DEVELOPMENT OF A LOW COST CUSTOMIZED ATTENDANCE MANAGEMENT SYSTEM FOR A SCHOOL

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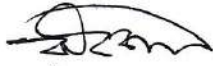
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It is hereby declared that this project or any part of it has not been submitted elsewhere for the award of any degree or diploma.

Hadiul Islam

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HADIUL ISLAM

Dedicated

To

My Parents, Teachers, Siblings, Friends and All of my well-wishers.

Table of Contents

Chapter One

Introduction

Chapter Two
Basics of Attendance Management Systems

Chapter Three

System Analysis and Design of Attendance Management System

Chapter Four

System Implementation and Integration of Attendance Management System

Chapter Five

Conclusion

List of Figures <u>   </u> **Page No**

List of Tables   **Page No**

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ABSTRACT

This project is designed to automate the attendance of students and employees by fingerprint which is more authentic and reliable. Users are able to monitor attendance of students and employees. It will eliminate the problem of manual method of attendance. The new system utilizes a fingerprint scanner as the input to acquire fingerprint images of students and employees and save the fingerprint into a database. The Database stores students and employees Information and attendance records. PHP was used as the programming language to develop this system. MySQL database is used to store information of students and employees and SQLSERVER is used to store fingerprint of the students and employees as the fingerprint scanner use SQLSERVER as database to store fingerprint and attendance record. This system creates a link server between MySQL and SQLSERVER to send attendance record to MySQL to monitor attendance from the system. This system is also able to send message to the student guardian mobile number to notify them about the absence of the students. It will help to build up an interactive relationship between guardians and school management. The results show that this system can be implemented in academic institutions for attendance management. The system is able to generate different attendance reports and send messages to absent students' guardian phone numbers. This system will save time, reduce manual attendance procedures. So a system has been created with expected results but there is still some room for improvement. A biometric identity based fingerprint scheme is presented. The study presents the application of such a scheme in rejection situations.

Chapter One

Introduction

1.1   Introduction

Attendance is the measure of a person's presence in a place. It is a term that applies to various daily activities and functions, as it is an unavoidable aspect of many environments. It is a very important metric in many institutions or organizations and is used for a variety of reasons, from tracking individual attendance to evaluating grades. In every setting where attendance is important, a system for attendance management is an important tool. Although several works on automated attendance management systems exist, most of the approaches have many weaknesses and are not efficient to manage large target/classroom populations due to additional hardware installation, operational costs including operating system dependencies, and most importantly, large target/classroom populations. One method of tracking student attendance is to use class attendance marking to ensure that students participate in lectures and any class activities to improve their academic performance and reduce the number of absences without any reasonable excuse. As technology advances, various methods are implemented in automated attendance systems. Biometrics methods, including fingerprints or face recognition, are the most popular [1].

In this paper, our focus is to develop a low-cost, secured, and more efficient automated student attendance system using fingerprints. The proposed system will enable any institution or organization to use a student attendance management system with limited hardware installation, enable students to clock-in attendance independently using a single device only when in the School gate, and also allows instructors to generate attendance lists per class in real-time and it will possible to send message to the guardians of absent students by one click [1-2].

1.2   Background Study

Student identification and tracking using biometric identification systems is becoming increasingly important in the education sector to accurately identify and track students. Standard student tracking systems such as roll call have limits and inconsistencies. Because these solutions are more accurate, faster, more practical and a more valuable mechanism for preserving student credentials and security, academic institutions increasingly need biometric student tracking systems. Conventional student identification and attendance techniques, such as roll call or paper attendance, have been reported to be outdated and cause academics and supervisors to spend an

inordinate amount of time documenting the student journey. Manual supervision is also a challenge when it comes to large groups of children. As a result, current monitoring systems have flaws that make it impossible to guard against things like proxy attendance, ID card theft, impersonation, and monitoring errors that directly affect educational quality. Students can check in and out quickly and efficiently using biometric identification technologies [1,3].

To ensure identification accuracy, avoid errors and eliminate the presence of proxies, in the case of identical twins, biometric technology uses the physiological and biometric characteristics of the person (which are different for each individual). The strong encryption of biometric technology protects students from identity theft. When a biometric attendance record records another physiological characteristic, such as a hand or fingerprint, an iris pattern, or even a voice recording, it serves as an identity verification record so that the validated person can perform the job as permitted. Biometric attendance devices also keep track of employees' work schedules, such as who did what and when, and so on. Biometric attendance records are becoming increasingly popular. To ensure attendance accuracy, biometric attendance systems use fail-safe technology such as fingerprints. These systems are especially effective when dealing with large numbers of employees or students. It provides administrators with an easy method to track the absence of both staff and students as an added benefit [2-3].

For example, fingerprint, facial, iris and retinal pattern recognition are all examples of biometric data that can be used to verify a person's identification. These approaches to physical data are attracting attention as a personal identification method that is more convenient than standard methods such as passwords or ID cards because they use metrics and such data is unique to the individual and remains so throughout life. Testing, evaluation and accreditation are all made possible by research. However, in most institutions, students must first meet a certain percentage of attendance requirements before they can take an exam. However, due to the burden of manual attendance and record keeping, many institutions in developing countries have failed to meet this requirement. Students are individually identified and verified to take a test in the same way using biometric technology. Unauthorized participation in an exam is prevented by verifying behavioral characteristics with a unique character, such as a fingerprint per student [3].

1.3 Existing Related Works

Numerous works have been done on the student attendance management system. Following Table 1.1 shows some of the unique approaches that were reviewed and a summary of their weaknesses were presented. These weaknesses are most likely applicable to their works that use a similar approach. To alleviate most of their weakness, we suggest that a solution that minimizes operational cost by leveraging existing hardware and provision on the cloud be adopted. In addition, the solution must be able to independently identify students using their biometric traits and ascertain their present location to avoid proxy attendance to guarantee a secured system [4].

Table 1.1: Existing Related Works

Approach	Usage	Strength	Weakness
GPS and NFC	Mobile Phone	Better than the manual method. Low cost and without hardware installation Suitable for large classroom population	Less secure as students can have a dedicated phone for this purpose which can be given to their friends to clock-in on their behalf. Software dependent because only android phone users can use the application.

ATmegaAVR32	Microcontrollers and RFID Smart card	Better than the manual method.	Less secure as students can give out their smart cards to friends to clock-in on their behalf. Not suitable for large classroom populations because students will have to queue to scan their smart cards hence, consumes time. High cost of installing hardware installations such as the RFID readers.
Biometric face recognition	IP camera	Better than the manual method. Very Secured.	Not suitable for large classroom populations due to limited camera coverage and students' faces appearing blurred hence, may fail to recognize every student in the classroom. High cost of installing and maintaining IP cameras.
Biometric fingerprint and GPS	Mobile phone	Better than the manual method. Very Secured.	Low cost and without hardware installation. Suitable for a large classroom population. Software dependent because only android phone users can use the application. High cost of installing and maintaining the Bluetooth low energy indoor positioning technology.

1.4   Statement of the Problem

In most Educational Institutes, student attendance identification is now done manually using paper, pencil and other outdated tools with students writing or signing their names next to them. This technique is time consuming and unproductive because it is sometimes difficult to update student data, store and maintain such information, and calculate attendance rates for test reasons. The mechanism used to identify student attendance does not track individual attendance records over time. In addition, since the essential data for these records is collected so as to undermine motivation for retaining student attendance records, the data contained in these records is often fraudulent, inaccurate and not legitimate. False attendance and impersonation are made extremely easy thanks to current procedures used to obtain and retain student attendance data. Students find it very easy to put their friends' identities on the attendance list without the teacher or other person in charge noticing.

