

# **Entrance Monitoring using Biometric System for STI College Carmona**

**A Thesis Proposal Presented to the STI College Carmona**

**In Partial Fulfilment of the Requirements for the Degree  
Bachelor of Science in Information Technology**

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**BSIT-3A**



**ENDORSEMENT FORM FOR PROPOSAL DEFENSE**

**TITLE OF RESEARCH: Entrance Monitoring using Biometric System for STI  
College Carmona**

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## **I. Introduction**

This presentation entails the researchers' comprehensive solution for entrance monitoring using a state-of-the-art biometric system. In today's fast-paced world, security has become an utmost priority for organizations, institutions, and even residential complexes. With the advancements in technology, traditional methods like ID cards, keys, and passwords have proven to be vulnerable to security breaches and impersonation. Hence, the biometric system detailed in this undertaking provides a robust and reliable solution to security problems. This includes ensuring enhanced access control, safeguarding the premises, and minimizing unauthorized entries. This biometric system revolutionizes access control by utilizing unique physiological and behavioral characteristics of individuals, such as fingerprints, iris patterns, and facial features. This is to establish a highly secure and accurate identification process.

Above-mentioned system offers numerous benefits over conventional methods. First, it eliminates the need for physical credentials, which reduces the risk of loss, theft, or unauthorized duplication. Next, it ensures fast and frictionless access. Individuals can simply present themselves for identification without the hassle of searching for or remembering access codes. Furthermore, the biometric system significantly enhances security by virtually eliminating the possibility of unauthorized access due to the inherent uniqueness of biometric traits. To address specific requirements, our system can be seamlessly integrated into existing access control infrastructure, providing a scalable solution for various premises – from small offices to large-scale facilities. Lastly, our software offers comprehensive monitoring capabilities. This enables real-time tracking, detailed audit logs, and the ability to generate reports for analysis and compliance purposes.

At STI College Carmona, we pride ourselves in delivering cutting-edge biometric solutions that prioritize security, accuracy, and convenience. The team of experts in this study provides seamless implementation, customization, and ongoing support to ensure the optimal performance of the system.

Experience the next generation of entrance monitoring and elevate your security standards with this advanced biometric system. Trust in this technology to keep your premises secure while streamlining access for authorized personnel.

## **1.1 Project Context**

In today's increasingly security-conscious world, organizations, institutions, and residential complexes face the challenge of ensuring robust access control while maintaining convenience for authorized individuals. Traditional methods such as ID cards, keys, and passwords have proven to be susceptible to security breaches, leading to a demand for more advanced and reliable solutions.

This project aims to implement an entrance monitoring system utilizing a cutting-edge biometric system. In this context, 'biometrics' refers to the measurement and analysis of unique physiological and behavioral characteristics of individuals. This system utilizes traits such as fingerprints, iris patterns, and facial features to establish a highly secure and accurate identification process. The primary objective of the project is to enhance security and streamline access control by implementing a biometric system at entry points. The system will replace or augment existing access control methods, providing a more reliable and convenient alternative for authorized personnel. This project will encompass several key components. First, the implementation of biometric sensors and devices will be required at designated entrance points. These sensors will capture the relevant biometric traits, which will then be processed and compared against a database of authorized individuals. The system will accurately authenticate individuals in real-time, granting or denying access based on the match results.

In addition, the project will involve the development or integration of software to manage and monitor the biometric system. This software will provide functionalities, such as real-time tracking of individuals, generating comprehensive audit logs, and facilitating the generation of reports for analysis and compliance purposes. It will also allow administrators to add or remove authorized individuals from the system as needed.

Furthermore, this project will address the integration of the biometric system with existing access control infrastructure. This will ensure a seamless transition and compatibility with other security measures, which are already in place. As such, the successful implementation of this project will provide numerous benefits to the organization



or institution. It will significantly enhance security by utilizing the inherent uniqueness of biometric traits, virtually eliminating the possibility of unauthorized access. The system will also streamline the access process, reducing the need for physical credentials and enhancing convenience for authorized personnel. Leveraging on advanced biometric technology, this project will introduce a new level of access control that offers enhanced security, accuracy, and convenience. It aims to provide peace of mind to both the organization and its members, ensuring a safe and secure environment, and at the same time, minimizing the risk of unauthorized entries.

## **1.2 Purpose and Description of the Project**

The purpose of this project is to implement an advanced entrance monitoring system based on biometric technology, ensuring enhanced security and efficient access control for STI College Carmona. This project aims to address the limitations of traditional access control methods and provide a reliable, accurate, and convenient solution. This project will involve the deployment of biometric sensors and devices at designated entry points. These sensors will capture unique physiological and behavioral characteristics, such as fingerprints, which will be utilized to establish the identity of individuals who are seeking access. The captured biometric data will then be securely processed and compared against a pre-registered database of authorized individuals.

Upon successful identification, the system will grant access only to authorized individuals. Unauthorized individuals, on the other hand, will be denied entry. The biometric system will provide real-time authentication, ensuring efficient and seamless access control without the need for physical credentials or reliance on passwords or keys. This project will also include the development or integration of software to manage and monitor the biometric system. This software will facilitate the enrollment of authorized individuals into the system, the administration of access permissions, and the generation of detailed audit logs and reports as well. It will enable administrators to track and monitor access activities, detect any suspicious events, and maintain a comprehensive record of entry and exit information.

Additionally, this project focuses on integrating the biometric system with existing security infrastructure. This integration allows seamless collaboration with other security measures, such as surveillance cameras, alarms, and visitor management systems. Through this

integrating with existing systems, this project ensures a comprehensive and holistic security approach. This project's overall goal is to provide a robust entrance monitoring system that maximizes security, accuracy, and convenience. Leveraging on biometric technology, organizations can significantly reduce the risk of unauthorized access, identity theft, and security breaches. The system will streamline access procedures, eliminating the need for physical identification cards or passwords and reducing administrative overhead. Ultimately, the implementation of this project offers a high level of security, allowing organizations to protect their premises, assets, and sensitive information effectively. The accurate identification provided by the biometric system ensures that only authorized individuals can access designated areas, promoting a safe and secure environment for all occupants.

### **1.3 Objectives of the Study**

This study is generally aimed to monitor the students' entrance attendance. Specifically, this study aims to give a solution to the problem in the existing security system, and to create a model that can help the school to make the entrance monitoring more accurate, while ensuring that the system developed is effective and helpful.

#### **1.3.1 General Problem**

This problem encompasses the need for a robust and reliable biometric system that accurately identifies and verifies individuals based on their unique physiological or behavioral traits (i.e., fingerprints). In implementing this kind of system, organizations can enhance their overall security measures, and can improve control access to restricted areas of their facilities more efficiently.

#### **1.3.2 Specific Problem**

- This problem involves unauthorized individuals' bypassing the school premises through the entrance of STI College Carmona.
- This problem focuses on capturing biometrics data real-time, processing these data efficiently, and providing instant access control.
- This problem involves databases or access control systems to enable quick and secure

storage, retrieval, and comparison of fingerprint data.

