DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM IN DASMARIÑAS EAST INTEGRATED HIGH SCHOOL

A Research Project

Presented to the Faculty of

Industrial Technology Department

Carlos Q. Trinidad Ave., Salawag,

Dasmariñas City, Cavite

by

MYRA MONIQUE ACUÑA

AIRO JAMES O. ALBERTO

CRYSTALYN C. RECAÑA

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Engineering Technology

JUNE 2021

ACKNOWLEDGEMENT

The key for success is support and motivation from the people around us.

We, the Bachelor of Technology students major in Computer Engineering Technology at Technological University of the Philippines-Cavite Campus would like to thank the following;

We are first and foremost thankful to God for giving us the opportunity, guidance, wisdom, and strength to pursue this course.

We are thankful to have a family, friends and classmates who always inspire and give us support to proceed in this study, who helped, and guided us.

We would like to give our deepest gratitude to our research adviser Professor Beverly M. De Vega for her guidance to surpass the challenges and encouragement to proceed in every step, our subject teacher Professor Daniden F. Yulde and our IT department head Professor Jay Victor G. Gumboc for the effort and time to answer all our inquiries and guide us in every way.

We would like to extend our gratitude to the panelist, Professor Arnold G. De Vega, Professor John Paulo M. Diaz, Professor Ma. Juliet Patria D. Escalona, and Dr. Melchor P. Fernando for their advice and recommendations to improve this study.

ABSTRACT

This study was to develop a Library Management System in Dasmariñas East Integrated High School. The researchers aimed to create and deploy a library management system kiosk specifically for the Dasmariñas East Integrated High School - Junior High students. The system was capable of the functions from the traditional library management it includes the registration of books and students, borrowing and returning of books. It also includes some additional features such as searching of books, logging in and out of students by the use of quick response code for a manageable time in and time out of students, and efficient management of records. The system was developed using sublime text editor to create or program a Hypertext Preprocessor (PHP) and JavaScript a scripting language for web development and for the designing of website some open-source web technologies are used such as HTML, and CSS. For the programming of the kiosk desktop application, the notepad++ and visual code are used for the python language. Test results showed that the process in the kiosk was much better than the traditional library system which uses paper and pencil in terms of speed and accuracy.

Technological University of the Philippines
DEPARTMENT OF INDUSTRIAL TECHNOLOGY
Carlos Q. Trinidad Ave., Salawag, Dasmariñas City, Cavite
Telephone: (046) 416-4120, Email Address: cavite@tup.edu.ph

APPROVAL SHEET

The project study entitled **"DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM IN DASMARIÑAS EAST INTEGRATED HIGH SCHOOL"**, prepared and submitted by **Myra Monique Acuña, Airo James O. Alberto,** and **Crystalyn C. Recaña,** in partial fulfillment of the requirements for the degree **Bachelor of Engineering Technology**, is hereby approved and accepted.

MS. BEVERLY M. DE VEGA
Adviser

MS. MA. JULIET PATRIA D. ESCALONA
Chairman

MR. ARNOLD G. DE VEGA
Member

MR. JOHN PAULO M. DIAZ
Member

DR. MELCHOR P. FERNANDO
Member

Approved in partial fulfillment of the requirements for the degree **Bachelor of Engineering Technology.**

PROF. JAY VICTOR G. GUMBOC
Head, Department of Industrial Technology
Date: _____

ALEXANDER E. MAG-ISA, PH.D., PME
Assistant Director for Academic Affairs
Date: _____

Sample

TABLE OF CONTENTS

	PAGES
PRELIMINARIES	
Title Page	i
Acknowledgement	ii
Abstract	iii
Approval Sheet	iv
Table of Contents	v
List of Tables	vii
List of Figures	viii
Chapter 1 - INTRODUCTION	
Background of the Study	1
Objectives of the Study	3
Scope and Limitations of the Study	5
Significance of the Study	6
Chapter 2 - CONCEPTUAL FRAMEWORK	
Review of Related Literature and Studies	7
Conceptual Model of the Study	
Operational Definition of Terms	

Sample

Chapter 3 - METHODOLOGY

Project Design 27

Project Development 31

Operation and Testing Procedure 38

Evaluation Procedure 43

Chapter 4 – RESULTS AND DISCUSSION

Project Description 47

Project Structure 49

Project Test Results 74

Project Capabilities and Limitations 89

Chapter 5 – SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of Findings 90

Conclusions 91

Recommendations 91

REFERENCES 92

APPENDICES 94

Sample

LIST OF TABLES

Table	Title	Page
1	Likert Scale	45
2	Descriptive Interpretation of the Mean	46
3	Testing Results for Barcode Scanner Process	74
4	Testing Results for Transactions Duration	75
5	Testing Results for the Verification of Transactions	76
6	Testing Result for the Verification of Admin	77
7	Testing Result for the Verification of Student	78
8	Testing Result for the Performance of System	79
9	Testing Result for Availability of a Book	80
10	Testing Result for the Chosen Transaction	81
11	Testing Result for the Status of Return	82
12	Testing Result for Data Filing in Borrowing of a Book	83
13	Testing Result for the Borrowing the Chosen Book	84
14	Testing Result for the Barcode Reader	85
15	Testing Result for the Log Time	86
16	Testing for the Borrowing Transaction	87
17	Testing for the Returning Transaction	88

Sample

LIST OF FIGURES

Figure	Title	Pages
1	Kiosk	8
2	Touchscreen Monitor	14
3	Barcode Scanner	16
4	Flowchart of (Araya & Mengsteab, 2020)	18
5	API from the server interact with IKiS	21
6	Design Thinking Model	21
7	Isometric View of Library Management System	28
8	Block diagram of the process on the Proposed Library Management System	29
9	Exploded View of the Prototype	31
10	Flowchart Diagram of QR Code Scanning	33
11	Data Flow Diagram of Student Registration	33
12	Data Flow Diagram of Student Time in and Time out	34
13	Data Flow Diagram of Borrowing and Returning of Books	35
14	Data Flow Diagram of Registration of Books	36
15	Prototype of Automated Library Management System	48
16	Unfinished Case of the Project	49
17	Connection of Components	50
18	Main View of Student Application	51
19	Student Manual Log	52
20	Student Search Window	53
21	Main View of Admin Application	54

Sample

22	Navigation Pages of Admin Application	55
23	Change Admin Window	56
24	Admin Login	57
25	Update Quantity	58
26	Borrowed Log	59
27	Book Information	60
28	Edit Book Information	61
29	Student Log	62
30	Student Information	63
31	Edit Student Information	64
32	ISBN Scanning	65
33	Book Registration	66
34	Student Registration	67
35	Borrow List	68
36	Borrow Book	69
37	Extend Due Date	70
38	Return Book	71
39	Book Schedule	72
40	Student Pre-Registration	73

Sample

Chapter 1

INTRODUCTION

Background of the Study

Books contain information and data that is needed by the readers to gain some idea and knowledge. It is classified in different categories for easy identification of readers. Library has been part of the day-to-day existence of students in every school. It contains a collection of resources of published books that plays an important role in the development of students and goals of every school. It is a venue for students to fully utilized the resources for their courses. Hence, some libraries still partially use a traditional management system where a logbook was used to verify the identity of students and manually log their names and the time as they walked in.

The researchers spent time observing the library management of secondary schools, from the verification of students' identity at the circulation desk, to recording, borrowing, and returning books. Logging in and out to the library took time due to long queues, specifically during lunch time. As a result, too much time was consumed at the circulation desk rather than on doing their significant objectives. Based on the researcher's observation, students verified their identity by providing identification cards and writing their names and sections in a daily logbook.

The traditional type of library management system may result in complications in monitoring and managing records of the library. Library was considered as a place for significant objectives, peace and convenience, not consuming time on trivial events such as logging in and out manually. It proves that traditional library management of secondary school is required to innovate and adapt to the smart society.

Sample

According to Nwokolo & Okundamiya (2018), there are several factors that have obliged libraries shifting from manually operating transactions to an automated library management system. These include the need for an improved and organized record keeping of library activities, improved security for the students and library officials, cost effectiveness by reducing the use of papers, efficient management of a large amount of scholarly literature. An automated library management system using a quick response code system will minimize the usage of students' logbooks.

One of the services that was provided by each library was the freedom of students to come in and out of the library. Students use this opportunity to feed their knowledge and to concrete their ideas. But there are some cases where there is an overloading in the library. As stated by the librarian (Ms. I. Lopez, personal communication, December 7, 2021) at Dasmariñas East Integrated High School, it would be great if the library has an integrated system that provides automation in monitoring of books and students data.

The design and implementation of the automated library management system developed the record keeping of library activities and security of students. In this study, researchers made a library system that used quick response code for student's identification. The researchers developed a system that the students can verify their registration and identity, searching, borrowing, and returning of books using QR code and barcode for the verification of the student and classification of books.

Sample

Objectives of the Study

The main goal of this study was to create a library management system kiosk that specifically aimed to be implemented at the Dasmariñas East Integrated High School - Junior High. The library management system kiosk aimed to adopt the functions from the usual library management system which included registration of books and students, borrowing, and returning of books, and searching of books with additional features of logging in and out of students with the use of quick response code device for manageable time in and time out of students, and efficient management of records.

Specific Objectives

1. To design an automated library management system kiosk using a QR code device for the verification of student's identity that will provide following features:
    a. Record all the login and logout information of registered students that were entering the library within the day.
    b. Reduce the consumed time of using a logbook to make library transactions within a day for at least 60% compared to traditional library system, specifically registration of books and students, login, and logout also the borrowing and returning of books.
    c. Record 80% of the dependable data per transactions such as borrowing, returning and the availability status of each book.
2. Determine at least 80% accuracy of the kiosk and reliability of data entered within a day, specifically achieving a trouble-free and minimal time

Sample

consumption for at least two (2) minutes per transactions with the use of kiosk machine in the library such as time in/time out of students, searching for the availability of books, and the borrowing/returning of books.

3. Evaluate the prototype in terms of functionality, aesthetics, workability, durability, and safety with at least 3.5 mean per each category and achieve a descriptive rating of *Very Acceptable*.

Sample

Scope and Limitations of the Study

The main concept of this study was based on the traditional way of doing transactions in secondary level school libraries. This study focused on the innovation of the traditional way of making transactions, the writing of names, and time and date on the logbook, the manually filling up of information for the registration of students and borrowing and returning form. The researchers aimed to improve the transaction of borrowing and returning of books. This was to reduce the consumed time of students by logging in/out and library officials by verifying the presence of students, and to reduce the use of paper. This study intended to provide more organized and precise information for better backup of every library department.