In most cases, instructors have to deal with an empty classroom and an overfull enrollment list. In most cases, absent students attend school for the first few weeks before dropping out and ask their regular classmates to sign their absence slips for them. Teachers do not have enough time to go through the attendance list one by one because they are too busy teaching and checking in students. The lack of an up-to-date attendance list and fraudulent attendance records have enormous consequences. Teachers have difficulty identifying the actual class attendance or collecting accurate student attendance data for archiving purposes due to the university's current ineffectiveness in tracking student attendance. In addition, imitations during tests with these flawed student attendance systems are also very difficult to detect [3,6].

1.5   Objective with specific aims

The principal aim of this research was to design and implement the biometric attendance management system. To achieve this primary goal, the following specific aims have been devised:

1. Analyze the current method of student identification at KN High School, Brahmanbaria.

2. To create a biometric system that can be used with a biometric device to instantly identify students' fingerprints at KN High School.

1.6   Organization of the Project Report

The project report is organized in five chapters.

Chapter 1: Introduction

> ➢ Background study, existing related work, Statement of problem and Object with specific aims are described in this chapter.

Chapter 2: Fundamental Review of Attendance Management Systems

> ➢ History of biometrics, Types of Biometric Device, Fingerprint Scanner and Application Areas of Biometrics are described in this Chapter.

Chapter 3: System Analysis and Design of Attendance Management System

> ➢ Analysis of the Existing system, Justification of the new system, ERD, DFD, Flow chart, Database design, Data collection and Software and Hardware requirements are described in this chapter.

Chapter 4: System Implementation and Integration of Attendance Management System

> ➢ Choice of Programming Language and Database and System Implementation pictorially described in this chapter.

Chapter 5: Conclusion

➢ Conclusion and Recommendation of future work are described in this chapter.

CHAPTER TWO

Basics of Attendance Management Systems

2.1   Introduction

Biometrics is the science and technology of measuring and breaking down natural information. In data innovation, biometrics relates to technologies that examine and measure the physical characteristics of the human body, such as DNA, fingerprints, eye retinas and irises, voice patterns, face patterns and hand measurements, for validation or authentication purposes.

The biometric validation process is the means by which an assessment of certain biological marker traits can be clearly identified in an individual. These unique identifiers constitute the retina, earlobe geometry, iris patterns, fingerprints, hand geometry, voice waves, earlobe geometry DNA and the signatures. The voice waveform recognition method with tape recordings in verification wiretaps that has been used for so many years is now primarily used in research facilities for access to restricted data banks. Law enforcement has implemented facial recognition technology to spot people in the congregation with unwavering quality and reliability. Most industries use hand geometry to provide physical access to buildings. For people trying to impersonate another person, the geometry of the earlobe is used to detect their identity. Signature comparison is not considered reliable or trustworthy in isolation from other biometric verification methods, but provides an additional level of control or verification when used with other biometric verification methods.

Using biometrics for recognizing users offers some extraordinary favorable circumstances because only biometrics can recognize an individual as himself or herself, biometrics could make

keys and combination locks could turn out not to be useful due to biometrics and all data, including biometrics is vulnerable whether in storage or in processing state [5,9].

2.2   History of Biometrics

The term "biometrics" is derived from the Greek words "bio" (life) and "metric". Automated biometric systems have only become usable in recent decades, thanks to substantial improvements in image processing and computing. Although biometric technology is a 21st century topic, biometrics has its roots for thousands of years. The ancient Egyptians and Chinese played a major role in the history of biometrics. Today, the focus is on using biometric facial recognition, iris recognition, fingerprints, retina recognition and human physical feature recognition to end the difficult situation of terrorism and improve security measures. The first recorded systematic capture of hand and finger images for recognition purposes was used in 1858 by Sir William Herschel of the Indian Civil Service, who recorded a handprint on the back of a contract for each worker to distinguish employees. In 1870, Alphonse Bertillon created technology for recognizing people that relied solely on elaborate records of their body measurements, physical descriptions, and photographs. This method was called "Bertillonage" or anthropometry and the use ended in 1903 when it appeared that some people had the same measurements and physical characteristics (State University of New York at Canton, 2003). Sir Francis Galton in 1892 created a fingerprint classification system using minutiae characteristics that is used by educators and researchers today [5].

2.3   Types of Biometric Devices Available

There are several types of biometric data commonly used today. Each of these devices has a different mechanism employed to capture data in different forms.

The different types of biometric that are frequently used today are devices that capture data in various formats using different mechanisms. There are many types of biometric devices employed today. Some of these biometric devices are generally detected in commonplaces such as movies. Biometrics is essentially the identification of human features that are distinct to each person. The best way to keep your devices safe and ensure people don't illegally have access to

your personal belongings such as files utilizing is to implement any biometric technology available in the market. Popular and most used biometric devices are [9,10]-

- ➢ Retina Scanner
- ➢ Iris Scanner
- ➢ Facial Biometrics
- ➢ Voice Recognition
- ➢ Hand Print Patterns
- ➢ Deep Tissue Illumination
- ➢ DNA Fingerprint
- ➢ Fingerprint Scanner

2.4 Fingerprint Scanner

Looking at the price of biometric identification scanners currently available in the market, fingerprint scanning is always on the low side. There are some fingerprint scanners that can only scan the actual print, while the more expensive scanners can capture the shape and size of the thumb, the presence of blood in the fingerprint, and other physical characteristics of a finger. The expensive scanner can capture a 3D image of the fingerprint, making it more difficult to duplicate such a fingerprint. The process of getting an image through the scanner is either through capacitance sensing or through optical scanning.

Biometric template generation is based on matching minutiae signature features in fingerprints. Examining general purpose fingerprints requires the comparison of so many features of the print format. These consist of patterns which are aggregate features of ridges and the minutiae points which are individual features found in these patterns. Knowing the characteristics of human skin and structure is paramount to the successful use of some imaging technologies [5,9,10].

The three fundamental patterns of fingerprint ridges are presented below.

I. Arch: In arch, the ridges will enter from one side of the finger then rise in the center forming an arc, and then exit the other side of the finger.

11

II.   Loop: The ridges enter from one side of a finger, form a curve, and then exit on that same side.

III.   Whorl: Ridges form circularly around a central point on the finger.
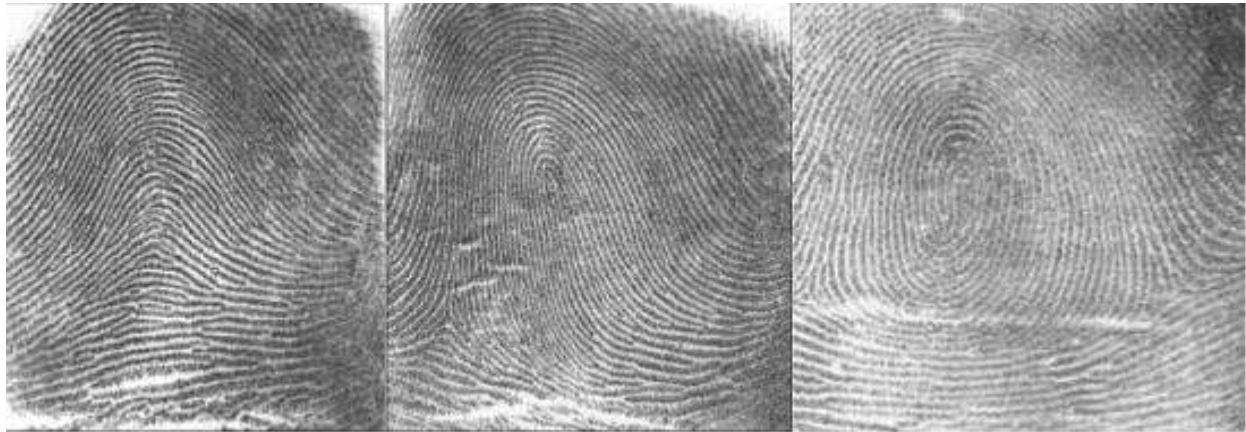
| The arch pattern | The loop pattern | The whorl pattern |

