to have originated from the same finger or palm (or toe or sole).



Figure 2 : Fingerprint

There are three basic fingerprint patterns: loop, whorl and arch, which constitute 60–65%, 30–35% and 5% of all fingerprints respectively. There are also more complex classification systems that break down patterns even further, into plain arches or tented arches, and into loops that may be radial or ulnar, depending on the side of the hand toward which the tail points. Ulnar loops start on the pinky-side of the finger, the side closer to

the ulna, the lower arm bone. Radial loops start on the thumb-side of the finger, the side closer to the radius. Whorls may also have sub-group classifications including plain whorls, accidental whorls, double loop whorls, peacock's eye, composite, and central pocket loop whorls.

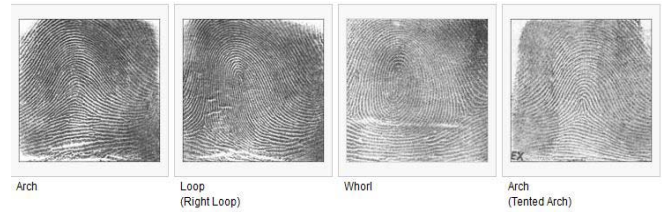


Figure 3 : Types of Fingerprint

#### b) Fingerprint Identification

Fingerprint identification is the oldest method that has been successfully used in numerous applications. Each of our ten fingerprints is different from one another and from those of every other person. Even identical twins have unique fingerprints. That makes them ideal for personal identification. A finger print is made of a series of ridges and furrows on the surface of the finger. The uniqueness of a fingerprint is determined by the pattern of ridges and furrows as well as the minutiae points. Minutiae points are local ridge characteristics that occur when a ridge splits apart or a ridge ends.

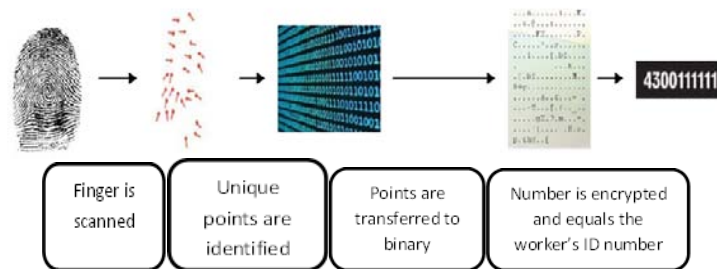


Figure 4 : Transformation of Fingerprint to Binary Number

When the worker returns to be identified, the finger scanner again scans the finger. The computer software now compares the new template with the other templates in the database. When a matching template is found, the worker is identified. This identification and matching process takes under one second to complete. At no time is a fingerprint image ever stored and no fingerprints can be recreated from the template.

#### c) Hardware

Fingerprint scanner is the external device and it is the only one hardware used in this project. A portable fingerprint scanner is directly connected to computer using USB port. Fingerprint scanner is generally used for the identification of a person based on unique patterns and ridges of fingerprint. Fingerprint matched a reference number or pin number with a person's name

or account. Biometric plays a huge role for the identification of worker's information and security. There are two types of fingerprint scanner:

- Optical scanner
- Capacitance scanner



Figure 5 : Fingerprint Scanner

The basic function of scanner is to get the image of worker's fingerprint and match this image with database.

## V. SOFTWARE DESIGN & IMPLEMENTATION

The purpose of software part of the embedded attendance system is to store necessary information including individual finger print data of users, workers and other member of an organization. Besides this, it also provides a way to identify with the fingerprint scanner output, the actual member of the organization and provide an interface to leave a comment especially if the worker does not come in time. The admin can check all the information about the entrance time and the leaving time and personal message of the workers Admin may be one or many. In a large organization admin of one branch can check out the status of the workers of other branches and can get whole information of all workers of the organization.

The software is web based and developed by using HTML, CSS, php, MySQL, JavaScript, Smarty. The following figures describe the software.