The scope of this study was the use of a mini PC as a connection between the scanner and the touchscreen monitor. It also aimed to store all the needed data coming from the student's registration, it consisted of the basic information of the student. The full name of the student, year, and section, contact information, and generated QR code of the student. The QR code/Barcode Scanner was designed to scan the unique QR code of the student. It was also for the scanning of the ISBN barcode that was uniquely provided in every book in the library, the ISBN barcode was used for the borrowing of the students.

The research was only limited to Dasmariñas East Integrated High School - Junior High Students. The registration required validation from the library official to proceed in making further transactions in the school library such as borrowing and returning of books. This project was limited only in using the kiosk machine to proceed in transactions requested by the student.

This research aimed to reduce the use of papers that preserved some resources of

the ecosystem, to save time in filling up logbooks and forms in every transaction and for more convenient transactions in the library that benefit both student and school officials. The project aimed to create a kiosk machine that helped to make an easier transaction of logging in and out, the borrowing and returning of books and to organize the gathered data. It was also expected to collect accurate data from every transaction.

Significance of the Study

End-Users and the public. The end users of this library system kiosk will be highly benefited. Taking advantage of the use of the technology into automation.

Researchers. The success of this study will deepen their knowledge in the field of computer programming, electronics and in research as well. It is also an opportunity for the researchers to establish a foundation of knowledge about building and making a small project into a bigger project.

Future Researchers. The future researchers may use this study as their reference, as they wish to pursue the same study. The researchers' design has some weak points that the future researchers may need to focus on.

Sample

Chapter 2

CONCEPTUAL FRAMEWORK

This chapter presented the articles, journals, and studies that were used to reinforce the conceptualization of the framework of the study. This supported the foundations and processes that were involved in the research. It also provided the necessary information for the selection of materials and components that were used in the development of the prototype. Lastly, this included the discussion of the conceptual model that was used in the research and the operational/functional definition of terms.

Review of Related Literature and Studies

Kiosk

Kiosk is a small stand-alone booth that is used for marketing in high-traffic areas. A kiosk is typically staffed by someone who help draw attention to the booth in addition to benefiting consumers. Kiosks that are used for retail were commonly found in shopping malls or on major city streets that are traffic, and they offer business owners a low-cost way to sell their goods.

According to the Computer Desktop Encyclopedia (1981-2019), a newsstand or a ticket booth is an example of a small, self-contained structure. The original kiosk had space inside for a person to handle transactions; now, the phrase has come to apply to unattended self-service kiosks with computers that provide information or make sales through a touchscreen. This helped the library system to monitor the students who go in and out without a person in charge to give them a logbook.

Figure 1. Kiosk

Source: https://www.meridiankiosks.com/kiosks/indoor-kiosks/

Mini PC

Mini PCs are desktop computers that do not take up much room on your desk. They are so small that they can be readily mounted on the back of a monitor, preferably with a standard VESA mount. This is a considerable benefit in circumstances where space is restricted such as the receptionist's desk. Reduced power consumption and, in finless devices, low noise levels are two advantages (Schofield, 2018).

It was the main component of this research; this served as the heart of the prototype as it interconnected the materials needed to build the prototype. The touchscreen monitor that was connected to the mini PC was essential for the display of the application. The barcode scanner that was connected to the mini PC was for the QR code and barcode reader.

Operating System

Sample

As mentioned in an educational website (https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/), the most crucial program that runs on a computer is the operating system. It controls the memory and operations of the computer, including all its software and hardware. It also allows you to communicate with the computer in human language. A computer is nothing without an operating system.

Operating systems used the hardware and software of the mini PC. This was where the drivers were installed to read the scanner. Without this the researchers cannot use the mini PC.

Windows 10

According to (Rathbone, n.d.) in his article, the Windows 10 desktop allows you to run multiple apps and programs at the same time, each in its own window. The separation allows the user to distribute many programs across the screen and share data between each windows. Windows begins with a clean, cleansed surface. Your desktop will fill up with icons that load your files with a quick double-click when you have been working for just a long time.

It was the specific operating system that was used for the mini PC. Aside from the Windows 10 home version any Windows 10 version can turn into kiosk mode. Windows 10 was a required operating system when making a kiosk.

Programming Language

As stated by (Beal, n.d.), a programming language is a set of grammatical rules and a vocabulary for commanding a machine to execute specified tasks. High-level languages such as BASIC, C, C++, COBOL, Java, FORTRAN, Ada, and Pascal are commonly referred to as programming languages. For structuring computer instructions, each

programming language has its own keywords and syntax.

This was a software application used to program an application. Python for the kiosk application and PHP for the website application were the programming languages that the researchers were going to use. It was a programming language used to create desktop and web applications.

Python

Python is a high leveled general-purpose programming language that is interpreted. With its new form of indentation that is considerable is used in its design philosophy that emphasizes the code readability. The language elements and the object-oriented approach promoted by python aims to assist programmers in writing clear and logical codes for small or large-scale projects.

Researchers used python as the main programming language in this research. It is used to create a software application to build the interface of the kiosk.

PHP

The website of PHP (www.php.net/manual/en/intro-whats.php) contains various useful resources such as PHP or hypertext preprocessor is a widely used open-source general-purpose scripting language that is well suited for web development and can be embedded in HTML. PHP is distinguished from client-side JavaScript by the fact that the code is performed on the server, resulting in HTML that is then provided to the client. The client then receives the results of the script's execution but would not be aware of the underlying code.

Specific programming language the researchers were going to use. This

language needed HTML and CSS for the front end and PHP for the backend. It can be coded in any text editor, just save it as a PHP file.

XAMPP

Apache Friends (2021) stated that XAMPP is a free and simple Apache distribution that includes MariaDB, PHP, and Perl. The XAMPP open-source software has been designed to be extremely simple to set up and use. It uses a PHP as its programming language and can be embedded into HTML.

An environment to develop a PHP that was needed in this research. It included MariaDB and PHP that the researchers were going to use. Local host admin was used as a connection to store the collected data in the database.

Database Software Program

Any collection of data or information that is specially arranged for rapid search and retrieval by a computer is referred to as a database, often known as an electronic database. Databases are designed to store, retrieve, modify, and delete data also it makes other data-processing tasks easier. In response to queries, a database management system (DBMS) retrieves data from the database (The Editors of Encyclopedia Britannica, 1998).

A software program to store the collected data in this study. Every query such as registration, time in/ time out, and borrow/ return in the library system were recorded here. Relational database was going to be used to make a structured collection of data.

SQL

Sirkin (2020) described SQL (Structured Query Language) as a standardized programming language for managing relational databases and performing operations on the data contained within them. The modification of

database table and index structures also the adding, updating, and removing rows, and obtaining subsets of information within a database for transaction processing and analytic applications, are all SQL applications. Here are the popular SQL statements it includes the selecting, adding, inserting, updating, deleting, creating, changing, and truncating.

Query language for simple CRUD which was Create, Update and Delete in the database. It processed the data input to return the right output. It was responsible for handling and modifying the data in the table in the database.

MySQL

According to the website of MySQL (www.mysql.com) MySQL is a relational database management system that is free and open source. "My" is the name of the co-founder's daughter, and "SQL" is the abbreviation for Structured Query Language. MySQL Database Service is a cloud-native database service that is fully managed.

An alternative database if the XAMPP database which was MariaDB was not compatible with the mini PC. Store data that will get from the student registration, time in/ time out, and borrow/ return in the library system. It also used a local host for the local server of the computer.

MariaDB

This website (mariadb.org/documentation/) stated that one of the most popular open-source relational databases is MariaDB Server. MariaDB was created originally by the MySQL developers and promised to remain system as open source. It is included in most cloud services and is installed by default in most

Linux variants. It is based on the principles of performance, stability, and openness, and the MariaDB Foundation guarantees that contributions will be accepted based on technical merit.

Main database for the automated library system. Also store data obtained from the student registration, time in/ time out, and borrow/ return in the library system. Needed to run the XAMPP to use this database.

InfinityFree

InfinityFree is a non-profit organization that focuses on offering dependable free hosting services. Researchers incorporated the project on the internet. They launched their website on this platform where students can view the available books in the school with the help of a web hosting site.

Touchscreen Monitor

A touch screen is a type of display that allows a user to interact with a computer by

using a finger or a stylus. They are a good alternative to using a mouse or keyboard to navigate a GUI (graphical user interface). Touch screens can be found on computer and laptop displays, smartphones, tablets, cash registers, and information kiosks, among other things (Computer Hope, 2020).

Touchscreen monitors were the physical interface of the user to interact with the system. The desktop application was executed here. This acted as the kiosk screen to do what the program which the user press, touch, or click in the application.

Figure 2. Touchscreen Monitor

Source: https://themarany.com/best-touchscreen-monitors/

Sample

Sensor

A sensor can be defined as an input device that produces an output signal in relation to a specified physical quantity input. Input device denotes that it is part of a larger system that gives input to a major control system like a processor or microcontroller. It is an electronic device that transfers signals from one energy domain to another (Teja, 2021).

These components were responsible for the reading of the specific data such as QR code, and barcode. It converted the analog data into digital data. This helped the researchers to get the needed data in the library system.

Barcode Scanner

Barcode scanner is used to read barcodes. The data in the barcode is stored or processed immediately by the computer. Barcoding was first used in the 1970s and has since become an integral element of everyday business operations. The codes are used by grocery retailers to collect price and other information about products (The Editors of Encyclopedia Britannica, 1998).

This study required this barcode scanner to read the barcode available in every registered book. The scanned barcodes were saved to the database for the student to be able to borrow and return the book. This also monitored the availability of books in the library. It was used by the researchers that can also scan student or admin QR code. The admin and student were given generated quick response code after the succession of registration. This acted as their pass to access the library management system.

Sample

Figure 3. Barcode Scanner
Source: http://shopee.ph

Design and Implementation of an Automated Library System

Their research aimed to design and promote realization about the importance of an automated library system. For their methodology, the development of the automated library information system began with the design of the 3- tier software application; the first tier was developed for the front-end using Microsoft Visual Studio, the second tier was developed for dynamic web using PHP, Java Server Page, Active Server Page and the third tier was developed for back end using MySQL server application. As their research came to conclusion, they concluded that the adaptation of automated library systems had gained momentum and it continued to grow further as the cost of the hardware reduced and easy integration of solutions became available. The automated library system can eradicate the human errors made due to manual documentation at the circulation desk. (Nwokolo & Okundamiya. 2018).