Figure 2.1: Fingerprint patterns

The major minutiae feature of fingerprint ridges are ridge ending, bifurcation, and short ridge (or dot). The ridge ending refers to the point at which a ridge terminates. Bifurcations are points whereby a single ridge is divided into two ridges. Short ridges are ridges which are importantly shorter than the average ridge length on the fingerprint. Minutiae and patterns are very important in the examining of fingerprints since there has not been any record of two fingerprints proven to be identical.

| The ridge ending | Bifurcation | Short ridge (dot) |

Figure 2.2: Fingerprint sensors

A fingerprint sensor is an electronic device used to capture a digital image of the fingerprint pattern. The image captured by the sensor is called a live scan, which is in turn digitally

processed to develop an accumulation of extracted features (biometric template). This template is stored in a database and used for matching. Figure 2.4 presented some fingerprint sensors.

Figure 2.3: Fingerprint Scanners

2.5   Application Areas of Biometrics

There are numerous applications for the use of Biometric Technology, but the most common ones are as follows [2]:

1. Logical Access Control;
2. Physical Access Control;
3. Time and Attendance;
4. Law Enforcement;
5. Surveillance.

2.5.1   Logical access control

This market application refers to accessing a computer network at the place of business or company or via a secure remote connection from a remote location. The security tool which is usually a traditional username and password. While this combination may have worked effectively in the past, it is now definitely showing signs of serious weaknesses and is a prime

target for cyberattacks. Usernames and passwords can be hacked and hijacked very easily via a denial of service or dictionary type attack.

Due to the frequency of these types of attacks, many organizations now require their employees to create long and complex passwords. They must contain a mix of upper and lower case letters, punctuation marks, spaces, numbers, and other types of special characters. To combat this and the other security problems associated with using passwords, biometric technology has been called upon to replace it altogether.

In this regard, the two most commonly used modalities are those of fingerprint recognition and iris recognition. With one finger movement or one scan of the iris, the employee is logged in to his workplace within a second.

2.5.2   Physical access entry

Physical Access refers to allowing an employee of a company or a company to access a secure building or even a secure office from the inside. Traditionally, keys and badges were used. However, the main problem is that these tools can be very easily stolen, lost, copied or even given to other employees who do not belong in those secure areas.

Smart cards have been used to solve these security vulnerabilities, but they also have their own limitations. Fingerprint recognition and hand geometry recognition are most commonly used in this application along with vein pattern recognition. In these cases, one of these biometrics is connected to an electromagnetic lock.

Once a person's identity has been confirmed by their fingerprint or the shape of their hand, the lock opens the door to the secure area within seconds. The main benefits of using biometrics are as follows:

- ❖ No more lost, stolen or fraudulent use of keys and ID badges;
- ❖ Only legitimate employees whose identity has been 100% confirmed are allowed access to secure areas to which they are required to access.

In physical access scenarios, the fingerprint recognition device or hand geometry scanner can operate in either standalone or client-server mode. The advantages of the latter are as follows:

1. Larger storage capacity for biometric templates;
2. Larger applications (such as physical access to multiple buildings and multiple doors) can be served much better;
3. All biometric information and data can be stored on a central server for efficient processing of verification and/or identification transactions;
4. The biometric modalities connected to every door in an organization can be managed centrally at the server level without having to perform the same functions on each device individually.

2.5.3 Time and presence

Educational Institutes supervise their students' attendance. Businesses and companies, at all levels of the industry, need to keep track of how many hours their employees have worked. However, the use of manual methods (such as a time card or a spreadsheet) has not only proven to be a huge administrative burden, but also brings many security vulnerabilities, such as that of "Buddy Punching".

For example, there is central control and administrative functionality from one location (namely the server) and all administrative tasks related to payroll processing can be fully automated.

Also, all clock-in and clock-out times of each employee are recorded electronically, resolving any issues with the actual shift worked. As a result, the security threat of "Buddy Punching" has been completely eliminated.

2.5.4 Law enforcement

Law enforcement agencies at all levels of the federal government are also beginning to use biometric technology to confirm the identities of suspects or wanted felons. It is traditionally fingerprint recognition, the most used modality. Iris, facial and even vein pattern recognition are starting to make their way into this market application, but they are used alongside fingerprint recognition.

The only way to truly identify the suspect is to take their fingerprint and run that image through a massive database known as the "Automated Fingerprint Identification System", or "AFIS" for

short. This is a huge database repository that contains all the fingerprint images of known suspects and criminals, not only here in the United States, but also worldwide. It is currently operated and maintained by the FBI.

2.5.5   Surveillance

Surveillance is simply monitoring a large group of people and identifying abnormal behavior from an established baseline. In this case, facial recognition is the most widely used, and in fact the most feared among the American public. The main reason for this is that this modality can be secretly deployed in CCTV cameras to positively identify known criminals or suspects.

At the moment there are five current Surveillance techniques that can be used:

   I.   Open surveillance
  II.   Secret surveillance
 III.   Follow people on a watch list
 IV.   Track individuals for suspicious behavior
  V.   Track individuals for suspicious activity

2.6   Summary of Review

In summary, Biometrics is a clear step toward identity management that provides ease of use, increased security, cost-effective provisioning, and an irrefutable, compliant audit trail for the system user and operator. The tokens and password cannot determine that a person using a system is the legitimate person unless natural features such as fingerprints, facial recognition, irises, retinas, speech recognition and other features are possible. The method of validating users using biometrics can be so frustrating for users and expensive for system administrators, but the users just have to do it because it helps personal authentication to deny imposters or fraudsters. Using biometrics to identify people offers some clear advantages, because only biometrics can identify you as yourself, biometrics can make keys and combination locks obsolete, and all data, including biometrics, is vulnerable in both storage and processing states. Biometrics has devices such as fingerprint scanners, retina scanner, iris scanner, voice recognition that have been used in the authentication of a person's confidentiality or getting the real data of a person. Biometrics

also consists of a reader or scanning device, software that converts the scanned information into digital form and compares match points, and a database that stores the biometric data for comparison.

Biometrics is now applicable in various fields or almost all fields such as education and commercial as a whole, in terms of educational institutes, banking sectors, buying and selling, airports etc. The government fields such as law enforcement, immigration, customs bureau etc. and in the forensics field for criminal investigation, identification of terrorists, determination of parentage and missing children [9,10].

CHAPTER THREE

System Analysis and Design of Attendance Management System

3.1 Introduction

Attendance is an important aspect in institutions. Regular attendance not only ensures full attendance exposure to the scope of majors and opportunities available at the institution, and it is one of them the criteria used in determining your final grade. Tracking and monitoring the student time of attendance using the manual attendance at colleges and universities can be tedious, time consuming and are more prone to errors.

3.2 Cost Analysis

The system is a low cost and reliable system compared to other existing systems. For 1 thousand students the cost analysis of the system is mentioned in table 3.1.