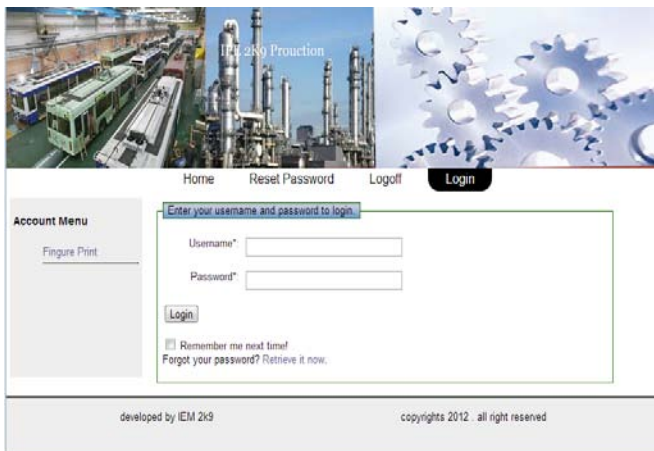


Figure 6 : Login Page for Admin

This figure provides the way to get login for admin. A particular username and a unique password will be provided before using this software for a particular industry. After login admin can set the required information according to his company or industry. Like as industry's worker's information, working period, Range of time for attendance if first period is started at 8.00AM then what is the range of time to attend? Admin can set it 5 minutes that is if worker is attend within 8.00AM to 8.05AM than attendance is accepted otherwise Not.

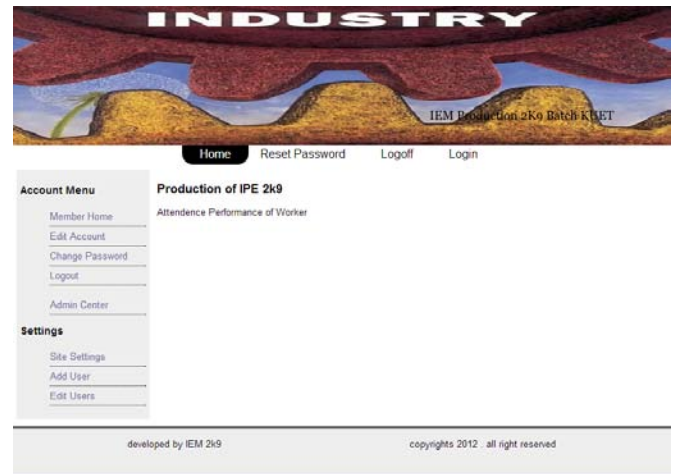


Figure 7 : Home Page of Site

Figure 7 is the home page for admin. By clicking Member Home menu admin can see his profile. By Edit Account, admin can change his account information. Admin Center provides an window to do a few task, these are Site Settings, adding new user, showing members information and attendance details.

Site Setting provides the admin a lot of tasks. At First setting the site URL, site name, admin info, site description. Second, setting look and feel of the site. Third, Email Setting enabling or not STMP, Captcha mood. Last, Maintenance Setting including Maint Mood, User Tracking, Force Compile ,User approval, Active Removal etc.

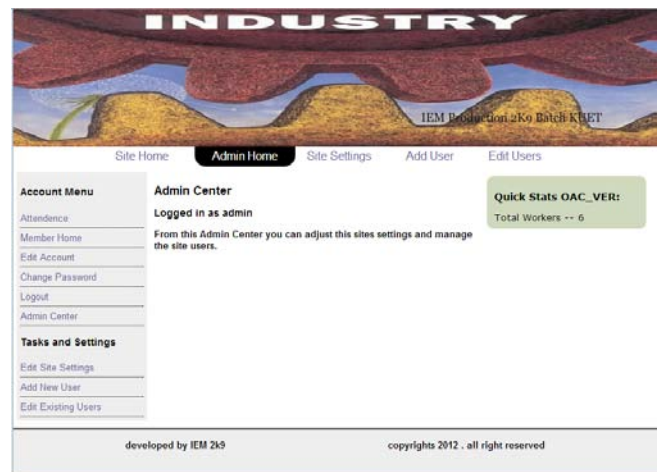


Figure 8 : Admin Home Page

By clicking Attendance Menu Admin can see the attendance details of all workers including the coming and leaving time with comments of each attendance. In right side of the corner shows the total workers in an organization. The attendance details depicts in fig. Add New User provides to take all information including fingerprint of the members depicts in fig.9 Edit Existing Users provides the list of all users as well as the advantage of viewing details and delete them.