### **1.3.3 General Objective**

This undertaking aims to enhance security and access control by implementing a biometric system for entrance monitoring. This ensures an accurate identification and verification of individuals entering specific locations or facilities within the campus.

### **1.3.4 Specific Objectives**

- Develop a system to accurately recognize and match fingerprints, ensuring reliable identification and verification of individuals in the school premises.
- Implement a real-time monitoring system that captures and processes fingerprint data efficiently, minimizing delays and providing instant access control.
- Integrate biometric system seamlessly with databases or access control systems, allowing for quick and secure storage, retrieval.

### **1.3.5 Significance of the Study**

**For students**, the entrance monitoring system will provide a more accurate and efficient way to track attendance, reducing the potential for errors in attendance records. This will enable students to monitor their attendance more effectively, helping them to identify areas for improvement and take corrective action as necessary. In addition, the system will also provide a more secure and contactless way to monitor attendance.

**For the institution**, the entrance monitoring system will provide a more accurate and efficient way to monitor attendance, enabling the institution to better assess student engagement and take corrective action as necessary. The system will also provide a more secure and contactless way to monitor attendance and enhance the safety of students.

**To the Future Researchers**, the researchers will be able to improve and obtain more knowledge and expertise in software development because of this study, providing a competitive advantage

in their future projects. Other researchers will benefit as well since they will be able to utilize this proposal to explain the relevance of their research investigation. The STI College Carmona will benefit from the web-based student attendance system by providing better service to students and parents in terms of attendance monitoring, especially in terms of student security since they will be notified via SMS, and by making teachers' work easier. This can lead to a more productive school environment.

## **1.4 Scope and Limitations of the Study**

### **1.4.1 Scope**

- Record Addition: the process of adding new records to the system, such as creating user profiles, inputting data, and validating the information before it is stored in the system.
- Recording: Database are digitally stored and will not utilize any paper despite increase in database volume.
- 

### **1.4.2 Limitations**

This undertaking has the following limitations:

- The system will not track if the students attended the class, only when the students enter and leave the campus premises.
- The system will not be able to inform the parents if the students are attending their respective classes.

## **II. Review of Related Literature/System**

### **2.1 Related Studies and/or System**

#### **FOREIGN LITERATURE:**

#### **COVID-19 Zero-Interaction School Attendance System**

Findings from Sawall (2021) reveals that for many years, student success has been heavily influenced by attendance at school, which also encourages consistent attendance. In

the past, university attendance was recorded on a piece of paper with a pencil or pen. The professor would often give a pupil a sheet of paper. The student next to them would pass the paper sheet with their presence noted on it to the other student. The sheet of paper would then be returned to the instructor or the teaching assistant so they could record who is present and who is not. This method of taking attendance carries a significant risk for potential disease transmission in the COVID-19 pandemic era.

### **A Smart Classroom of Wireless Sensor Networks for Students Time Attendance System**

Wireless Sensor Networks (WSNs), according to Alassery (2019) depicts that the creation of smart surroundings is now being studied using Wireless Sensor Networks (WSNs). Internet of Things (IoT) is becoming more and more ingrained in our daily lives everywhere—at home, on the street, in the classroom. An essential tool for better preparing students for the future digital world is the use of IoT based on WSNs in the educational field. In comparison to manual paper attendance sheets, which require time and money and have a greater failure rate, digital student attendance systems in schools or universities are an example of how technology can simplify the conventional methods for verifying students' attendance. Numerous timekeeping systems had been put out in the literature as solutions to improve the manual, time-honored techniques for recording and computing students' attendance.

### **Smart Attendance System**

Ghosh (2018) revealed that through the enrollment procedure, the device recorded the fingerprint impressions of all faculty members and students at an institute. Students' registration fingerprints were compared to the enrolled database during the attendance process. If there was a match, the student's name was stored in that device and wirelessly communicated to an Android application created in-lab using Bluetooth protocol service. Only approved staff members have access to the Android application, which is used to share academic records and track student attendance. The device is extremely secure because only authorized employees (faculties) with matching fingerprints can activate it. The gadget is affordable, reliable, transportable, and user-friendly.

## **Cloud Based Smart Attendance System for Educational Institutions**

The Internet of Things (IoT) is quickly transforming how we communicate and learn about our own selves and the outside world (Yadav, 2019). IoT has shown to be successful and efficient in addressing the underlying issues and shortcomings in a few sectors, including smart transportation, energy, healthcare, and waste management. A cloud-based, end-to-end smart attendance system prototype had been created based on the IoT paradigm to address the issues with manual attendance systems currently used in schools and colleges. This prototype generates automated attendance records, reports, monitoring, and alerts for various educational institute stakeholders.

## **Developing an Online Early Detection System for School Attendance Problems: Results from a Research-Community Partnership**

In an article, Chu (2019) highlighted that school-aged children, families, educators, and clinicians struggle with school refusal and other attendance concerns. There are, however, limited tools available to identify problematic attendance. The current article outlines three elements of a research-community collaboration to create an early detection program to find children who may have poor attendance patterns. To begin with, a study was carried out to gauge the extent and expense of school rejection in grades K–12. The results emphasized the prevalence and financial burden of issues with student attendance, offer advice on how to use technology to track attendance and related indices (tardiness, early departures), and draw attention to juvenile characteristics that may be helpful in identifying children who are at risk for poor attendance.

## **FOREIGN STUDIES:**

### **Biometrics in schools: The role of authentic and inauthentic social transactions**

Gray (2017) emphasized that although biometrics had always been a part of society, it has only lately become possible to recognize people using a digital model rather than an instinctual human one. The commercial sector has capitalized on recent scientific advances in the field, and school administration systems have used them in a variety of ways, with biometrics becoming more common in US and UK schools. As biometrics start to alter the

fundamental interaction between institutions and the children under their care, this generated both benefits and drawbacks. While it examines potential issues with unproblematic adoption and talks about how this could affect future data privacy laws, it also presents a theory of social exchange that builds on Homans' work and identifies three major social difficulties related to the use of biometrics in schools.

### **Biometric applications in education**

In an undertaking it was concluded that in order to improve the efficiency of operations and the appeal of services to both staff and students, educational institutions are embracing cutting-edge technologies (Hernandez-de-Mendez, 2021). One example that has been used successfully in educational institutions is biometric technology. In addition to student identification, access control, and personal data management, it has crucial applications to enhance the teaching and learning processes in the academic arena. Biometric technology is mostly used in the identity management system, class attendance, e-evaluation, security, student incentives, and learning analytics fields. A survey of the literature is conducted to provide an overview of biometric technology uses for educational objectives, obstacles to implementation, and potentially foreboding tendencies.