Table 3.1: Cost Analysis

SL.NO	Name of the Equipment's	Cost of the Equipment's

01.	Application (Open Source)	0.00
02.	Fingerprint Scanner	8500.00
03.	Switch	1500.00
04.	Connecting Wire	2000.00
05.	Other Necessary Equipment's	2000.00
	Total Cost	**14000.00**

3.3 Justifications of the New System

The new system is going to deal with the limitations of the existing system by; keeping historical data that makes it easy for lecturers to access and grade students, providing a high level of security thereby making it impossible for imposters and impersonators in making their way to examination halls. The system will allow the lecturer to monitor each student's attendance, track down truants and take the appropriate action and reduce the stress in queuing up which result in delay and often time in the damage of the attendance sheet. System will allow sending sms to the guardian of the absent student to inform them and also allow them to send sms to the absent teacher about their absence. The new system will provide a user friendly interface which will help to guide each user to use it correctly without any specialized training [5,6].

3.4 System Architecture
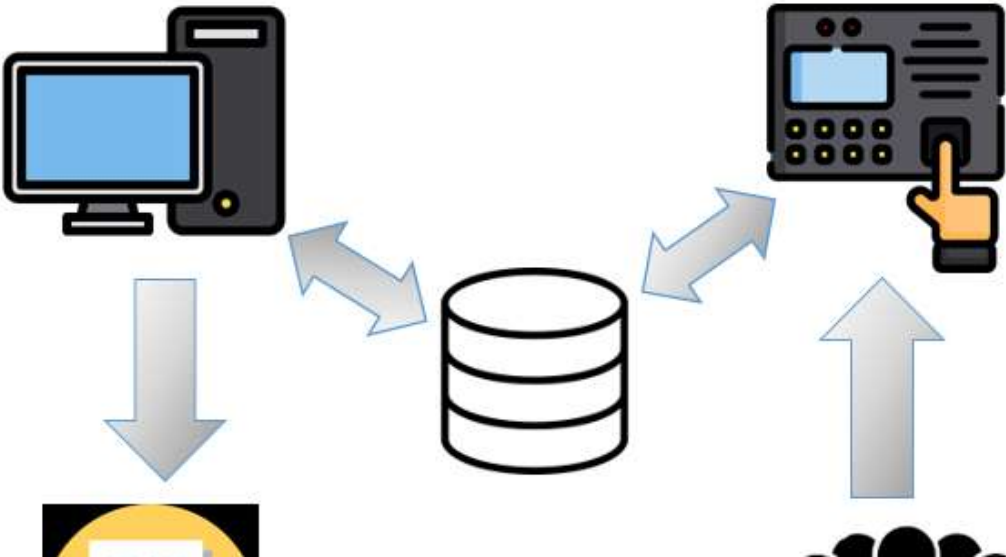
The architecture of the system is as shown in figure 3.1.

Figure 3.1: System Architecture

3.5   System Design

The system Design includes: Entity Relation Diagram, Data Flow Diagram and Flow Chart

3.5.1.   Entity relation Diagram:

An entity relationship diagram (ERD), also known as an entity relationship model, is a graphical representation that depicts relationships among the tables and the attributes.
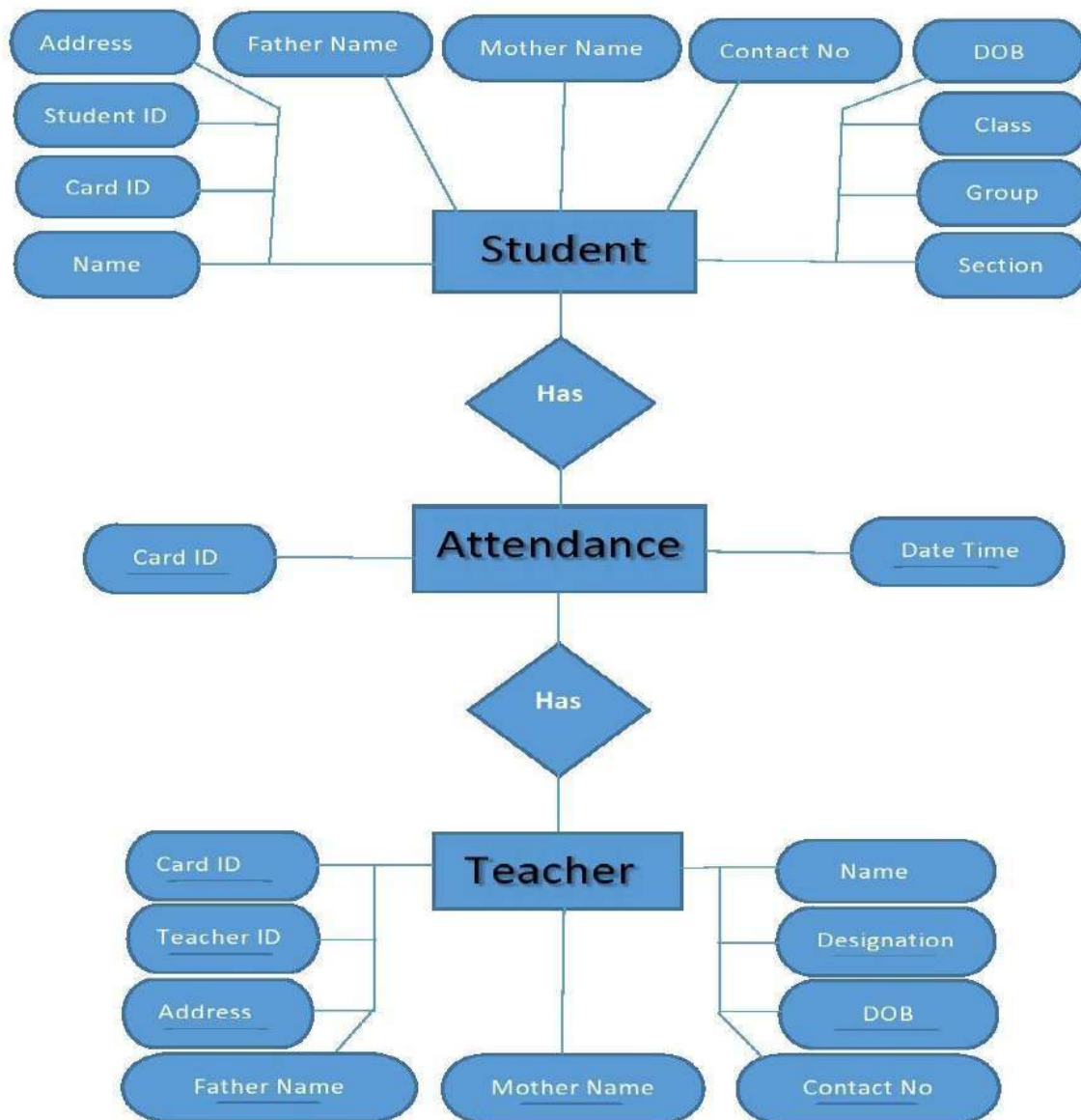
Figure 3.2: Entity Relation Diagram