Designing Web-based Library Management System

Their research sought to design and develop a web-based Library Management System for Dasmarinas East Integrated High School that was capable of adding, keeping track of borrow and return of books, and an online login system. The study also aimed to eliminate the physical library as it showed many limitations that cannot satisfy user needs in a way that most hard copy documents were damaged after a limited time of usage and there were some instances of missing files, reducing high demand for the cost of books and to get rid of paper works in the library. For the methodology, the researchers used Database Design that controlled data and for creating a data model that consisted of different parameters such as; Conceptual Design for the structure of Entity-Relationship Design that described the input and stored data, Logical Design for the logical relationship in the system, Module design consisted of flowchart for the whole system and Physical Design, Architecture Design, Interface Design for the Graphical User Design that were used in interacting to the users. The design parameters presented in their system were Java Programming language, PHP, HTML, and Database MYSQL. For the conclusion, the researchers showed the benefits of a web-based library management that can easily drawback the physical library and as for the storage of data, the computerized system can generate a faster member's report with an assurance of no data loss or missing reports. (Araya & Mengsteab, 2020)

The study of Araya & Mengsteab were proven to be successful by achieving the main target of accomplishing the library activities using a computerized system and can provide easy access to the library for the librarian and the students of Asmara Community College of Education (ACCE). In relation to this study, the researchers maintained the

main target of accomplishing the library activities using a computerized system. By the use of this practice, every transaction would be much more convenient and easier for the students and librarians. On the other hand, in the study of Araya & Mengsteab it aimed to eliminate the physical library by creating an inter network library system.

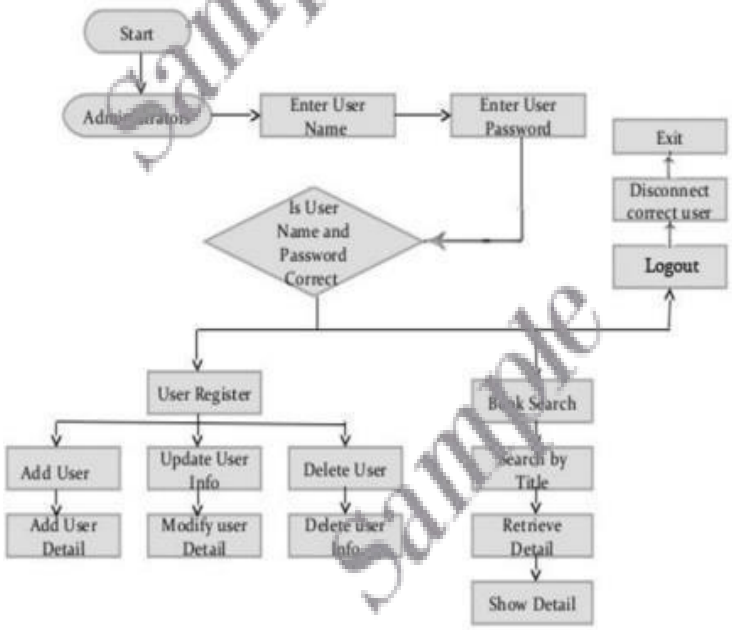


Figure 4. Flowchart of (Araya & Mengsteab, 2020)
Source: https://www.researchgate.net/publication/344728543_Designing_Web-based_Library_Management_System

Sample

This type of idea was opposed by Bodomo saying "Some students still prefer print books in the 21st century" (Bodomo et al., 2003, p.46) since the researchers and Bolomo had the same opinion about this matter, the researchers only adopted the use of a library management system to accomplish every transaction. The system was installed in kiosks that were used inside the library with physical presence of students and the librarian. Also, the Web-based Library Management System of Araya & Mengsteab was only limited to Asmara Community College of Education (ACCE), for this study the library management system kiosks were able to operate for any secondary schools, specifically the secondary schools that were still using the traditional library system. The researchers concluded that the study of Araya & Mengsteab supported the contingency idea of accomplishing all the library transactions with the use of a library management system that can help the students and librarians for a much effortless process.

Figure 4 showed the flowchart design of (Araya & Mengsteab, 2020) about the study of Web-based Library Management Systems. It consisted of a process from the administrator from entering of username and password to registering a new user, editing, or deleting the data of existing user and also the searching of books.

Sample

IKiS Self Service Kiosk for Library Service

The major goal of this study was to create the Interactive Kiosk System (IKiS), which was an interactive Kiosk-based printing system. IKiS allows you to search, access information, and conduct transactions in the library without having to print anything. It was created utilizing standard computer hardware accessible on the market in the hopes of speeding up the manufacturing process without having to wait for exclusive devices to become available. The development of the IKiS system begins with defining system and user requirements based on the previous stage's customer design outcomes. After that, perform hardware and software testing. System functionalities consist of: 1. Searching for a collection. 2. View collection. 3. Printing collection. IKiS was created with users of the IR Library collecting services in mind. It is helpful, ergonomic, and easy to use. (Mardiana & Muhammad, 2018)

Making a kiosk was a challenge for the researchers in this study so with the help of the research of Mardiana & Muhammad the researchers now had an idea how to build one. As they already mentioned in their study, the researchers came up with an idea of how they were going to utilize it in this research. Since Mardiana & Muhammad research only focused on searching a document and print it the researchers modified it to improve what it was lacking and to achieve this research objective.

In figure 5 it showed the connection of the kiosk designed by Mardiana & Muhammad to the server PC that consisted of API and the library management system that they created. The kiosk was the one used by the students while the server was the PC used by the librarian.

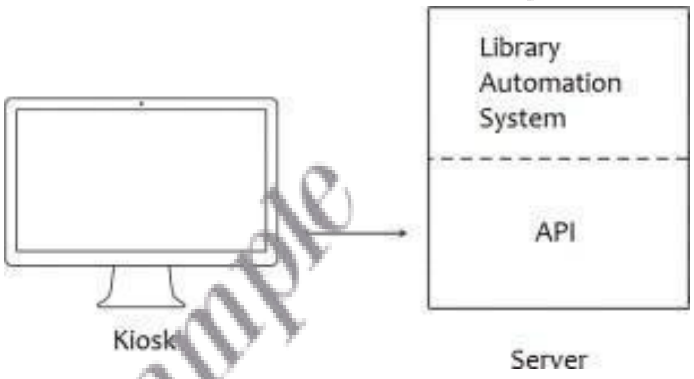


Figure 5. API from the server interact with IKiS

Source: https://jurnal.darmajaya.ac.id/index.php/icitb/article/view/1004/678

Conceptual Model of the Study

The Conceptual Model of this research came with a design thinking model that was a design methodology that provided a solution-based approach to solving problems. In order to solve complex problems that occur around us, a design thinking model was applied. The five different stages of design thinking were shown in figure 6.

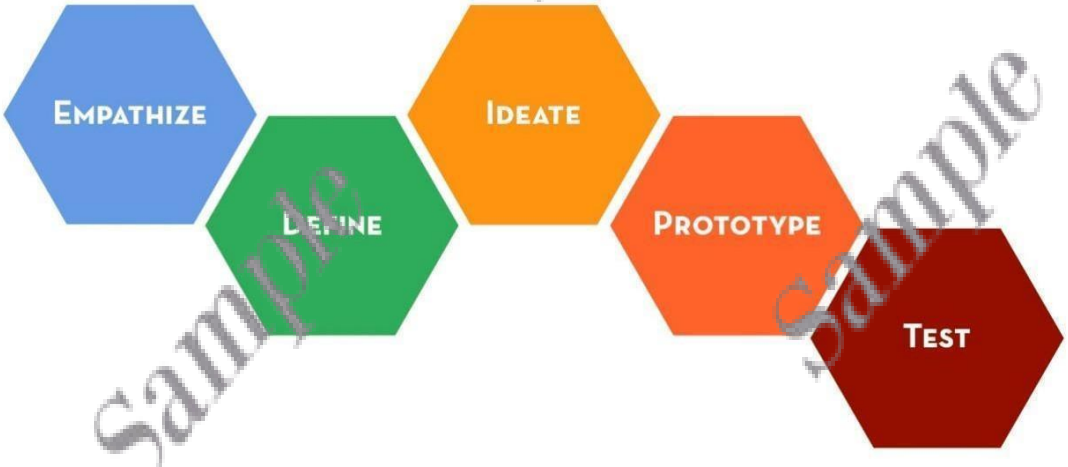


Figure 6. Design Thinking Model

Source: https://sites.google.com/site/mobilelearning/design-thinking

Sample

To make research, the researchers came up with a problem which was under the empathize stage. The researchers spent some time observing the library management in secondary schools at the circulation desk on how the students entered the facility, how they recorded the log of each student, and how borrowing and returning of books was processed. Logging into the library took time due to long queues, specifically during break times. As a result, too much time was consumed at the circulation desk rather than on significant objectives. Based on their observation, students verified their identity by providing their names and sections in the daily logbook. There were several factors that required students to write their names on a daily logbook and leave their identification card at the circulation desk.

Next was the define stage which addressed the initial solution of the researchers to be implemented based on the gathered cause and effect of the problem. The researchers intended to propose a solution that automated the filling up of forms, to minimize the consumed time of each student and remove the traditional logging process wherein students needed to write the log of date and time, their name, year level and section to a logbook for verification to enter inside the library. By this process, there might be unexpected errors such as unreadable writings of the students, not exact log of date and time, and other human errors. From these problems, automation can provide a more secure transaction between the librarian and student in borrowing and returning of books and to be more accurate in getting the needed data from each student.

During the third stage of the design thinking process, which was the ideate, researchers were ready to start generating ideas. In this study, researchers made an automated library management system using quick response code as authentication of

students. The researcher considered the availability of the librarian to assist the student for time in and time out, by this solution it was expected to minimize the consumed time of the students at the circulation desk. To narrow it down, the researchers came up with a solution which was the development of the automated library management system that was feasible. This research was expecting to achieve maximum productivity with minimum wasted effort. The researchers' prototype was low cost but performed to its maximum limitation.