### **“A Study on Transformation in Technological Based Biometrics Attendance System: Human Resource Management Practice”**

In the modern period, as Garg (2018) contended, both the public and private sectors often engage in imitation at a high level. Across the three pillars of the government, phantom worker phenomenon is prevalent. Employers are concerned about employee absenteeism on the job and how difficult it is to track students' attendance at lectures. The use of a fingerprint as part of a biometric identification system is a special technique that lasts a lifetime. The goal of this paper is to shed light on the attendance monitoring software using fingerprint biometric techniques in a university environment. Biometric system is the process of verifying identity of individuals by analyzing the human body features and is used in numerous aspects for various purposes, especially workforce attendance. Even though the biometric technique has several advantages and has an impact in many areas, choosing the

right procedure often proves difficult for the benefitted parties while keeping the cost-benefit ratio in mind.

### **Face Recognition-Based Attendance System**

Gode (2019) argues that because data entered through machine count take a long time and carries a high risk of error, managing the participation of a large number of students in a class is challenging under the traditional system. Real-time facial recognition is a practical method for organizing the numerous students who attend school each day. When taking attendance, a procedure called facial recognition uses facial biometrics to identify the faces of the students. Everybody has a different set of facial features. They are utilized for identification tracking because it is unlikely that faces will be distorted or duplicated.

### **Automated Student Attendance System Using Face Recognition**

An automated method for recording attendance is created and put into use in the study of Akay (2020). Two distinct face detection algorithms—Haar-Cascade and Histogram of Oriented Gradients— were used, and their results were differentiated. Convolutional neural networks (CNNs) were used in deep learning to identify the students in a classroom. A mask checking feature was also added as an additional precaution against the Covid-19 epidemic. Python was used to create a graphical user interface (GUI) system.

## **LOCAL LITERATURE:**

### **Integrated Technologies of Blockchain and Biometrics Based on Wireless Sensor Network for Library Management**

The Internet of Things (IoT), as explained by Fu (2020) was built on a strong internet infrastructure and many wireless sensor devices. Presently, Radio Frequency Identification embedded (RFID-embedded) smart cards are ubiquitous, utilized for various things like student ID cards, transportation cards, bank cards, prepaid cards, and citizenship cards. One example of places that require smart cards is libraries. Each library, such as a



university library, city library, local library, or community library, has its own card and the user must bring the appropriate card to enter a library and borrow material. However, it is inconvenient to bring various cards to access different libraries. The development of wireless infrastructure has enabled the connectivity of IoT devices. Moreover, the development of biometric identification technologies has continued to advance.

### **Real-Time Online Attendance System Based on Fingerprint and GPS in the Smartphone**

Meanwhile, the study of Kamelia (2018) explained that for students who have multiple schedules or who engage in a lot of activities outside of the workplace, the real-time online attendance approach is beneficial. The attendance system employing online biometric fingerprint technology would alleviate the problems created by manual system usage such as lags in data management. The purpose of the research is to construct an online presence system that combines fingerprint modules and GPS. The ZFM-20 fingerprint module was utilized as the system's principal input as well as a security tool as an entrance to acquire access to the full system. The user's location was determined and sent to the smartphone using a GPS module. Arduino module in the system will send a text message to the parties concerned about the user's location data automatically.

### **Development of Attendance Monitoring System using IoT Technologies**

IoT systems also save time, are safe, and can be managed remotely Mamatnabiyev (2021). Building digital classrooms and automation systems make IoT technology's implementation in controlling the educational process more significant. However, collecting student absence reports continues to be a significant concern in the education sector. This process adds to the amount of paperwork, takes a lot of time, requires a large workforce, and is inefficient. Radio Frequency identifying (RFID) has been used to build several automatic identifying systems. To maximize the advantages of adopting this technology, numerous research initiatives and works were created. The current work offers an automatic attendance monitoring system (AMS) leveraging IoT technologies comprising RFID and hardware platforms.

### **Attendance Management System using Fingerprint and Iris Biometric**

An undertaking from Adamu (2019) explained that the system consists of a user interface, database, fingerprint, and iris scanner installed at the entrance of lecture theatre. When a student approaches the area, he or she must either present a fingerprint or directly face the iris scanner. The scanner reads the fingerprint or iris to obtain the pattern and compares it with the features that are already stored in the database of the attendance management system. If the fingerprint or iris is validated, the scanner displays successful; otherwise, it displays the error "place fingerprint again for verification."

### **The Use of Biometric Technology for Effective Personnel Management System in Organization**

Companies have begun to use biometric systems because they recognize the value of employee attendance in resolving issues brought on by manual attendance systems (Unal, 2018). Particularly, fingerprint and facial recognition are the two most used forms for biometric identification since it is recognized as the most trustworthy and safest method in terms of its uniqueness. However, since manual attendance systems are time consuming and ineffectual, firms assess their control mechanisms for employee attendance to include new technology in their operations. This article provides a new generation technological framework used to produce effective results in personnel attendance systems.

### **LOCAL STUDIES:**

#### **Vehicle Access Control and Security System: University of Lagos Security Gate as a Case**

Muhammad (2019) explained that information technology advancements have significantly improved how crimes are committed nowadays. One of the significant difficulties found is the lack of suitable monitoring technologies or a standardized national database to rely on for complete investigation. The gathered information could aid in the physical planning of the school by the administration and government since it makes it simple to identify and track drivers and vehicles. Nigeria's national security improved because of this technology, which made it easy to distinguish between foreigners and citizens. This alternate approach to the country's porous border dilemma aided in resource optimization and the plugging of revenue leaks in government spending.

### **Biometric car security and monitoring system using IOT**

Due to the recent increase in thefts, car security has become a vital concern Sri Anusha (2019). Handling of vehicle's keys are of concern as well. Keys must be carried to be used, therefore losing, or misplacing them can be a serious problem. Here, the author suggested to use a fingerprint vehicle starter system as a solution to the existing problem. The system enabled licensed users to start the vehicle. Users will initially register into the system by scanning their fingerprints. The technology provided a secure and trouble-free way to start/stop the vehicle engine. Multiple users can also register with the system.

### **Biometric User Identification Based on Human Activity Recognition Using Wearable Sensors: An Experiment Using Deep Learning Models**

Mekruksavanich (2021) discussed that the Internet of Things (IoT) and wearable sensor technology are both widely used, which has made the topic of HAR a significant one in the fields of mobile and ubiquitous computing. Deep learning has become the most popular inference and problem-solving technique in the HAR system in recent years. The application of HAR for issues in biometric user identification, where a variety of human behaviors can be thought of as sorts of biometric traits and utilized to identify persons, still faces significant obstacles. In this undertaking, a novel framework for multi-class wearable user identification was provided. Its foundation was the employment of deep learning models to identify human behavior. Sensory data from the wearable devices' tri-axial gyroscopes and tri-axial accelerometers was used to gather in-depth information about users while they engaged in a variety of activities.

### **Walking in a Smart City: Investigating the Gait Stabilization Effect for Biometric Recognition via Wearable Sensors**

Common mobile device accelerometers (particularly those found in smartphones) pick up the generated signals. The user needed just proceed normally toward a controlled entry because environmental elements (beacons) automatically activate authentication. Since

installing the appropriate software requires user awareness of the authentication, this transparent protocol avoids any covert privacy violations. It also permits bypassing any explicit, perhaps onerous authentication process (De Marsico, 2019).