3.5.2 Data Flow Diagram level 0:

DFD Level 0 is also called a Context Diagram. It's a basic overview of the whole system or process being analyzed or modeled.
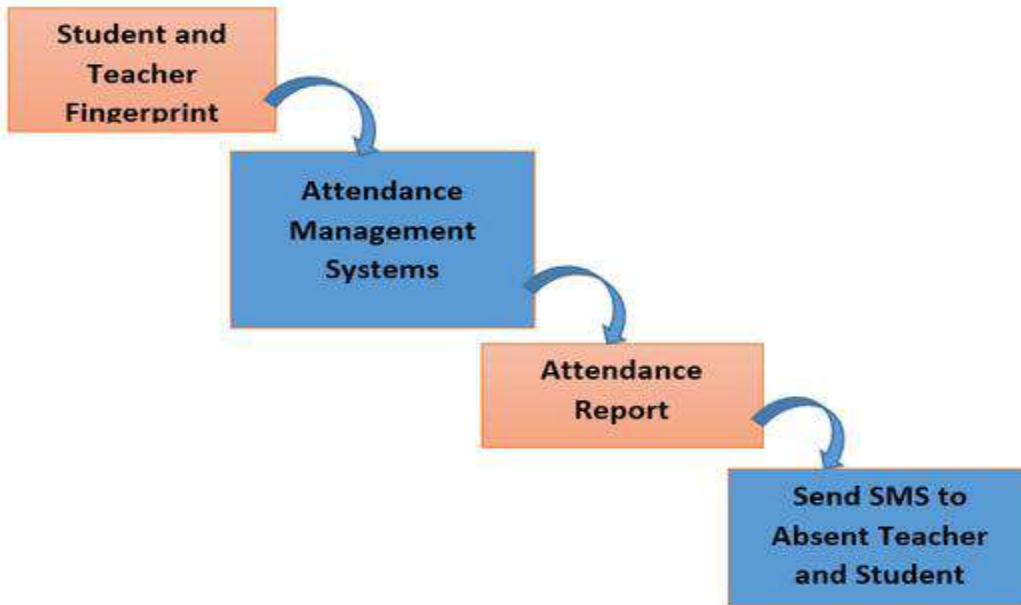
Figure 3.3: Data Flow Diagram level 0

3.5.3 Data Flow Diagram level 1:

In 1-level DFD, the context diagram is decomposed into multiple bubbles/processes. In this level, we highlight the main functions of the system and break down the high-level process of 0-level DFD into sub processes.
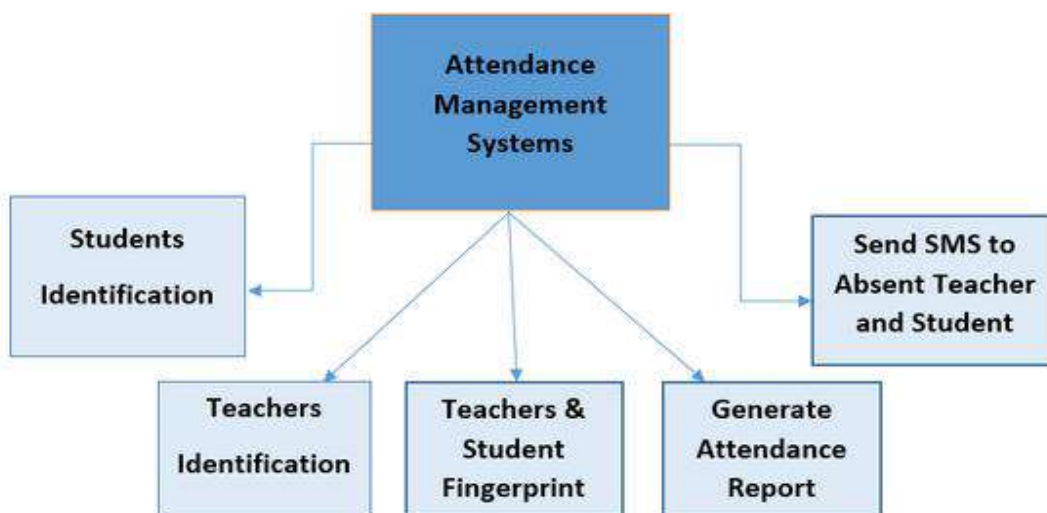

Figure 3.4: Data Flow Diagram level 1

3.5.4 Flow Chart:

A flowchart is a type of diagram that represents a workflow or process. The flow chart of the system is as figure 3.4
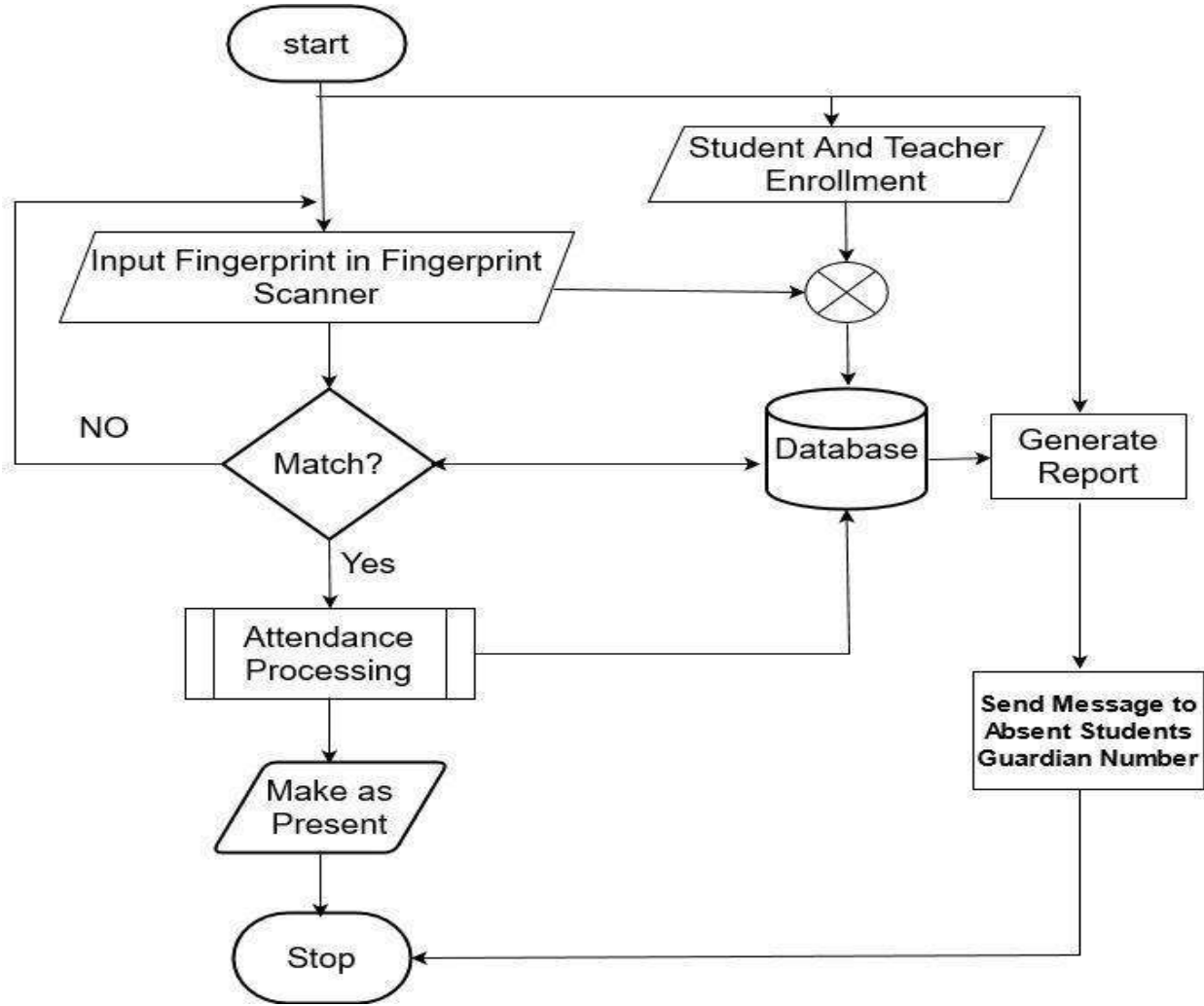

Figure 3.5: Flow Chart

3.6 Database Design:

Database design is the organization of data according to a database model. Design of all the required data table is as follows-

3.6.1 Administration Table:

➢ Table Name admin

➢ This table is used to create admin username and password.

Table 3.2: Login Table

FIELD S	DATA TYPE	CONSTRAINTS	DESCRIPTION
id	int(11)	Primary key	User /Admin ID
uname	varchar(50)	Not Null	User/Admin Name
pass	varchar(50)	Not Null	User/Admin password

3.6.2 Students Information Table:

➢ Table Name studentinfo.
➢ This table is used to store students' information details.