For the prototype stage of the design thinking model, it consisted of how the researchers processed the creating and assembling of components for the prototype. For this study, the researchers happened to gather materials and components that were easy to find and replace for less inconvenience in case of malfunction in hardware parts for the prototype. The main component was the mini PC, it served as the brain of the prototype since all the other main components were connected to this component, then the QR code/barcode scanner and a 13.3" inch touchscreen monitor that was directly connected to the mini PC that were used as the physical interaction of users to the software application. For the software requirement of this project, the researchers intended to create a new computer application that was used for the interaction of the users to the hardware components and had the capability to save the respected data needed for backup of the library management system.

The final stage was the test stage where the researchers tested their prototype. After creating the software and assembling the components and materials of a prototype which was the automated library management system using quick response code as authentication of students. A series of tests were conducted by the researchers to determine if there was

an error, or a problem encountered. Researchers tested the functionality of the software application from registration of books information, librarian's, and students' information, into using these data for processing time in, timeout, borrowing, and returning of books. If problems or errors occur, it will undergo troubleshooting procedures to modify the prototype. A series of tests again were conducted until no such error occurred. The prototype was evaluated according to its functionality, accuracy, reliability, running time and usability.

Sample

Operational Definition of Terms

Logbook – This term was used in the study pertaining to the daily record, where students write their name, section and date and time in order to enter the library.

Catalog – This term was used in the study pertaining to the library's list of all the books or resources available in the library in this research.

Barcode Scanner – This term was used in the study pertaining to the sensor that will be installed inside the kiosk cabinet and will be used to scan the barcode of the book to register in the library system.

Kiosk – This term was used in the study pertaining to the small stand-alone booth with a cabinet that the researchers intended to build and design for the project.

Mini PC – This term was used in the study pertaining to the miniature computer that has a low power consumption to make the prototype stand alone with little intervention from the librarian.

Touchscreen monitor – This term was used in the study pertaining to the display that allows a researchers' respondents to interact with a computer by using a finger.

Database – This term was used in the study pertaining to the collection of organized data that will store the data of the students in this research to easily store and search data.

MySQL – This term was used in the study pertaining to the researcher who will use this as they are familiar with as a relational database management system that is free and open-source.

Sample

XAMPP – This term was used in the study pertaining to the researchers configuring the port of this open-source PHP development environment needed to link the application to the database.

PHP – This term was used in the study pertaining to the acronym for hypertext preprocessor, programming language used by the researchers to program an application.

Sample

Chapter 3

Methodology

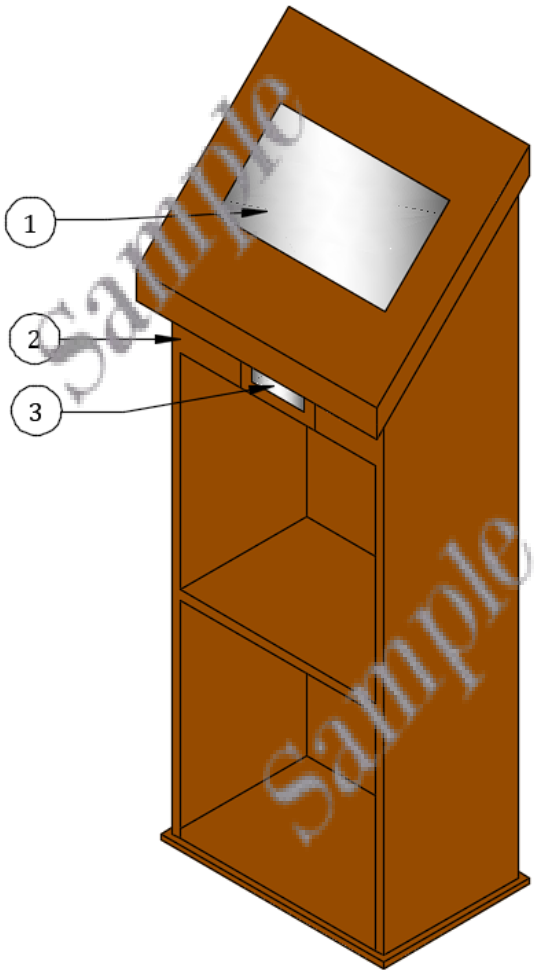
This chapter contained the isometric drawings of the proposed project design, the block diagram, and the flowchart related to the process of the study. This also showed the different figures of components for the development of this project. The operation, testing, and the evaluation procedures of the prototype was also included.

Project Design

Automated Library Management System aimed to monitor and display the availability of books and data of library users using a database and generated user's quick response code to utilize the system in connection with time in/time out and borrowing and returning of books. As shown in Figure 7, the isometric view of the library management system prototype with specific dimensions of 114 cm in height of kiosk excluded the base and the case of touchscreen monitor, 46.68 cm length by 35 cm in width and 2 cm thickness of the base, and the monitor was tilted in 45 degrees to prevent the inconvenience in using the kiosk. In the lower part of the kiosk, a bookshelf was provided for the returned books.

Mini PC instructed the system to follow the options of the users, touchscreen monitor that displayed the graphical user interface of the system and where users input their data and course of actions. Registration, borrowing of books, and return of books can be accomplished by connecting the QR code/barcode scanner to the Mini PC. The scanner was intended to obtain the quick response code of each student and admin every borrowing and returning of books, and time in and time out process.

Sample



1. Capacitive Touchscreen Monitor 2. Mini PC, placed inside the Kiosk
3. QR Code/Barcode Scanner

Figure 7. Isometric View of Library Management System

On the other hand, different transactions and processes can be executed in the library management system kiosk. As shown in Figure 8, the different processes on the proposed library management system were book, student, and admin registration, time in and time out, and borrow and return of books.

Sample

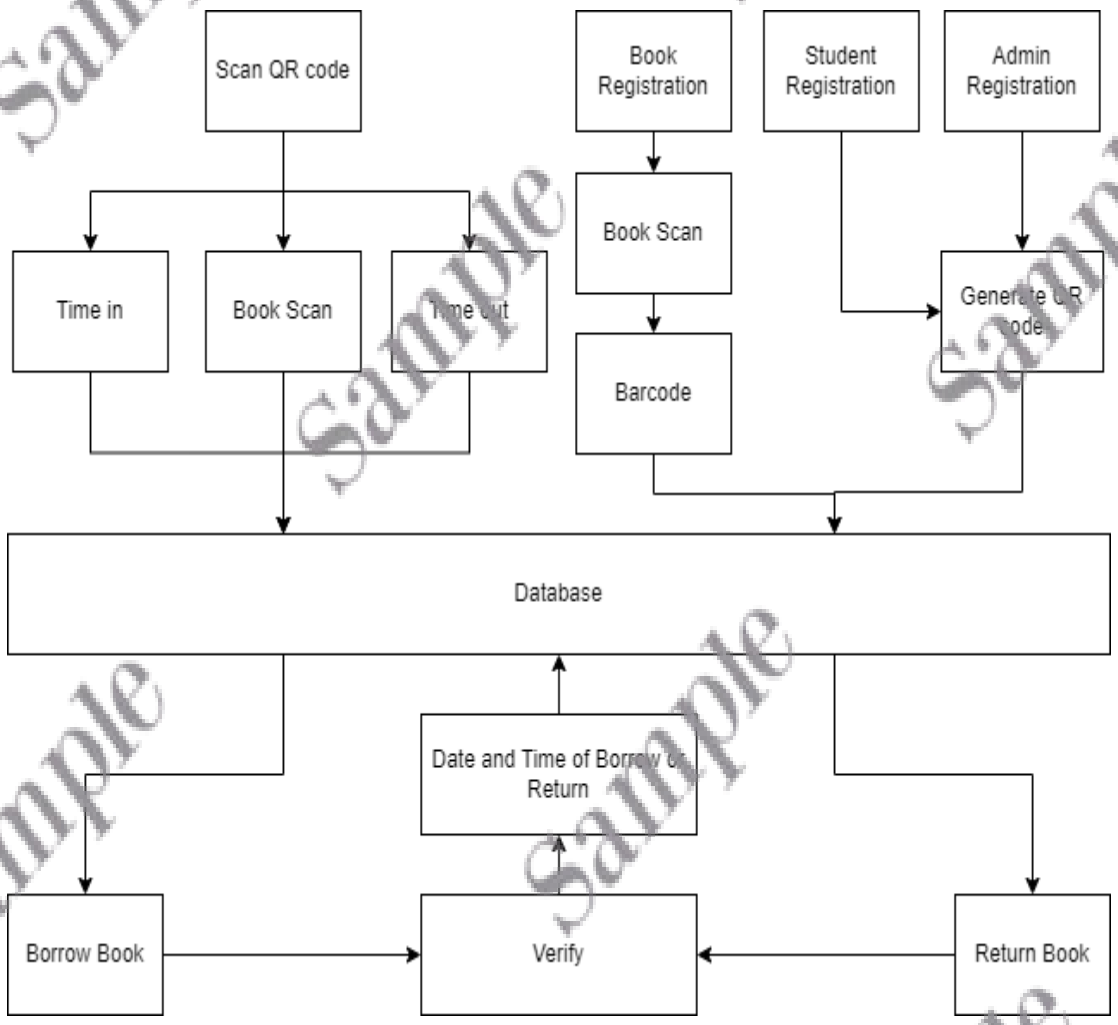


Figure 8. Block diagram of the process on the Proposed Library Management System

Admin was required to provide the registered username and password for generating QR code. When the system had respectably set up the information of the admin, input data were transferred in the database that signified the succession of registration. For registration of a book, the book's information must be provided for generating a new barcode. In student registration, students were required to provide their basic information to generate a personal QR code, for the verification process in every transaction, the admin verification was needed for the succession of student registration. After the registrations, all data were transferred in the database, and were displayed the succession of registration.

For time in or time out, registered students were required to provide their QR code or with the use of username and password to present either time out or time in state automatically. This was also used for the checking process if the student had the state of the pending borrowed book for the notification of its due date. In this case, the usage of logbooks and losing of books were prevented.

In order to borrow a book, the barcode was scanned to show the availability of the book. The student scanned their QR Code or entered their registered username and password for identification of the borrower. In order to accomplish the transaction, the admin approval was needed. For the return of the borrowed book, information of the borrowing transaction was displayed. For accomplishment of transaction borrower and admin verification was needed.

Sample

Project Development

For the development of the study, the hardware and software components of the library management system were presented in this chapter. It included the exploded view of major components, logical data flow diagram, and the development process of the project.

The exploded view of the library management system prototype as presented in Figure 9, consisted of the major components: the touchscreen monitor, Mini PC, QR code/barcode scanner with its dimensions in centimeters.