### **Development of Gate Security System based on Mash-up Framework**

Lee (2017) explained that a typical security system among the conducted study is the gate security system. ID cards or biometrics were often utilized for identification and authorization in the current gate security systems. Although ID card-based gate security systems were frequently used, they were susceptible to ID card duplication and modification. The biometrics-based gate security system is more sophisticated than an ID card-based system.

## **2.2 Synthesis**

People can utilize biometrics in the form of scanning their fingerprints to serve as attendance at the school so that they are aware of other students and vehicles that have entered the building. If they leave the building, they can also scan their fingerprints once more. With this kind of technology, school security staff can easily keep an eye on who enters and leaves the building premises. Due to the digital nature of the information, and the procedure that it will be saved on the system, the attendance monitoring system will also speed up data entry.

### **III. Technical Background**

#### **3.1 Overview of Current Technologies used in the System**

##### **3.1.1 Methodology of the Study**

This chapter deliberated and determined the research design, the sample size, population and who were included in this study. Instrument and sampling technique that were employed for data collection and research result were also explored. Relevant and real information were gathered. This study has been completed and will be further investigated.

##### **3.1.2 Theoretical Framework**

###### **3.1.2.1 IT Theories**



The primary programming environment that was used was Visual Studio Code. Required input codes were all visible. There were numerous programming options. Languages that were compatible with the IDE, including those that were used in building the web system. The researchers located the issue with the aid of Visual Studio Code. In utilizing library or features, the investigators were able to make the essential corrections in the line of code.



CSS (Cascading Style Sheets) is a standard (or language) for formatting markup language pages. CSS will allowed the developers to separate content and visual elements on a page for greater control and flexibility. A CSS file is typically attached to an HTML file via a link within the HTML file. CSS allowed Web developers to create a consistent look across multiple pages of a website. Instead of defining the style of each table and block of text within the HTML of a page, commonly used styles should only be defined once in a CSS document. Once defined in the cascading style sheet, the style can be used by any page that references the CSS file.



JavaScript is a dynamic programming language that may be used for web development, web applications, game development, and a variety of other things. JavaScript is a cross-platform, object-oriented scripting language for creating websites. It allows a user to add dynamic and interactive features to an individual's website that they could not do with just HTML and CSS (e.g., having complex animations, clickable buttons, popup menus, etc.). JavaScript is a client-side scripting language, wherein rather than the web server, the source code is interpreted by the client's web browser. This means that JavaScript functions can be executed after a webpage has loaded without contacting the server.



PHP is a script language and interpreter that is freely available and used primarily on Linux Web servers. PHP, originally derived from Personal. The proponents used PHP programming language as extension for developing the system since, the PHP was used as a connection from JavaScript function to PHP, then connection to the database.



Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing responsive, mobile-first websites. Bootstrap is completely free to download and use. The proponents included bootstrap for the certain design, which allowed the utilization of library full of design.



XAMPP is a popular cross-platform web server that allowed developers to create and test their programs on a local webserver using computers and laptops before deploying them to the main server. It is a platform that provided a suitable environment for testing and verifying the operation of projects based on Apache, Perl, MySQL databases, and PHP via the host's system.

### **3.1.2.2 Non-IT Theories**

The system implemented in this system utilized entrance monitoring through a biometric system. In utilizing biometric data, which comprised of unique physical or behavioral characteristics like fingerprints, the system ensured reliable identification. The use of biometric data in the entrance monitoring system offered significant advantages over traditional access control methods like keys, cards, or PINs. Primarily, biometric data was inherently harder to forge, or steal compared to physical objects or codes. It provided a higher level of security by relying on biological traits that were unique to everyone. Second, the system offered enhanced convenience. With traditional methods, individuals needed to carry physical objects like keys or cards or remember PINs to gain access. In contrast, a biometric system eliminated the need for such items. Users only needed to provide their biometric data, such as a fingerprint, which they inherently possess. This simplified the process, reduced the risk of lost or stolen access credentials, and enhanced user experience. The use of a biometric system in the entrance monitoring project ensured a robust and efficient approach to security and attendance tracking. Leveraging the unique characteristics of individuals, the system established a secure means of verification, allowing only authorized individuals to access the monitored areas. It also provided a convenient and user-friendly experience, eliminating the need for physical access cards or PINs while maintaining a high level of security.

### **Operational Definition of Terms**

- 1. Parents** – The individuals who were notified of what time their child entered and left the school premises via SMS.
- 2. Admin** – The individuals who kept track of their students' daily entrance and exit.
- 3. STI Collage** - The institution which benefited from the Entrance Monitoring system, which also gave security to the institute.
- 4. Digital Persona Fingerprint Reader 4500** – The Device that was used by the proponents

to scan and save the biometric data of the students at Paraclete Foundation Community School. The Digital Persona 4500 Reader features optical fingerprint scanning technology for enhanced image clarity, a broad capture area, and dependability. With its silicone layer, it can read a wide variety of fingerprints reliably and quickly, independent of placement angle.