Table 3.3: Student Information Details Table

FIELDS	DATA TYPE	CONSTRAINTS	DESCRIPTION
StudentID	int(11)	Primary key	Student ID
CardID	varchar(50)	Not Null	Card ID for Attendance
Year	int(4)	Not Null	Education Year
Name	varchar(50)	Not Null	Student Name
Roll Number	int(110	Not Null	Student Roll Number
DOB	date	Not Null	Student's Date of birth
GenderID	varchar(50)	Not Null	Gender of Student
Religion	int(11)	Not Null	Religion of student
PresentAddress	varchar(50)	Not Null	PresentAddress of student
PermanentAddress	varchar(50)	Not Null	PermanentAddress of student
ContactNo	varchar(50)	Not Null	Contact Number of students guardian.
FatherName	varchar(50)	Not Null	Students Father name
FOccupationID	int(11)	Null	Student's father's occupation

MotherName	varchar(50)	Not Null	Students Mother name
MOccupationID	int(11)	Null	Student's Mother's occupation
ClassID	int(11)	Not Null	Present Class
GroupID	int(11)	Not Null	Present Group
SectionID	int(11)	Not Null	Present Section
PreviousInstitution	varchar(50)	Null	Students Previous Educational Institution Name
Image	longblob	Null	Image of the Student
Status	tinyint(1)	Not Null	Student Active=1; Inactive=0

3.6.3   Employee Information Table:

➢ Table Name teacherinfo.

➢ This table is used to store teacher and other employee information detaisl.

Table 3.4: Employee Information Details Table

FIELDS	DATA TYPE	CONSTRAINTS	DESCRIPTION
TeacherID	int(11)	Primary key	Employee ID
Name	varchar(50)	Not Null	Name of the Employee
Designation	int(4)	Not Null	Designation Id of the employee
FatherName	varchar(50)	Not Null	Fathers' name of the employee
MotherName	varchar(50)	Not Null	Mothers' name of the employee
DOB	date	Not Null	Student's Date of birth
PresentAddress	varchar(50)	Not Null	PresentAddress of employee
PermanentAddress	varchar(50)	Not Null	PermanentAddress of employee
Gender	varchar(50)	Not Null	Gender of Student
BloodGroup	varchar(50)	Not Null	Blood Group of the Employee
MaritalStatus	varchar(50)	Not Null	Marital Status of the Employee

Religion	int(11)	Not Null	Religion of student
NationalID	varchar(50)	Not Null	NID Number of the Employee
Nationality	varchar(50)	Null	Nationality of the Employee
JoiningDate	Date	Not Null	Joining date in the Institution
ContactNo	varchar(50)	Not Null	Contact Number of the Employee
Email	email	Null	Email Address of the Employee
Picture	longblob	Null	Image of the Student
CardID	varchar(20)	Not Null	Card ID for Attendance

3.6.4   Student Attendance Table:

➢ Table Name studentattendance.

➢ This table is used to store Students' attendance records.

Table 3.5: Student Attendance Table

FIELD S	DATA TYPE	CONSTRAINTS	DESCRIPTION
AttID	int(11)	PrimaryKey	Attendance ID
CardID	int(10)	Not Null	Card ID of the Student
Date	datetime	Not Null	Time of Entry and Exit

3.6.5   Employee Attendance Table:

➢ Table Name emoloyeeattendance.

➢ This table is used to store Employees' attendance records.

Table 3.6: Employee Attendance Table

FIELD S	DATA TYPE	CONSTRAINTS	DESCRIPTION
AttID	int(11)	PrimaryKey	Attendance ID
CardID	int(10)	Not Null	Card ID of the Employee

Date	datetime	Not Null	Time of Entry and Exit

3.6.6 Student Leave Table:

➢ Table Name studentleave.

➢ This table is used to store Students' Leave records which is used to generate attendance reports.

Table 3.7: Student Leave Table

FIELD S	DATA TYPE	CONSTRAINTS	DESCRIPTION
LeaveID	int(11)	PrimaryKey	Leave ID
StudentID	int(10)	Not Null	Student ID who get the leave
DateFrom	date	Not Null	Leave start Date
DateTo	date	Not Null	Leave End Date
Days	int(11)	Not Null	Number of leave Day
LeaveType	int(11)	Not Null	Leave type. Casual or Sick
Reason	varchar(150)	Null	Reason of Leave
Status	tinyint(1)	Null	Default value 0; Rejected=1

3.6.7 Employee Leave Table:

➢ Table Name teacher_leave.

➢ This table is used to store Employees' Leave records which is used to generate attendance reports.

Table 3.8: Employee Leave Table

FIELD S	DATA TYPE	CONSTRAINTS	DESCRIPTION
LeaveID	int(11)	PrimaryKey	Leave ID
TeacherID	int(10)	Not Null	Employee ID who get the leave
DateFrom	date	Not Null	Leave start Date

DateTo	date	Not Null	Leave End Date
Days	int(11)	Not Null	Number of leave Day
LeaveType	int(11)	Not Null	Leave type. Casual or Sick
Reason	varchar(150)	Null	Reason of Leave
Status	tinyint(1)	Null	Default value 0; Rejected=1

3.7 Data Collection

The major purpose of this work is to eliminate the use of paper in manual signing process and all the risk associated with it and carry out the analysis of manual process involved in class attendance and examination attendance of students with the aid of fingerprint based student attendance monitoring system. For these I met with lecturer and departments, and asked then to tell me the information that they need from students for the assessment of their class attendance in order to assign marks. Then they mentioned: student ID, matriculation number, student name, department, level, gender and fingerprint template. All the information listed will be the main information to be collected from each student. Then also ask departments to tell me the information they also need from the lecturers in order to assign courses to then. Then they mentioned; lecturer ID, courses taken for the semester/session. Name. and fingerprint template etc. this information listed will be the primary information to be collected from each lecturer and so also the administrator.

3.8 Software and Hardware Requirements

Table 3.9: Software and Hardware Requirements

Software	Hardware

➢ XAMPP (localhost)
  ○ PHP
  ○ MySQL
➢ SQL SERVER
	➢ Computer
	➢ ZKTEcho Fingerprint Machine
	➢ Cable
	➢ Connector

➢ ZKTEcho	➢ Cable Crimper

CHAPTER FOUR

System Implementation and Integration of Attendance Management System

4.1   Introduction

According to the system analysis in chapter three, a new reliable, faster, low cost attendance management system has been developed. This system is usable in any educational institute as well as any business organization for managing their employees' attendance. In this chapter I represent the systems' working procedure step by step.

4.2   Choice of Programming Language and Database

The System was developed using popular and very common programming languages PHP and MySQL as Database. This system also integrated another database SQLServer 2019 to get attendance Data from fingerprint machines. I used the ZKTeco fingerprint machine which provides data in SQLServer and Oracle but not in MySQL. So I need to make a connection between MySQL and SQLServer to get data in my system. I created a link server between MySQL and SQLServer.

4.3   System Implementation

There are several interfaces that make up the entire system. They are described below:

4.3.1   Home Page

Home page of the system shows a simple website with a different menu and information about the school. Figure 4.1 shows the home page of the system.

Figure 4.1: Home Page

4.3.2 Login Page

From the home page user can login into the systems admin panel. After click admin login Figure4.2 will open. Users can login with user ID and password.

Figure 4.2: Login Page

System check User ID and password from database. If the match system allows you to login and if not match system show message User ID or Password is wrong.