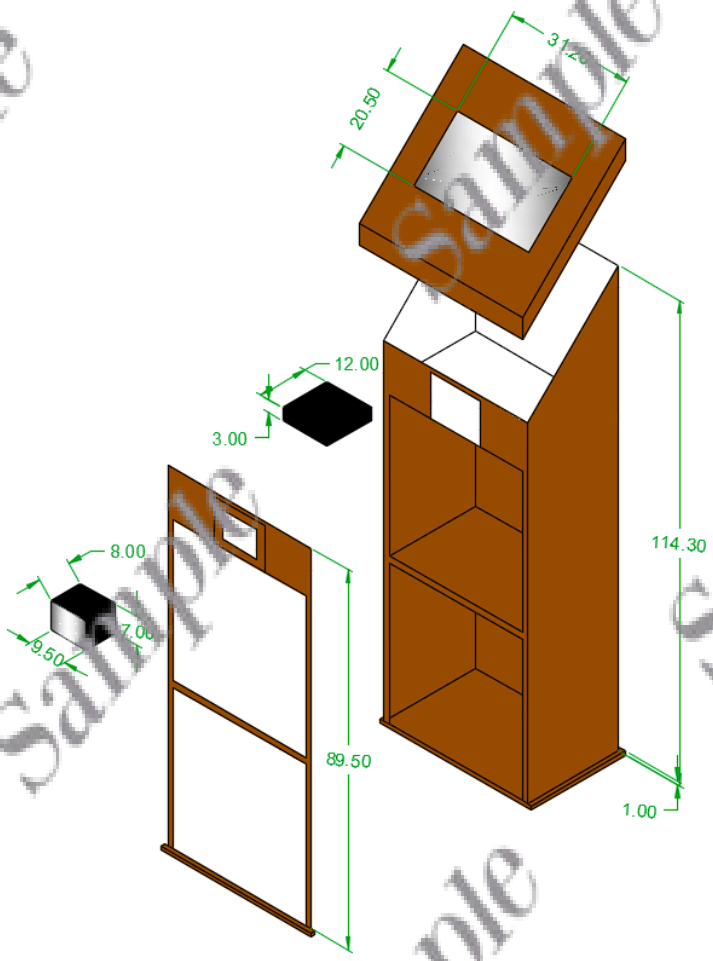


Figure 9. Exploded View of the Prototype

Sample

The specification and function of each major hardware component in the prototype were specified in this section.

The researchers used Mini PC to ensure that all processes occurred in this major part of the library management system prototype. This instructed the system to follow the options of the user. A Mini PC was similar to a desktop PC, but it did not take up large space and can be used for self service kiosks that provided access in specific transactions.

Touchscreen monitor displayed all graphical user interfaces of the library management system. The researchers used a 13.3-inch touchscreen monitor to gather the data and course of actions of the user and display an output based on the given selections provided by the system.

Barcode/Quick Response code scanner is an omnidirectional device that is compatible for Linux, IOS, Android, Windows, etc. This was used to scan the barcode of the book and QR code presented by the admin, for book registration and verification purposes, and students who wanted to enter the library, borrow, and return books.

For the process of obtaining the QR code of users, Figure 10 was presented. The QR code was required to be scanned in the QR code/Barcode scanner, then it was extracted and compared to the existing data. Transactions such as time in and time out and borrowing or returning of books were allowed if the QR code was from authorized users.

Sample

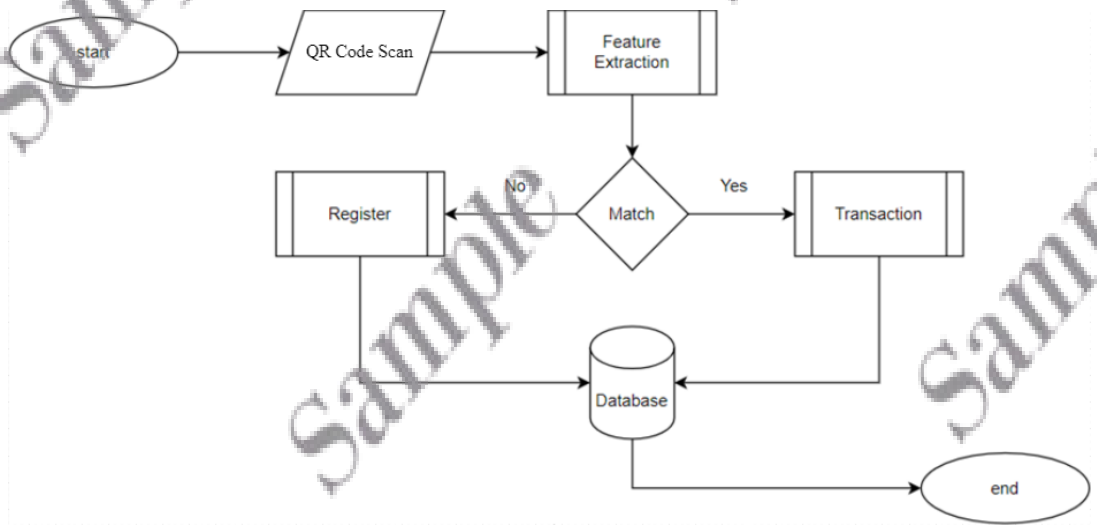


Figure 10. Flowchart Diagram of QR Code Scanning

The process of student registration, as shown in Figure 11, showed the system checked the validity of registration of the student before creating a student profile and transferring records into the database. All information provided including the generated QR code were used in the kiosk.

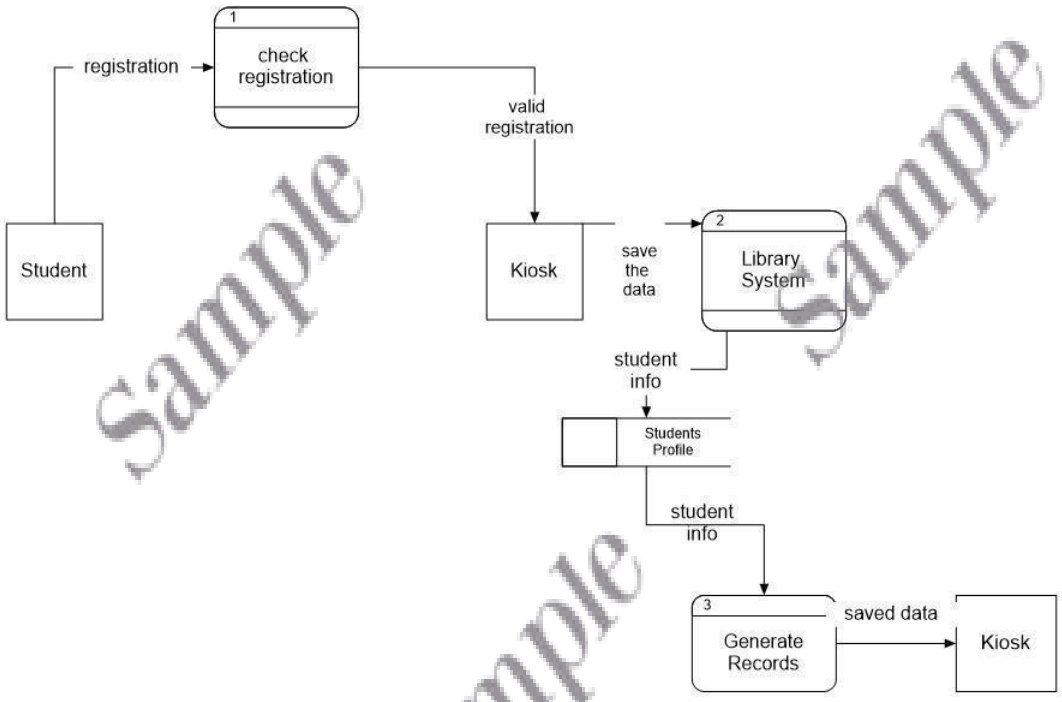


Figure 11. Data Flow Diagram of Student Registration

In Figure 12, this showed that registered students were able to time in and time out in the library using the kiosk. All data such as date and time, and the student information that login or logout in the library management system kiosk were transferred to the database for the daily records.

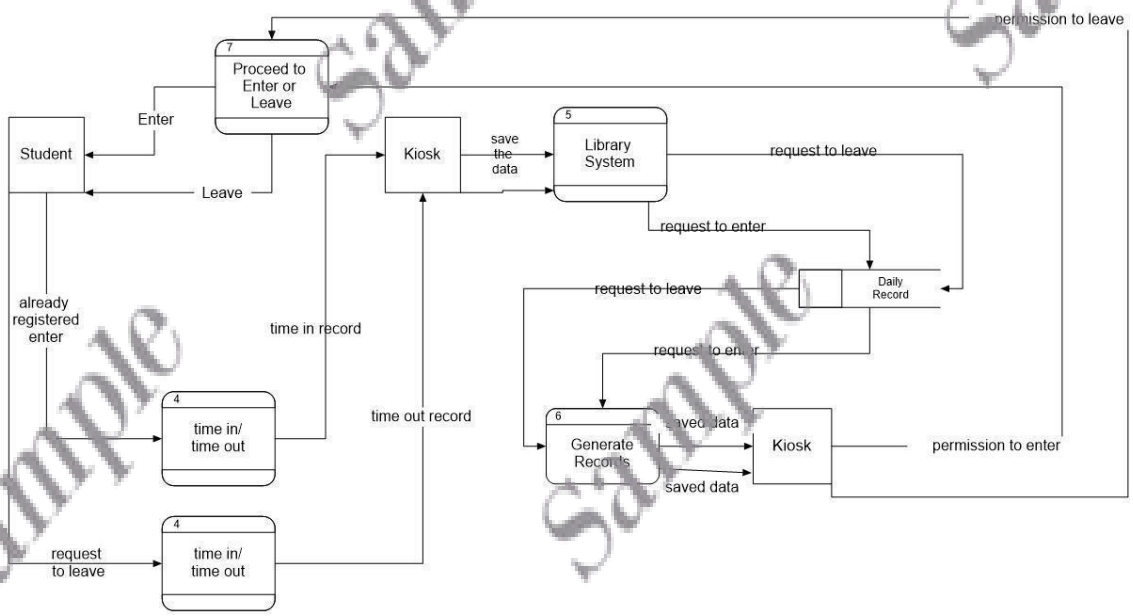


Figure 12. Data Flow Diagram of Student Time in and Time out

Figure 13 presented the data flow diagram of borrowing and returning of books. Borrowing and returning of books needed the librarian's approval of the transaction. For every borrowed or returned book, this updated and generated the records.