### 3.1.3 Hierarchy Chart

### 3.1.4 Data Flow Diagram

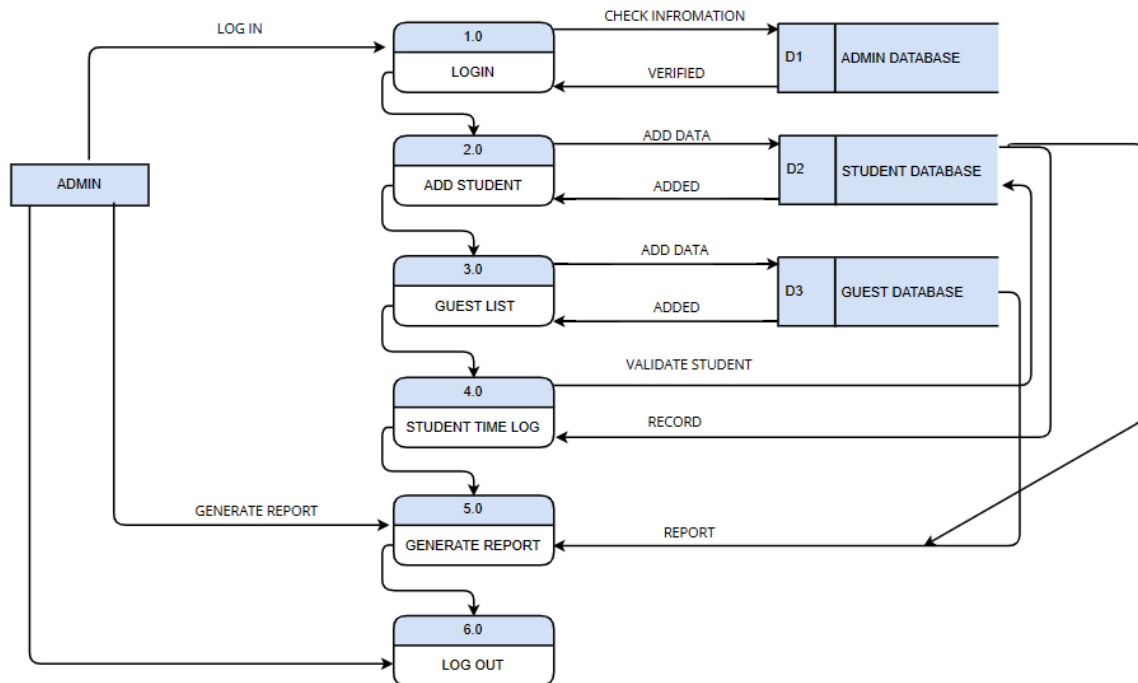


Figure 3.1.4.1 ADMIN DIAGRAM

Figure 3.1.4.1 showed the Admin Diagram. In this figure, the admin class explained the processes 1 through 6. The admin first logged in with his/her login credentials, then the admin database will be verified, and if it is correct, the system will proceed to step 2 where the admin will add the student information to the student database. The admin will view the student record, and the system will record and save the student's attendance status to the student database. The system will message the parent. In addition, the admin also can view the record of the guest. The administrator can generate a report on the student's overall attendance.



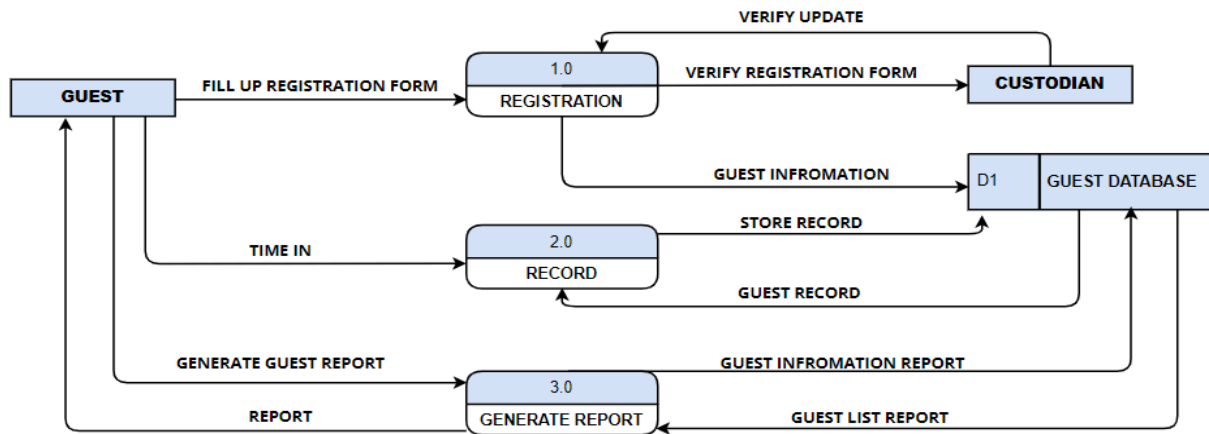


FIGURE 3.1.4.2 GUEST DIAGRAM

Figure 3.1.4.2 presented the Guest Diagram. In this figure, the guest needed to fill up first the registration form before entering the campus. Then the custodian must be verified it first the registration is only a one-time process for each guest. After the registration, it will continue to time in and record. Reports can be generated daily or monthly according to the admin or staff requests.

### 3.1.5 Entity-Relationship Diagram

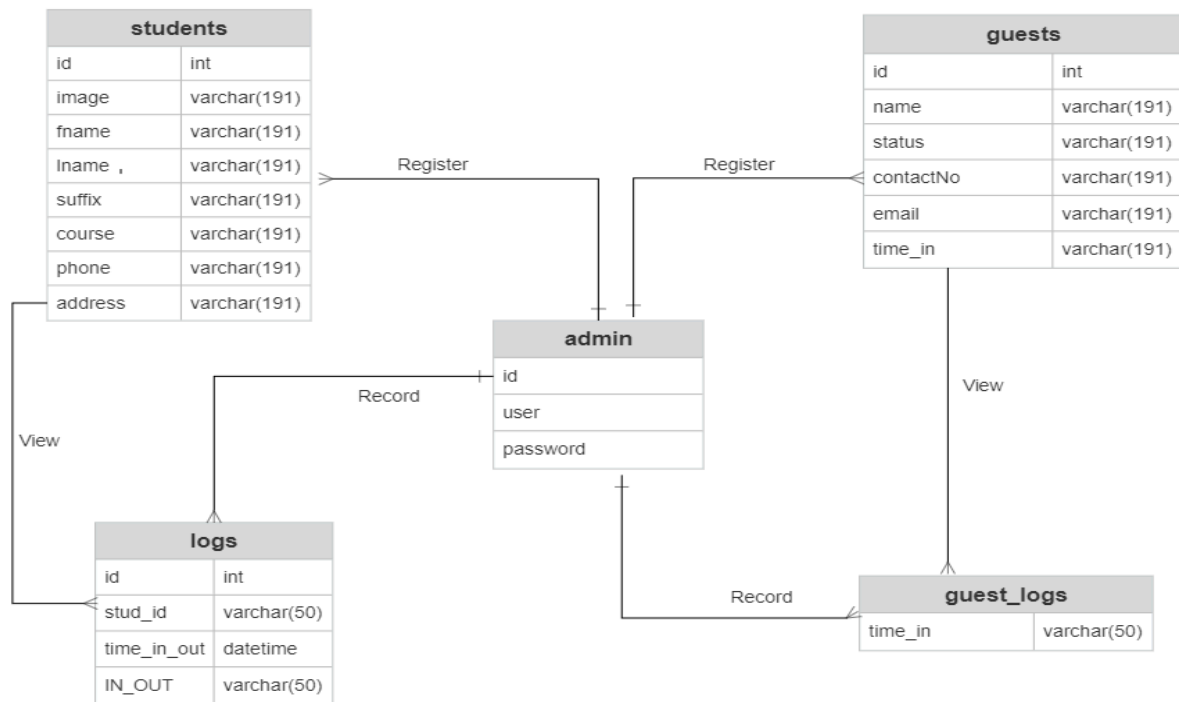


Figure 3.1.5.1 ERD for STI College Carmona

Figure 3.1.5.1 presented the relationship of the tables in the Entity Relationship Database for STI College Carmona. An ERD is shown to trace the connection of each table. The models of the data were used independently of all physical consideration is constructed. The model was based on the requirements specification of the system. The design also considered the logical and physical database design phase. This meant that the design was based on the target data and base relations, indexes, integrity constraint. Security was defined using SQL Language. The database management system (DBMS) used was MySQL and the design user interface and the application program that used and processed the database were defined and designed.

#### a) Advantages

- Reduced paperwork and saved time;
- Eliminated duplicate data entry and errors in time and attendance entries;
- Improved visibility to track and manage students;

- Tracked the attendance of teachers and students;
- Kept the parents informed about the students if they are in the school;
- Auto-generated various types of reports of student attendance; and
- Increased security and confidentiality with role-based permissions to users.