4.3.3 Dashboard

Figure 4.2.3 shows the dashboard of the system. From this dashboard user can operate and monitor the whole attendance System. On the left side of the dashboard there are some menus. From this menu user can set up all necessary information for the home page. New student and employee information can be added from here. Attendance and absent reports of both students and employees can be seen from the dashboard menu. Admin is able to observe Total, Present and Absent students and employees at a glance from the dashboard. He is also able to send messages to the absent student's guardian mobile number to inform about their absence and send messages to the employee's mobile number to inform about his or her absence.
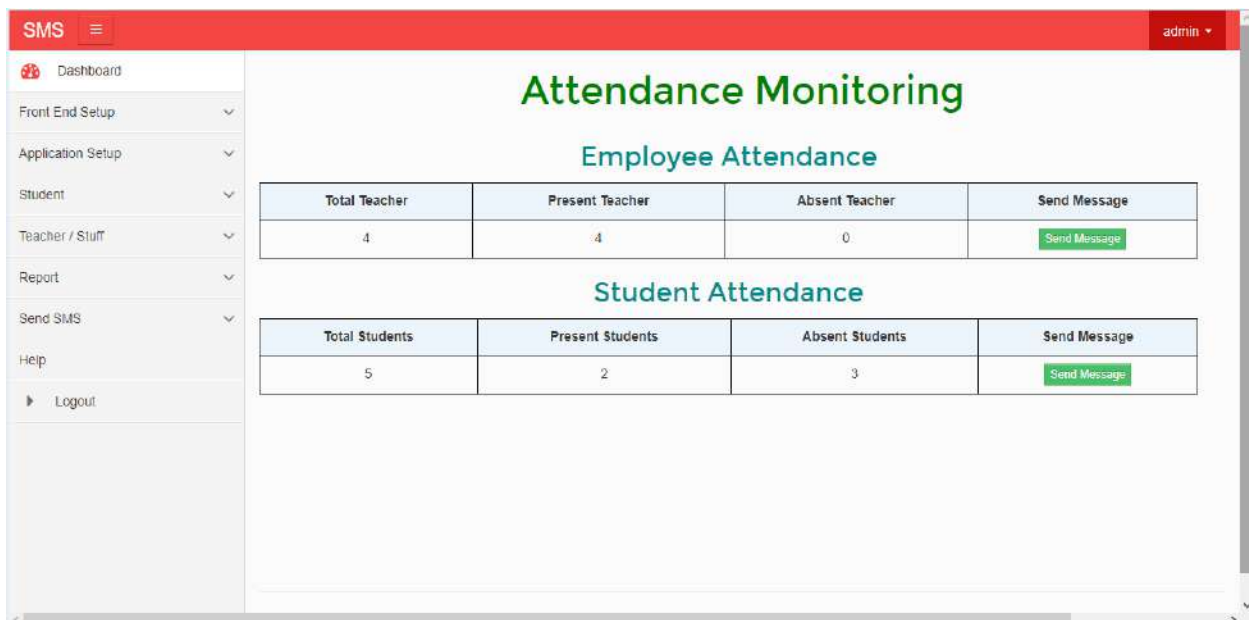
Figure 4.3: Dashboard

4.3.4 Student Information Setup Page

Figure 4.4 shows the Student information setup page. From this page user can add new students into the system.

Figure 4.4: Student Information Setup

4.3.5 Employee Information Setup Page

Figure 4.5 shows the employee information setup page. From this page user can add new employees in the system.

Figure 4.5: Employee Information Setup

4.3.6 Employee and Students Setup in Fingerprint Machine System

Figure 4.6 shows a user interface of the ZKTeco fingerprint machine. From this interface user setup students and employees with minimum necessary information and take fingerprints.
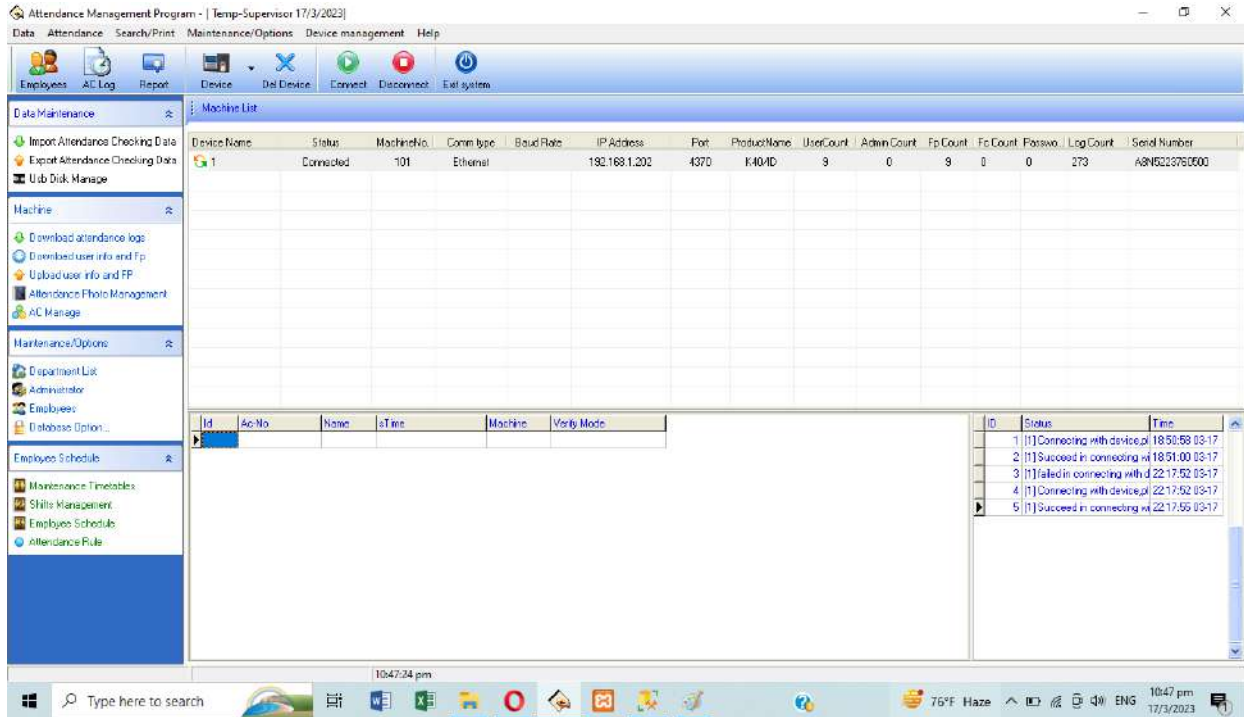

Figure 4.6: Fingerprint software Interface

For taking fingerprints, the user has to connect the fingerprint machine with this system. When students and employees give fingerprints for attendance, the fingerprint machine must be connected in this system. One or more machines can be added in this system and it is possible to give attendance from any one machine.