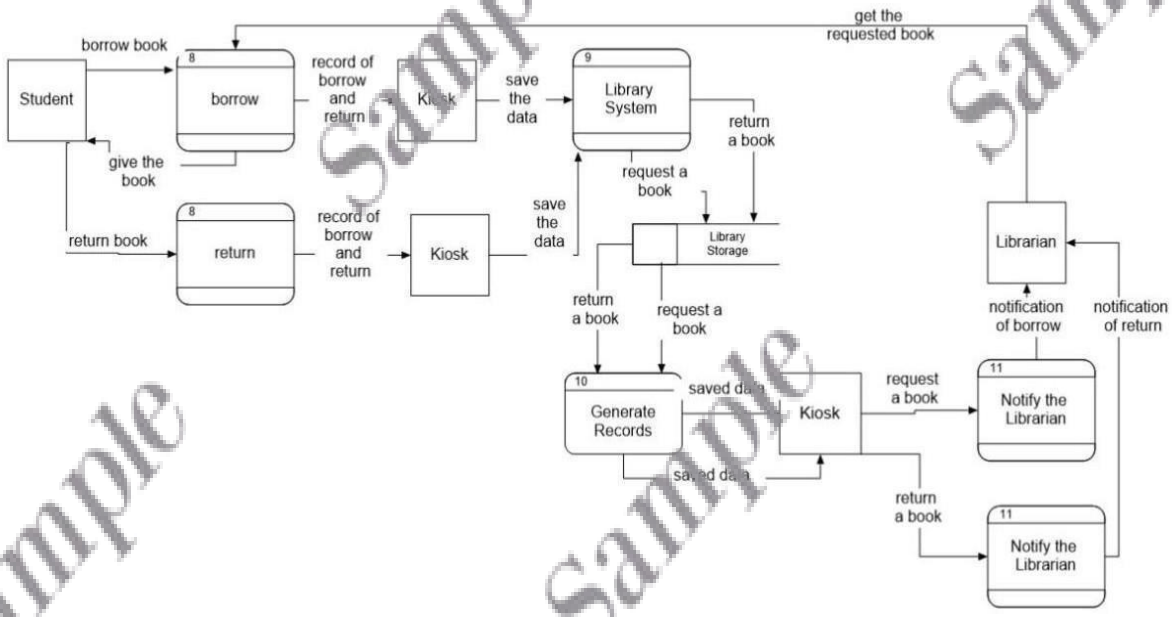


Figure 13. Data Flow Diagram of Borrowing and Returning of Book

Figure 14 showed the process of registration of books. Librarian's QR code acted as the security and verification process. All required information of the book were provided to generate barcodes and transferred all the data in the database.

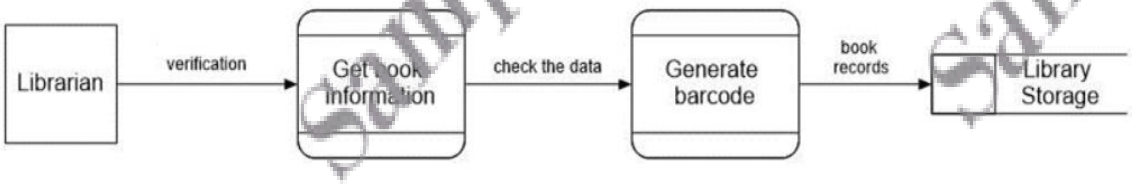


Figure 14. Data Flow Diagram of Registration of Books

Sample

The process of constructing and developing this project was shown in this section. The library management system was composed of hardware and software components.

For hardware components:

1. Purchase components such as Mini PC, Barcode Scanner, Capacitive Touchscreen Monitor, and exterior case.
2. Check the purchased components if working properly and no damage.
3. Assemble and connect all the purchased components according to the design and designated connections to each other.
4. Construct the exterior case.
5. Assemble the whole project on the exterior case.

For software components:

1. Create a database using MariaDB.
2. Communicate with the two main components, such as Mini PC with the monitor and QR code/barcode scanner.
3. Program the whole desktop system using python programming language and program the website using the PHP programming language.

Sample

Operation and Testing Procedure

This section as a whole contained the operation and testing procedures for testing the system properly, for this section it focused on the operations that were observed including the registration of accounts, borrowing and returning of books and the time in and time out of the students.

This procedure was for the registration of admin accounts, students, and books, it included the quick response code of the subject for the verification of transactions and security purposes of data. In the following procedures below the "Admin Application" accepted the QR code and saved all accurate data entered from thesubject.

For the registration of the new admin, the following procedures were followed:

1. Open the admin application.
2. Select the "ADMIN SETTINGS" button.
3. Login the current admin.
4. Select the “ADMIN SETTING”
5. Fill up the information needed.
6. Click the "Change Admin" button.

For the registration of student, the following procedures were followed:

1. Open the admin application.
2. Select the "STUDENT REGISTRATION" button.
3. Fill up the information needed.
4. Scan the QR Code or enter the username and password of the registered admin.

5. Click the "Register" button.

For the registration of book, the following procedures were followed:

1. Open the admin application.
2. Select the "BOOK REGISTER" button.
3. Scan or enter the ISBN of the book.
4. Fill up the information needed.
5. Click the "Register Book" button.

This procedure was for the borrowing and returning of book(s) in the library, in the following procedures listed below, the "Admin Application" acknowledged and verified the QR code of the students and librarian for the verification of transaction also the barcode of the book(s) that were requested for borrowing and returning.

For the borrowing of a book, the following procedures were followed:

1. Open the admin application.
2. Select the "BORROW BOOK" button.
3. Scan or enter the ISBN of the book.
4. Set the expected date of return of the book.
5. Verify the student identification via username or QR Code.
6. Verify the approval of the admin via username or QR Code.
7. Click the "Borrow Book".

For the returning of a book, the following procedures were followed:

1. Open the admin application.
2. Select the "RETURN BOOK" button.

Sample

3. Double click the borrowing transaction information.
4. Verify the borrower identification via username or QR Code.
5. Verify the approval of the admin via username or QR Code.
6. Click the "Return Book".

This procedure was for the time in and time out of the student, the "Student Application" was acknowledged and verified by the QR code of the student in order to time in and out inside the library.

For the time in and time out, as long as the open application was the student application, the following procedures were followed:

1. Scan the QR code of the student.
2. Wait for the confirmed prompt to display.

In this section, a series of tests were listed to ensure that the project was functioning in terms of 80% functional, accuracy and reliability of data according to the research objectives. The system was tested with the guidance of general parameters such as time consumed in doing transactions using the library management system kiosk (by minutes), time and date of transactions, data of the students, data of the books and type of transaction requested.

For this study the researchers conducted a series of testing procedures in line with the study's objectives such as;

1. Logging in and out of registered students with the parameters time and date. The researchers tested and recorded the logging in and out of registered and unregistered students using their QR code for different times.

2. Reducing the consumed time per library transactions with the parameters of time consumed using the kiosk (by minutes) and type of transaction requested. The researchers recorded the minutes consumed in making transactions using the library management system kiosk.

3. Recording all the needed data with the parameters of student and books data, type of transaction, and time and date of transactions. Researchers tested taking in correct and incorrect data in the prototype for testing of reliability and accuracy of data that can be recorded in the system.

Other testing procedures were also conducted to affirm that the system was working with functionality, reliability, and accuracy.

The following were the trials conducted to test the functionality of the project such as registering the accounts and books and performing a verified transaction.

1. The scanner can scan a student QR code and ISBN barcode.
2. The student can make transactions with admins approval using the kiosk.
3. The student can make transactions to the kiosk.
4. The admin can make transactions to the kiosk.

The following were the trials conducted to test the reliability of the project such as filling of data, taking the chosen transaction, update of available books, and gathering correct data.

1. The system performed for 13 hours.
2. The system can change the number of available books per transaction.

Sample

3. The system will take the requested transaction of the user.
4. The system will take book data of the student chosen book for borrowing.

The following are the trials to be conducted to test the accuracy of the project such as correct logging date and time and correct reading of ID.

1. The scanner can read the student QR code and ISBN barcode correctly.
2. The system can reject the borrowing of the same book ID of a student.
3. The system can save the correct time and date of the student log.
4. The system can check if the borrower ID is the same as the returnee ID.

The aim of this study was applied. The researchers were able to develop a library management system for Dasmariñas East Integrated High School-Junior High to achieve a less-time consuming trivial due to manual usage of resources. Data were collected directly by the researchers, as they used primary research data, they gathered relevant and significant data for the study by conducting a survey. They used a quantitative research method for objectivity and accuracy of the results. All data were taken in a field for real-world setting and longitudinal timescale to gather at several points in time to conclude the functionality, accuracy, and reliability of the system. For this study, descriptive design was used. Researchers used flexible research design as different aspects may develop through the data collection process. After all data had been gathered, quantitative data analysis were used to apprehend the correlation of variables for the study.

Sample

Evaluation Procedure

Upon the accomplishment of creating the prototype and passing the series of tests conducted by the researchers, evaluation for the proposed solution of the study which was the implementation of automated library management system was the next step.

The researchers considered nine (9) secondary school students and one (1) librarian with a total of ten (10) respondents. They were chosen to be the respondents because they were the ones that often interacted with the project and the librarian had the most knowledge in the process inside the library.

The research project was evaluated by respondents using the following procedures:

1. The researchers explained to the total of ten (10) respondents that consisted of nine (9) secondary level students and a librarian, the capabilities, operating procedures, guidelines of the project and demonstrated how the prototype works.
2. The respondents operated the prototype with the guidance of the researchers, for the respondents to fully analyze the functions of the prototype properly.
3. As the respondents comprehend and tested the prototype, the Criteria Evaluation Form of the TUP for the prototype were given to the respondents to have a proper basis in rating the project and the researchers explained to the respondents on how to evaluate the TUP Criteria.

Evaluation Form for the prototype with the basis of Likert Scale for ratings.