Figure 9 : Add New User Page

This figure shows the way of adding new user to the site. Only admin have the rights to add a new worker's information. Here username, Password and mail are the worker's account information. Each worker has unique ID according to the company's provisions. Full name of the worker and fingerprint is added by the scanning of worker's finger. After than put the mobile number and post of worker. Now just agree to the terms of service and click submit button. New worker will be added and a confirmation email will be sent to the worker's mail.

Figure 10 : Edit Existing User Page

Figure.10 shows the entire workers information, Admin can see the details from this page and edit the worker's information. By clicking View Full details, details information of worker will be presented to the admin. Admin can see the last activity of workers with date and time and also delete the worker.

Serial No.	Employee Details	9 am to 1 pm (in)	9 am to 1 pm (out)	2 pm to 5 pm (in)	2 pm to 5 pm (out)	Date
14	Rahim Uddin worker	ok	1 hour 33 minutes early	20 minutes late	ok	06/14/2013
25	Kamal Hossian worker	ok	1 hour 20 minutes early	ok	ok	06/14/2013
36	Iktal Hossian worker	ok	ok	20 minutes late	36 minutes early exit	06/14/2013
47	Rana Sakib worker	ok	ok	ok	ok	06/14/2013
59	Mahmuda Hasan junior engineer	ok	ok	20 minutes late	36 minutes early exit	06/14/2013
108	Tabia Nafiz junior engineer	4 hours late	ok	ok	36 minutes early exit	06/14/2013

Figure 11 : Worker Attendance Page

Figure. 11 shows the attendance history of worker in an industry. For this industry working period is divided into two sections one is called first half which is between 9.00 AM - 1.00 PM and the second half is 2.00PM – 5.00 PM. During entrance time and outgoing time 5.00 minutes late is ignored for the worker which is adjusted by admin of industry. The ignorance time is depended on the industry's rules and regulation.

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108	Tabia Nafiz junior engineer	4 hours late	ok	ok	36 minutes early exit	06/14/2013

Figure 12 : Date of Attendance

Figure. 12 shows the worker's attendance details for selected date.

Site Home Admin Home Site Settings Add User Edit Users

Delete All

Search  health is not good Date

Serial No.	Emp. ID	in to 5 min (in)	2 pm to 5 pm (out)	Date
14	Rahim worker	view	view	06/14/2013
25	Kamal Hossian worker	ok	1 hour 20 minutes early	06/14/2013
36	Ikbai Hossian worker	ok	20 minutes late	06/14/2013
47	Rana Sakib worker	ok	ok	06/14/2013
59	Mahmuda Hasan junior engineer	ok	20 minutes late	06/14/2013
108	Tabia Nafiz junior engineer	4 hours late	ok	06/14/2013

Account Menu

- Attendance
- Member Home
- Edit Account
- Change Password
- Logout
- Admin Center

Tasks and Settings

- Edit Site Settings
- Add New User
- Edit Existing Users

Figure 13 : Viewing worker's message

Worker can directly give their personal message or problem to the admin in note box for every time of attendance and admin can see their message by clicking view. Particular worker can be found by typing his or her name in search box. Here serial number shows the personal identity number of workers.

## VI. CONCLUSION

For developing countries like Bangladesh, people working in industries and garment factories are not enough educated and conscious about their attendance. Also they have no direct communication with the Admin or top management authorities of the industry. As attendance is vital thing for the development of the industry and so understand the thoughts or reason of being late is also a very important thing. So an attendance management system providing this privilege is crying need for now-a-days. Our attendance system with fingerprint scanner provides the accurate attendance information of the workers and an interface to communicate with the workers. As all data is uploaded in server, internet connection is a must during attendance taking. Our automated attendance management system is user friendly, easy to use and provides a better security and privacy than manual attendance system.

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