4.3.7 Attendance Report

Figure 4.7 Show an interface of report generation of Present and Absent Students. Users are able to generate Date wise, Date and class wise and also Date, class and section wise Present and absent students report.
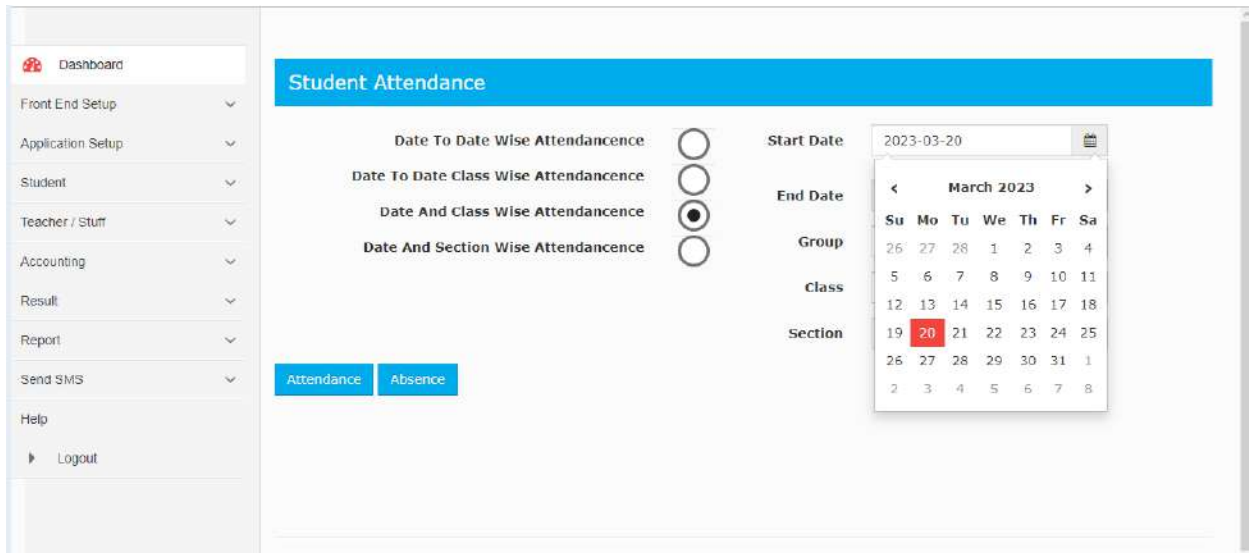
Figure 4.7: Menu of Present and Absent Students Report

To generate reports of present students, click on the Attendance button shown in figure 4.7. It will show the report as the figure 4.8
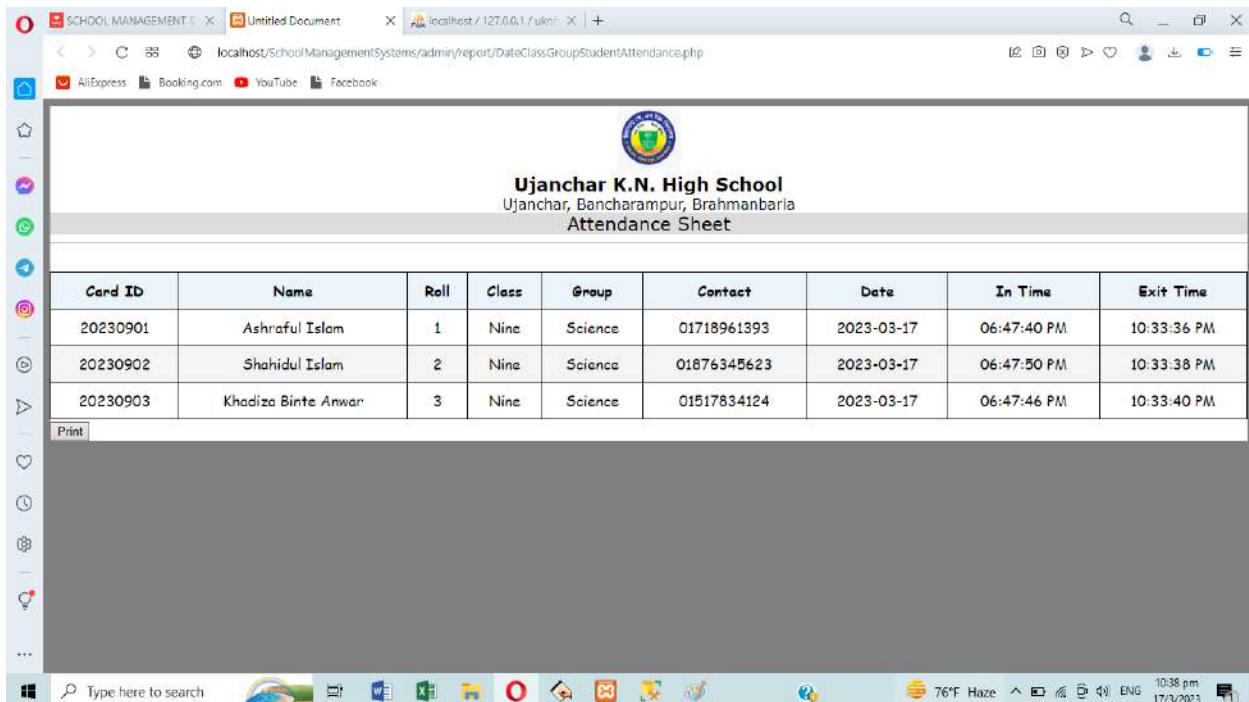

Figure 4.8: Present Student Report

To generate reports of absent students, click on the Absent button shown in figure 4.7. It will show the report as the figure 4.9

Figure 4.9: Absent Student Report

Figure 4.9 shows an interface to generate reports of present and absent teachers. Users are able to generate reports Date wise and Date to Date wise present and absent teachers.

Figure 4.10: Menu of Present and Absent Employees Report

To generate a report of the present employee choice date and click on the Attendance button in figure 4.10. It will show a list of present employee on that day as figure 4.11

Figure 4.11: Present Employee Report

To generate a report of the Absent employee choice date and click on the Absent button in figure 4.10. It will show a list of Absent employee on that day as figure 4.12

Figure 4.12: Absent Employee Report.

38

4.3.8 Send SMS

From the dashboard in figure 4.3 there are two buttons named Send Message in two different tables Employee Attendance and Student Attendance. If an admin wants to send a message to all absent employee and students mobile numbers he needs to click on the Send Message button. Then a new page will come with a list of absent employees or students shown in Figure 4.12 and Figure 4.13.

Absent Teacher List

Name	Mobile No.	Designation
Naymor Rahman	01676458054	Assistant Teacher
Saifur Rahman	01742325020	Assistant Head Master
Hadiul Islam	01762265765	Head Master
Hedayet Kanak	01723692460	Computer Operator

Send Message

Figure 4.13: Send Message to Absent Employee

Absent Student List

Name	Mobile No.	Roll	Class	Group
Ashraful Islam	01718961393	1	Nine	Science
Shahidul Islam	01876345623	2	Nine	Science
Khadiza Binte Anwar	01517834124	3	Nine	Science
Sadia Binte Anwar	01517834124	4	Nine	Science
Abdullah	01517834124	5	Nine	Science

Send Message

Figure 4.14: Send Message to Absent Students

Now click in Send Message. A message will be sent to all the absent employees and absent students.

CHAPTER FIVE

CONCLUSION

5.1   Conclusion

From the above discussion, it can be concluded that a reliable, safe, fast and an efficient system has been developed instead of a manual and unreliable system. The results show that this system can be implemented in academic institutions for attendance management [5]. The system is able to generate different attendance reports and send messages to absent students' guardian phone numbers. This system will save time, reduce manual attendance procedures. Therefore, a system has been created with expected results but there is still some room for improvement. A biometric identity based fingerprint scheme is presented. The study presents the application of such a scheme in rejection situations. This work has been an insight into hidden problems; Manual attendance systems are included in daily activities. The problems are justified and a computerized authentication system is needed to replace the manual student attendance system.

5.2   Recommendation of Future Work

There are lots of scopes to develop this system like as:

- ➢ Student Migration is not automated in this system. Manual migration is required. If any student fails to give attendance due to fingerprint problems or any other reason, this system has no manual attendance scope. A manual attendance can be added in case of emergency.
- ➢ This system required two databases like MySQL and SQLSERVER which is not ideal for any system. I will try to integrate the whole system into one database.
- ➢ Users' roles are not defined in this system. There is one admin user in this system. can be easily integrated with School Management Systems.

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