Sample

Upon evaluation, the researchers gathered the data and proceeded to analyzation of ratings afterwards. The research project was evaluated using the approved evaluation system instrument for prototype, the TUP Criteria Evaluation Form for prototype which consisted of the following criteria: the functionality that is based on its performance; aesthetics that is based on physical appearance of the prototype and graphical user interface of the software application; workability that refers to the availability of materials; durability that is based on the quality of the prototype; and safety that refers to the absence of hazardous and dangerous materials. The gathered data from the TUP Criteria Evaluation Form for prototype were calculated by mean per criteria in the evaluation form: The Descriptive Interpretation of the Mean with a numerical rating of 4.51-5.0 for Highly Acceptable which was the highest descriptive rating, 3.51-4.0 for Very Acceptable, the average descriptive rating which was 2.51-3.0 for Acceptable, 1.51-2.0 which was Fairly Acceptable, and 0.51-1.0 which was Not Acceptable for the lowest descriptive rating were used as the guide for rating. In each criteria the lowest rating should be 3.51-4.0 and an overall mean of 4.5 for the prototype to be acceptable. As the researchers gathered all the needed evaluation forms, they proceeded in summarizing the ratings for the finalization of the results.

Sample

Table 1 showed the Likert scale which was used as a measurement tool for evaluating the prototype. The highest rating was 5.0 that corresponded to "Highly Acceptable", the average rating that corresponded to "Acceptable" was 3.0 and the lowest was 1.0 that corresponded to "Not Acceptable".

Table 1

Likert Scale

Numerical Scale	Descriptive Rating
5.0	Highly Acceptable
4.0	Very Acceptable
3.0	Acceptable
2.0	Fairly Acceptable
1.0	Not Acceptable

Sample

Table 2 showed the descriptive interpretation of the mean for interpreting the results of each computed mean. The rating ranging from 4.51 to 5.0 means that the project was "Highly Acceptable", 3.51 to 4.0 which means the project was "Very Acceptable", 2.51 to 3.0 indicated that the project was "Acceptable", 1.51 to 2.0 rating means that it was "Fairly Acceptable", and 0.51 to 1.0 signified the project was "Not Acceptable".

Table 2

Descriptive Interpretation of the Mean

Numerical Rating	Interpretation
4.51-5.0	Highly Acceptable
3.51-4.0	Very Acceptable
2.51-3.0	Acceptable
1.51-2.0	Fairly Acceptable
0.51-1.0	Not Acceptable

Sample

CHAPTER 4

RESULTS AND DISCUSSION

This chapter contained the Project Description, Project Capabilities and Limitations and Project Test Results.

Project Description

The Automated Library Management System in Dasmariñas East Integrated High School was a kiosk machine that was used to improve the transactions in the library. The machine offered faster and easier transactions such as registration of students, login/logout, borrowing and returning of books. The kiosk machine had five main functions, the registration of students, the login of students, the logout of students, the borrowing of books and the returning of books.

The registration of the student was located at the admin application. It was used to gather and save the important information of students such as name, year and section, contact information and account information for the verification of the student in every transaction and for the student to have a faster transaction in the library facility.

The login and logout transaction of the student was located at the student application. In this part the student had a choice on how to verify their log. It was either by the use of their registered username and password or by the scanning of their QR Code. The student application also had a search window for the students to be able to check if the book was available in the facility or if the book was available for borrowing.

The borrowing of the book function was located at the admin application. The student brought the book to the kiosk machine and with the guidance of the librarian the ISBN Barcode was scanned, after the information of the chosen book to be displayed and

the availability of the book was shown. The verification of the student and admin was needed for the transaction to be saved. And for the return of the book function, a table was displayed containing the list of books and borrower's details. The admin clicked the borrowing information for either the extension of due date or returning the book. The student and admin verification were needed for both transactions. *Figure 15* showed the prototype of the Automated Library Management System Kiosk.

Figure 15. Prototype of Automated Library Management System

Sample

Project Structure

Figure 16 showed the initial case of the kiosk machine. The machine case was made up of 8mm thick plywood. The reason for the chosen material was its availability to the market and for the components to be secured intact and stay in place. The mini PC and Barcode Scanner were attached inside the kiosk. The back side had a door for easy access to the wire connections and mini PC. The monitor case had a dimension of 40 by 44.3 cm. The layers below served as cabinets for some books. The case had a base to ensure and maintain the steadiness of the kiosk machine. The kiosk had a 1.25-inch nylon caster wheel for the easy transporting of the machine.

Figure 16. Unfinished Case of the Project

Sample

Figure 17 showed the connection of components. The barcode scanner had a USB type-B cable connected to the scanner and a USB data line connected to the mini PC that were used for the scanning of ISBN barcode and student QR Code. The monitor had a connection of two type-C and a mini HDMI. The one type-C was for the power source of the monitor, the second type-C had a USB cable that was connected to the mini PC for the touch function of the monitor and the mini HDMI had a HDMI cable connected to the mini PC for the viewing function of the monitor. The monitor was used as the interface of the user to the system. The barcode scanner and mini PC were located inside the kiosk cabinet.

Figure 17. Connection of Components

Sample

The student application had a main view which was shown in *figure 18*. The student login consisted of one input box for the reading of the scanned student QR code. It also consisted of four labels. Three labels were always shown for the display of current date, current time and total number of students inside the facility. One label was for the information of registered students such as name, year and section and greetings either "Welcome!" or "GoodBye!". If the reading was unrecognized, it showed an error message. The label was shown only when the system recognized readings from the scanner. The window consisted of a "Manual Login" button that navigated to the manual log window of the student, "Search Book" button that navigated to the searching window of the student and the quit button for the closing of the student application.

Figure 18. Main View of Student Application

Sample

As shown in *figure 19* was the manual log of the student. The window contained two input boxes for the registered username and password of the student. The password input had a “Show” button for showing the input of the user. The “LOGIN” button was clicked by the registered student when the username and password was filled. The information of the registered student was shown in the main view of the student. The “Automatic Login” button navigated the student application to the main view of the student.

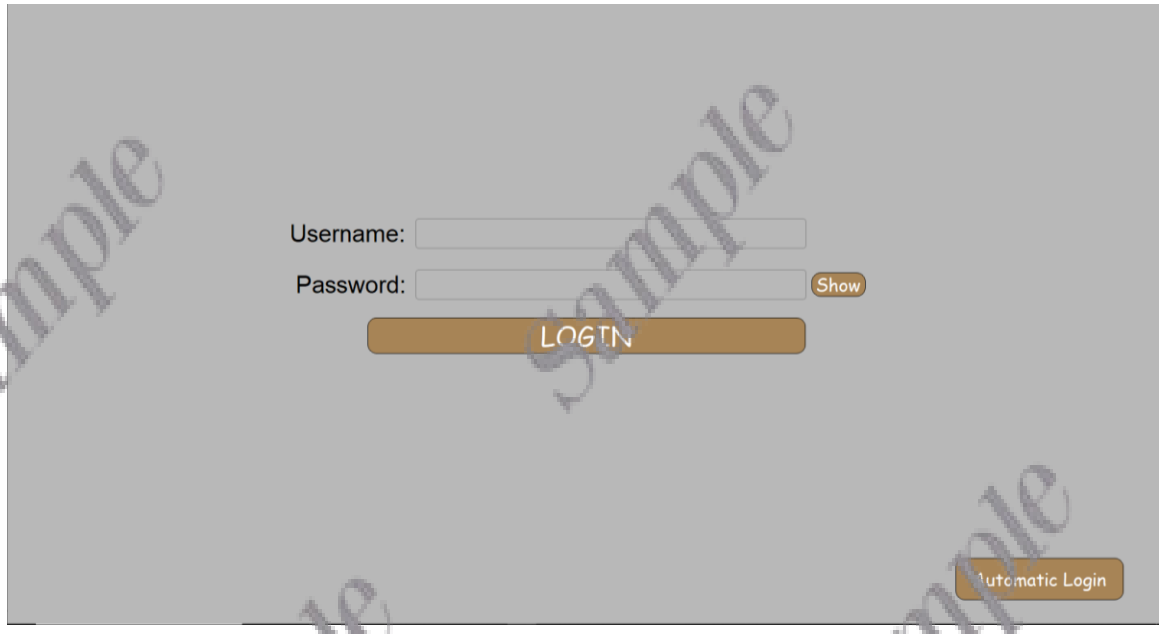


Figure 19. Student Manual Log

Sample

The *figure 20* showed the searching window of the student application. It consisted of an input box and "Search" button for the searching of either title or author. The table with Title, Author and ISBN was filled if the searched data matched any of the registered books. The box that contained labels was for the clicked book data. The information of the registered book was shown and if it was available for borrowing or not. The refresh button at the top of the table was for the refreshing of data in the table. The "Back" button navigated to the main view of the student application.

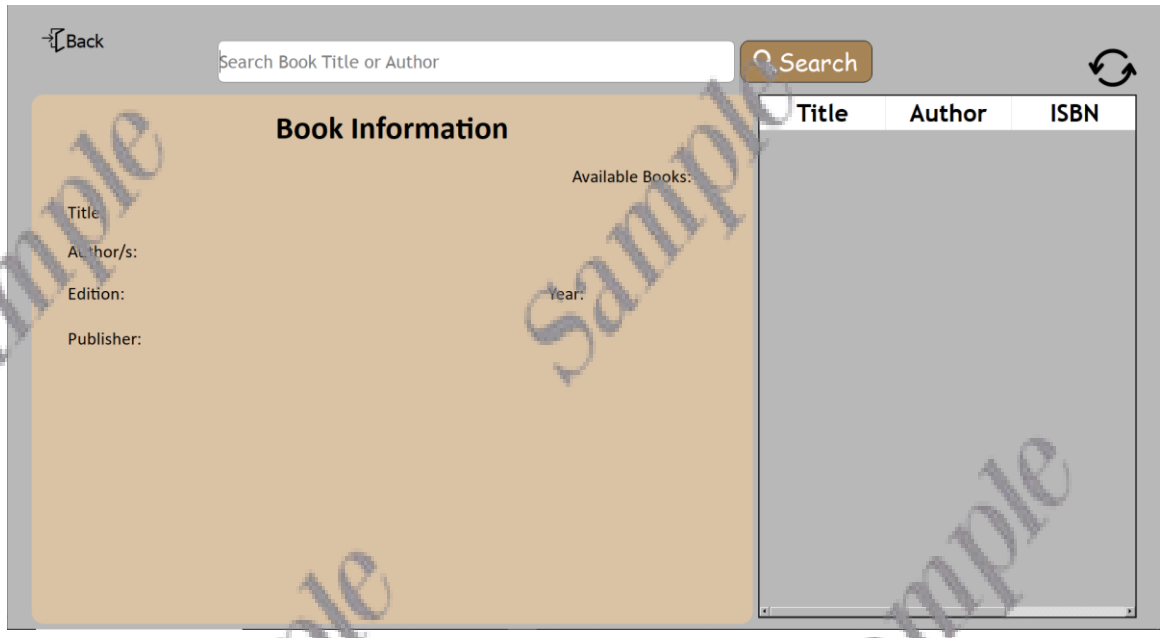


Figure 20. Student Search Window

Sample

Figure 21 showed the admin application main view which consisted of six main buttons. The "STUDENT REGISTRATION" that navigated to the student registration window. The "BOOK REGISTRATION" showed an input window for the scanning of the ISBN barcode. The "BORROW BOOK" for the navigation to borrowing window. The "RETURN BOOK" that navigated to the return of the book window. "BOOK SCHEDULE" for the navigation to list of schedule book windows. "STUDENT PRE-REGISTERED" for the navigation to list of pre-registered students.