#### **b) Disadvantages**

- Automatic generation of teachers and students' evaluations about attendance performance; and
- Scheduling of events in the school.

#### **c) Technical Feasibility**

- During the research development in STI College Carmona, the investigators concluded that the system was technically feasible since all the technical aspects of the system were already available, as presented to the organization throughout the research.

#### **d) Social and Operational Feasibility**

- This undertaking was feasible both socially and operationally. The system was designed as a user-friendly system was aligned to the client's needs for an effective biometric attendance system

#### **e) Economic Feasibility**

- The Entrance Monitoring System Thesis being developed was economic with respect to the school's point of view. It is cost-effective as it has eliminated the paperwork completely. The system was also time effective because the calculations were automated which were made at the end of the month or as per the user requirement. The result obtained contained minimal errors and was highly accurate as the data showed.

### **3.1.6 Wireframe Design**

## **3.2 Calendar of Activities**

### **3.2.1 Gantt Chart**

## **3.3 Resources**

### **3.3.1 Hardware Requirements**

Fingerprint reader (Digital Persona 4500 U are U) - 3.4 GHZ Intel i3-4130(2 Cores, 4threads), 4 GB RAM 1366x768 of Display.

Digital Persona 4500 U are U - The Digital Persona 4500 Reader used optical fingerprint scanning technology to provide high-quality images, broad captured area, and high reliability. It can read a wide range of fingerprints reliably and quickly, given its embedded silicone layer, in different placement angle. The device was used by the proponents as a fingerprint reader for the desktop application side.

### **3.3.2 Software Requirements**

The researcher needed software to create a system. The Microsoft SQL Server was used for database. Visual Studio 2022 was used for GUI design and as an IDE for coding. The C sharp language was used to implement the system. The C# language was familiar to many users and suitable for GUI design.

### **3.3.3 Peopleware Recommendations**

## IV. Methodology, Result and Discussion

### 4.1 Requirements Analysis

# Entrance Monitoring using Biometric System for STI Collage of Carmona.

Good day! We are currently conducting a Capstone project entitled "Entrance Monitoring using Biometric System for STI Collage of Carmona. "In this study, we sincerely seek your time and effort in responding to this questionnaire, as your response will be extremely useful in reaching the goal of our research. Rest assured that your responses will be treated with the highest confidentiality and will only be used for research study purposes, as required by the Data Privacy Act of 2012.

We are grateful for your time and consideration. Thank you.

basbaciomarklester@gmail.com [Switch account](#)



Not shared

\* Indicates required question

**NAME:**

Your answer

**OCCUPATION:**

Your answer

This type of System is required in every school. \*

1 2 3 4 5

Strongly Disagree

☐☐☐☐☐

Strongly Agree

The system is effective and efficient. \*

1 2 3 4 5

Strongly Disagree Strongly Agree

The attendance sheet is simple to provide.

1 2 3 4 5

Strongly Disagree Strongly Agree

Monitoring Records has become much more highly organized.

1 2 3 4 5

Strongly Disagree Strongly Agree

Reports for students may be readily delivered

1 2 3 4 5

Strongly Disagree Strongly Agree

The process for informing parents of their status is efficient

1 2 3 4 5

Strongly Disagree Strongly Agree

Students can easily be contacted through text to attend the discipline trials

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The likelihood of losing the attendance sheet is negligible

|                   | 1                     | 2                     | 3                     | 4                     | 5                     |                |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|
| Strongly Disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Strongly Agree |

The likelihood of losing the attendance sheet is negligible

|                   | 1                     | 2                     | 3                     | 4                     | 5                     |                |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|
| Strongly Disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Strongly Agree |

The system is simple to use.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system is simple to use.

|                   | 1                     | 2                     | 3                     | 4                     | 5                     |                |
|-------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|----------------|
| Strongly Disagree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | Strongly Agree |

The system is sufficiently secure.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

The system is sufficiently secure.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

Usefulness in terms of usability and friendliness

1 2 3 4 5

Strongly Disagree Strongly Agree

Usefulness in terms of usability and friendliness

1 2 3 4 5

Strongly Disagree Strongly Agree

Usefulness in terms of usability and friendliness

1 2 3 4 5

Strongly Disagree Strongly Agree

## Population and Sampling

The researchers used their discretion to choose participants who provided valuable feedback on the prototype system. Purposive Sampling Approach was utilized and referred to the criteria or characteristics that the researchers were looking for among potential participants. These criteria included factors such as prior experience with similar systems, expertise in the domain of the prototype, and specific demographic information relevant to the study. Once the criteria were established, the researchers then identified individuals who met those criteria and invited them to participate in the study. This involved reaching out to individuals directly, using existing networks or professional contacts, and employing other targeted recruitment methods to find suitable participants. It is important to note that the Purposive Sampling Approach is a non-probability sampling strategy. This means that the sample were not randomly selected from the population. This approach relied on the researchers' judgment and expertise to select participants who provided meaningful insights and feedback on the prototype system. In utilizing the Purposive Sampling Approach with a sample size of 100 people, the researchers focused on obtaining in-depth feedback from a targeted group of individuals who possessed the necessary expertise, experience, and characteristics relevant to the study. This approach allowed for a more efficient use of resources and time, as the researchers concentrated on collecting high-quality feedback from a smaller sample rather than attempting to survey a larger, more representative population.

### 4.1 Table 1. Respondent Occupation

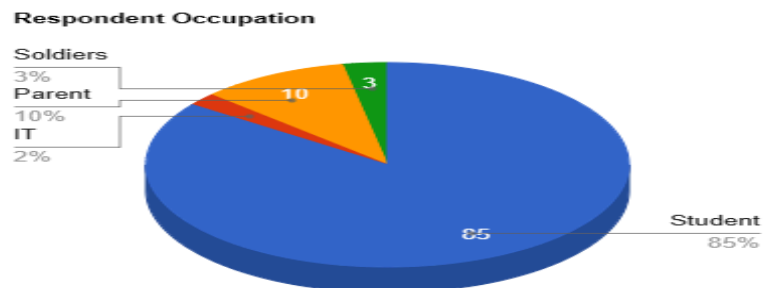
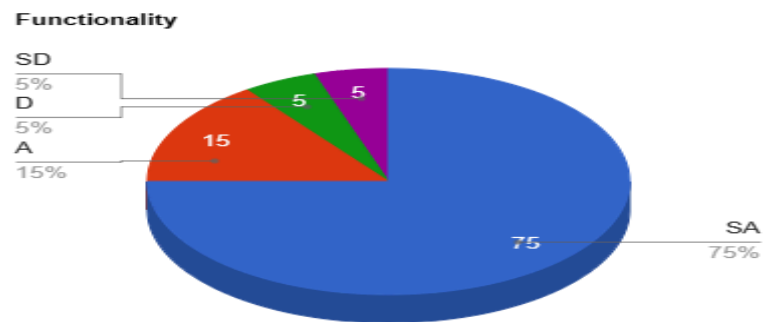


Figure 1. Respondents' Occupation



Figure 1 presented the respondents' respective occupations. The survey received responses from 100 people in total, where it was comprised of 85 students, 10 parents or guardians, 2 IT workers, and 3 soldiers.

#### 4.2 Table 2. Functionality

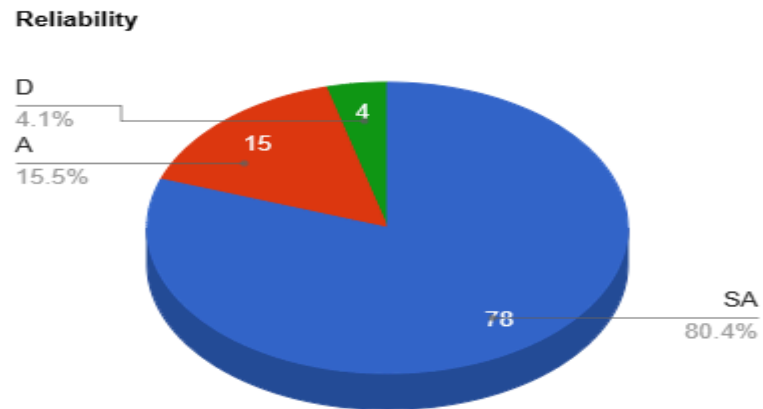


| Functionality            |           |           |          |          |          |            |
|--------------------------|-----------|-----------|----------|----------|----------|------------|
| Observed Frequency       |           |           |          |          |          |            |
| Respondents/Likert Scale | SA        | A         | N        | D        | SD       | Total      |
| Parent                   | 5         | 3         | 0        | 2        | 1        | 11         |
| Student                  | 70        | 12        | 0        | 3        | 4        | 89         |
| <b>Total</b>             | <b>75</b> | <b>15</b> | <b>0</b> | <b>5</b> | <b>5</b> | <b>100</b> |
|                          |           |           |          |          |          |            |
|                          |           |           |          |          |          |            |
| Expected Frequency       |           |           |          |          |          |            |
| Respondents/Likert Scale | SA        | A         | N        | D        | SD       | Total      |
| Parent                   | 7.00      | 1.75      | 0        | 1.25     | 1.00     | 11         |
| Student                  | 68.00     | 13.25     | 0        | 3.75     | 4.00     | 89         |
| <b>Total</b>             | <b>75</b> | <b>15</b> | <b>0</b> | <b>5</b> | <b>5</b> | <b>100</b> |

**Figure 2. Functionality**

As seen on Figure 2 depicting Functionality, 75 out of 100 respondents firmly agreed that use in an entrance monitoring system was beneficial.

### 4.3 Table 3. Reliability

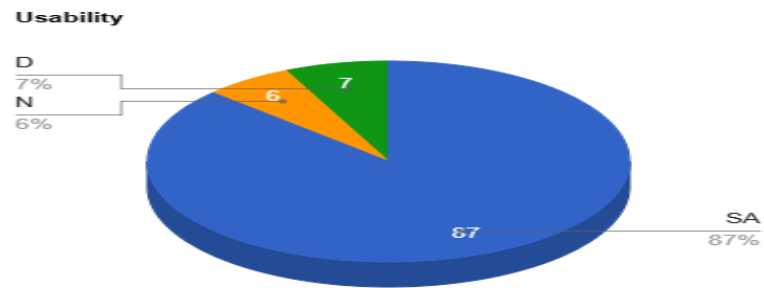


| Reliability              |             |             |          |            |          |            |
|--------------------------|-------------|-------------|----------|------------|----------|------------|
| Observed Frequency       |             |             |          |            |          |            |
| Respondents/Likert Scale | SA          | A           | N        | D          | SD       | Total      |
| Parent                   | 7.2         | 5           | 0        | 2.05       | 0        | 14.25      |
| Student                  | 73.2        | 10.5        | 0        | 2.05       | 0        | 85.75      |
| <b>Total</b>             | <b>80.4</b> | <b>15.5</b> | <b>0</b> | <b>4.1</b> | <b>0</b> | <b>100</b> |
|                          |             |             |          |            |          |            |
|                          |             |             |          |            |          |            |
| Expected Frequency       |             |             |          |            |          |            |
| Respondents/Likert Scale | SA          | A           | N        | D          | SD       | Total      |
| Parent                   | 7.20        | 5.00        | 0        | 2.05       | 0        | 14.25      |
| Student                  | 73.20       | 10.50       | 0        | 2.05       | 0        | 85.75      |
| <b>Total</b>             | <b>80.4</b> | <b>15.5</b> | <b>0</b> | <b>4.1</b> | <b>0</b> | <b>100</b> |

**Figure 3. Reliability**

As reflected on Table 3 showing Reliability, 78 out of 100 respondents firmly agreed that using an entrance monitoring system increases reliability.

### 4.4 Table 4. Usability



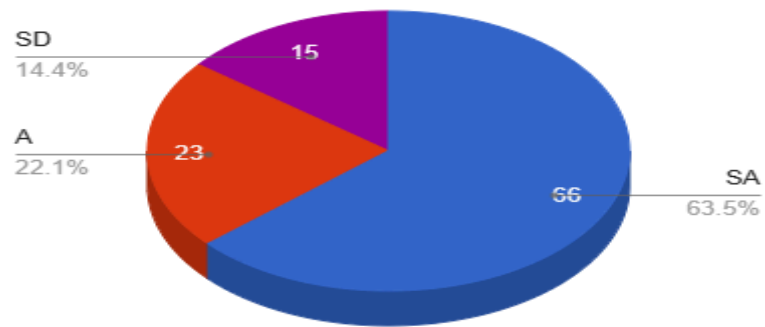
|                          |       |   |      |      |    |       |  |
|--------------------------|-------|---|------|------|----|-------|--|
|                          |       |   |      |      |    |       |  |
| Usability                |       |   |      |      |    |       |  |
| Observed Frequency       |       |   |      |      |    |       |  |
| Respondents/Likert Scale | SA    | A | N    | D    | SD | Total |  |
| Parent                   | 7     | 0 | 0    | 2    | 0  | 10    |  |
| Student                  | 80    | 0 | 6    | 5    | 0  | 90    |  |
| Total                    | 87    | 0 | 6    | 7    | 0  | 100   |  |
|                          |       |   |      |      |    |       |  |
|                          |       |   |      |      |    |       |  |
| Expected Frequency       |       |   |      |      |    |       |  |
| Respondents/Likert Scale | SA    | A | N    | D    | SD | Total |  |
| Parent                   | 6.30  | 0 | 0.90 | 2.80 | 0  | 10    |  |
| Student                  | 80.70 | 0 | 5.10 | 4.20 | 0  | 90    |  |
| Total                    | 87    | 0 | 6    | 7    | 0  | 100   |  |

**Figure 4. Usability**

In terms of usability, 87 out of 100 respondents strongly agreed that implementing web-based entrance monitoring is very helpful. Figure 4 further depicted Usability, and showed that out of 100 respondents, 6 were neutral and 7 were opposed to its implementation being helpful.

#### **4.5 Maintainability**

#### Maintainability

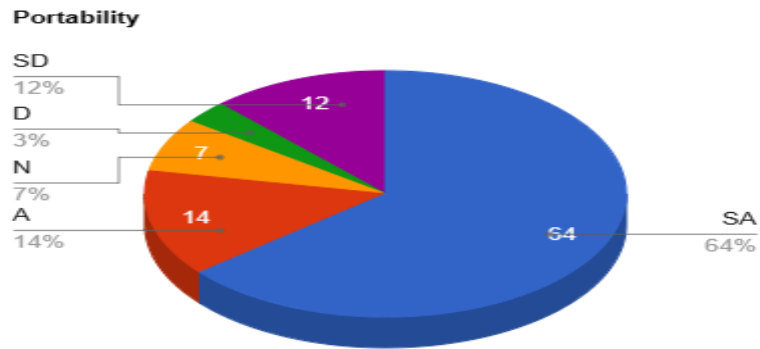


| Maintainability          |             |             |          |          |             |            |
|--------------------------|-------------|-------------|----------|----------|-------------|------------|
| Observed Frequency       |             |             |          |          |             |            |
| Respondents/Likert Scale | SA          | A           | N        | D        | SD          | Total      |
| Parent                   | 3.5         | 0.1         | 0        | 0        | 0.4         | 4          |
| Student                  | 60          | 22          | 0        | 0        | 14          | 96         |
| <b>Total</b>             | <b>63.5</b> | <b>22.1</b> | <b>0</b> | <b>0</b> | <b>14.4</b> | <b>100</b> |
|                          |             |             |          |          |             |            |
|                          |             |             |          |          |             |            |
| Expected Frequency       |             |             |          |          |             |            |
| Respondents/Likert Scale | SA          | A           | N        | D        | SD          | Total      |
| Parent                   | 1.50        | 1.10        | 0        | 0        | 1.40        | 4          |
| Student                  | 62.00       | 21.00       | 0        | 0        | 13.00       | 96         |
| <b>Total</b>             | <b>63.5</b> | <b>22.1</b> | <b>0</b> | <b>0</b> | <b>14.4</b> | <b>100</b> |

**Figure 5. Maintainability**

Figure 5 showed Maintainability responses. In terms of this criteria, 63.5% of the respondents Strongly Agreed that the system was maintainable. Meanwhile, 22.1% fell under the Agree preference, while 14.4% chose Strongly Disagree in the implementation of web-based monitoring system.

#### 4.6 Table 6. Portability



| Portability              |           |           |          |          |           |            |
|--------------------------|-----------|-----------|----------|----------|-----------|------------|
| Observed Frequency       |           |           |          |          |           |            |
| Respondents/Likert Scale | SA        | A         | N        | D        | SD        | Total      |
| Parent                   | 4         | 6         | 7        | 0        | 2         | 19         |
| Student                  | 60        | 8         | 0        | 3        | 10        | 81         |
| <b>Total</b>             | <b>64</b> | <b>14</b> | <b>7</b> | <b>3</b> | <b>12</b> | <b>100</b> |
| Expected Frequency       |           |           |          |          |           |            |
| Respondents/Likert Scale | SA        | A         | N        | D        | SD        | Total      |
| Parent                   | 3.60      | 5.50      | 7.00     | 0        | 2.90      | 19         |
| Student                  | 60.40     | 8.50      | 0        | 3.00     | 9.10      | 81         |
| <b>Total</b>             | <b>64</b> | <b>14</b> | <b>7</b> | <b>3</b> | <b>12</b> | <b>100</b> |

**Figure 6. Portability**

Figure 6 presented the Portability responses of the respondents. Based on the sample, 64% fell under Strongly Agree, 14% under Agree, 7% were Neutral, 3% under Disagree and 12% fell under Strongly Disagreed with the portability of a web-based entrance monitoring system.

According to the survey results shown in the table above, 85 out of 100 participants strongly agree that implementing a web-based entrance monitoring system is very functionally helpful. The null hypothesis is therefore accepted.

**4.2 Requirements Documentation**  
**4.3 System Design**  
**4.4 Development and Testing**

**V. Conclusions and Recommendations**

This chapter represented the Summary, Conclusion, and Recommendation of the “Entrance Monitoring using Biometric System for STI College Carmona” base on the following evaluators, Students, End-User and IT Experts.

**Summary**

The research aimed to investigate the effectiveness and usability of a biometric system for entrance monitoring at STI College Carmona and its impact on security and access control. The research found that a biometric system for entrance monitoring is a more secure and efficient solution compared to traditional security measures. The research also identified some challenges and limitations of the biometric system, such as user acceptance. The research also found that the biometric system had a positive impact on security and access control at the college, such as reduction in unauthorized access and faster response time to security incidents. The research provided recommendations for the implementation of a biometric system for entrance monitoring at STI College Carmona and other educational institutions, including providing training and support to users, regular monitoring, and evaluation, and considering other forms of biometric identification. The research also highlighted the importance of considering the ethical and social implications of the biometric system and taking steps to mitigate any potential negative impacts.

Monitoring demonstrates that the implementation of a biometric system for entrance monitoring was a more secure and efficient solution compared to traditional security measures, such as ID card-based systems and surveillance cameras. The biometric system had a positive impact on security and access control at the college, such as reduction in unauthorized access and faster response time to security incidents. The research also identified some challenges and limitations of the biometric system, such as user acceptance, but suggested solutions to overcome these challenges. The research provided recommendations for the implementation of a biometric system for entrance monitoring at STI College Carmona and other educational institutions, including providing training and support to users, regular monitoring, and evaluation, and considering other forms of biometric identification. The research also highlighted the importance of considering the ethical and social implications of the biometric system and taking steps to mitigate any potential negative impacts. The research showed that the implementation of a biometric system can improve the security and access control measures of the college and can be beneficial for other educational institutions facing similar challenges.

## **Appendix**

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**Accomplishment and Consultation Form****Data Gathering Procedures / Letters**

The researchers issued the ISO 9126 Standard questionnaire to the respondents via google forms. By doing so, the researchers offered convenience to the respondents since they can answer the questionnaire using their own devices at any time. The submitted answers were saved in a Google Sheet that acted as a database. The answers were subjected to a statistical analysis which were used for understanding the strengths, weaknesses, and opportunities of the system. The data also gave the researchers insights about specific demographics, and how they felt about the system. With the resulting data from the analysis, the researchers got sense of direction about the strengths and weaknesses of the system.

**Resource Persons****Certificate from Grammarian****Relevant Source Code**

<https://www.fundaofwebit.com/post/php-crud-using-bootstrap-5-example>

**User's Guide****Personal Technical Vitae**