There was also a button at the upper right part of the window named "ADMIN SETTINGS" that was used to navigate to the admin settings navigation window. And a quit button at the left part to close the admin application.

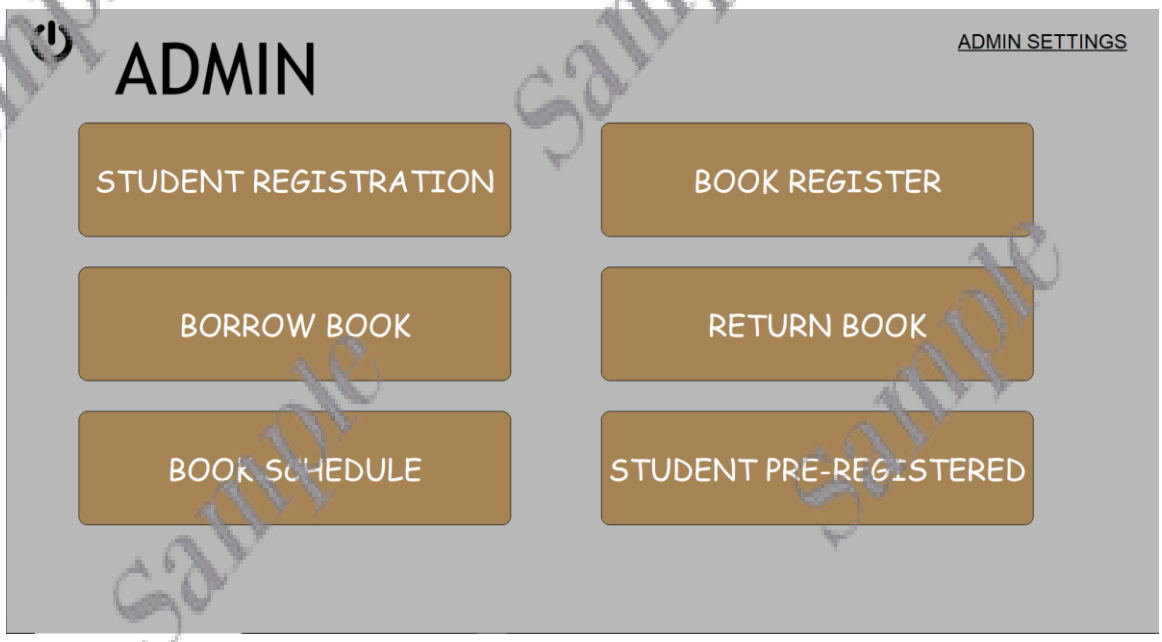


Figure 21. Main View of Admin Application

The windows in *figure 22* were the pages present in the admin application mainly used as navigators. The admin setting window has three main buttons: the "admin setting" that will navigate to change of the admin window, the student setting button that will navigate to the student setting navigation window and book setting window that will navigate to book setting navigation window. There was also a LOGOUT button in the upper right part to go back to the admin main view.

The book settings window had a "BOOK LIST", "BORROW HISTORY" and "BOOK UPDATE" buttons for the navigation to list of books, history of borrowed book and update of quantity on book windows respectively. The student settings had a "LIST OF STUDENTS" and "STUDENT HISTORY" buttons for student list and history of student logging in and out windows respectively. Both book setting and student setting had a back button that would go back to the admin setting window when clicked.

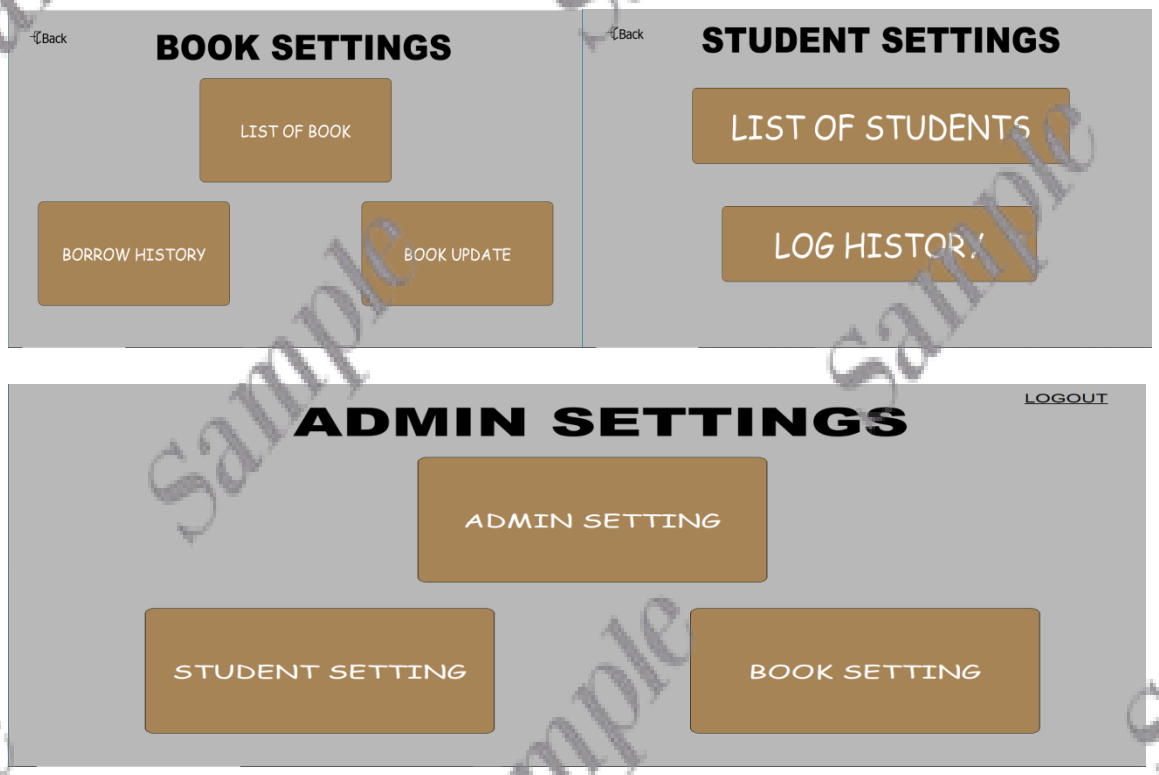


Figure 22. Navigation Pages of Admin Application

Sample

The *figure 23* showed an admin window that had an input for name, username, password and confirmation of password. The password and confirm password input had a hidden type of input in order to show the input of the user. The “View” button beside the input must be checked.

The "Change Admin" button saved the data if the passwords were the same. The "Back" button will go back to the admin settings window.

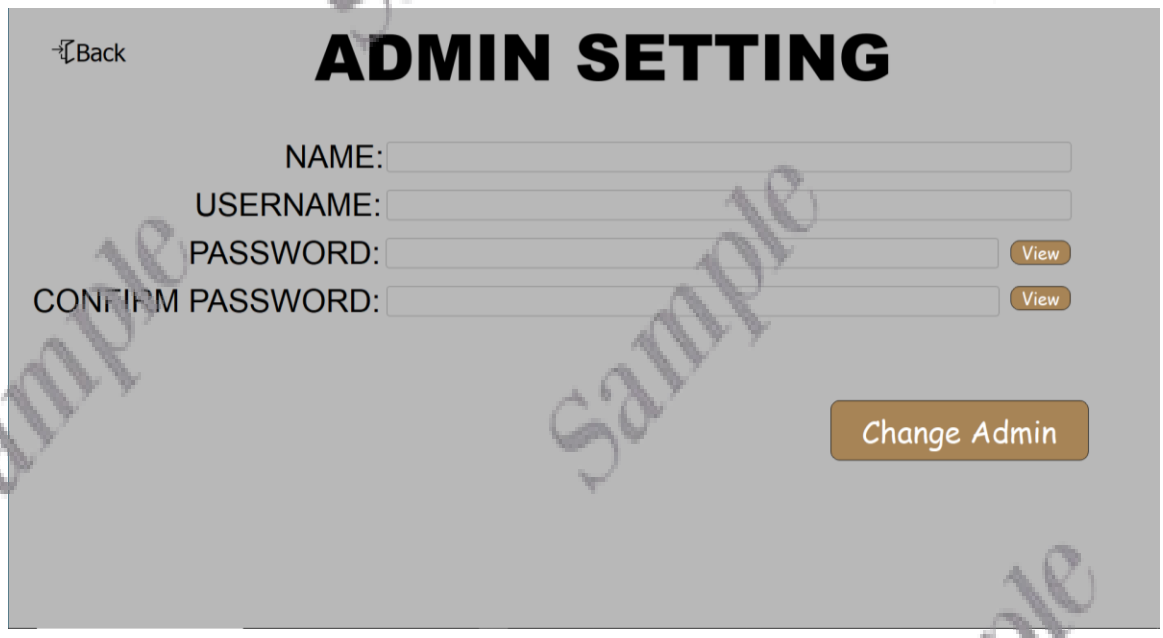


Figure 23. Change Admin Window

Sample

Figure 24 showed the admin login window consisted of three input boxes for the QR code scan, username and password. Beside the password input was the "Show" button for showing the input of the user in readable format. And a "LOGIN" button, it checked if the inputs were the same with the registered username and password of the admin. The "Back" button navigated back to the main view of the admin application.

Figure 24. Admin Login

Sample

The book update window in *figure 25* consisted of one input for the ISBN. It can either be by scanned ISBN barcode or by entering the ISBN manually. When entered if the book was registered it showed the information in the labels below. There was also a spin-box for the input of quantity; the minimum set for the spin box was one. The "Update Book" checked if the quantity input was greater than the total number of borrowed book IDs. It declined the update if the quantity was less than the number of borrowed book IDs.

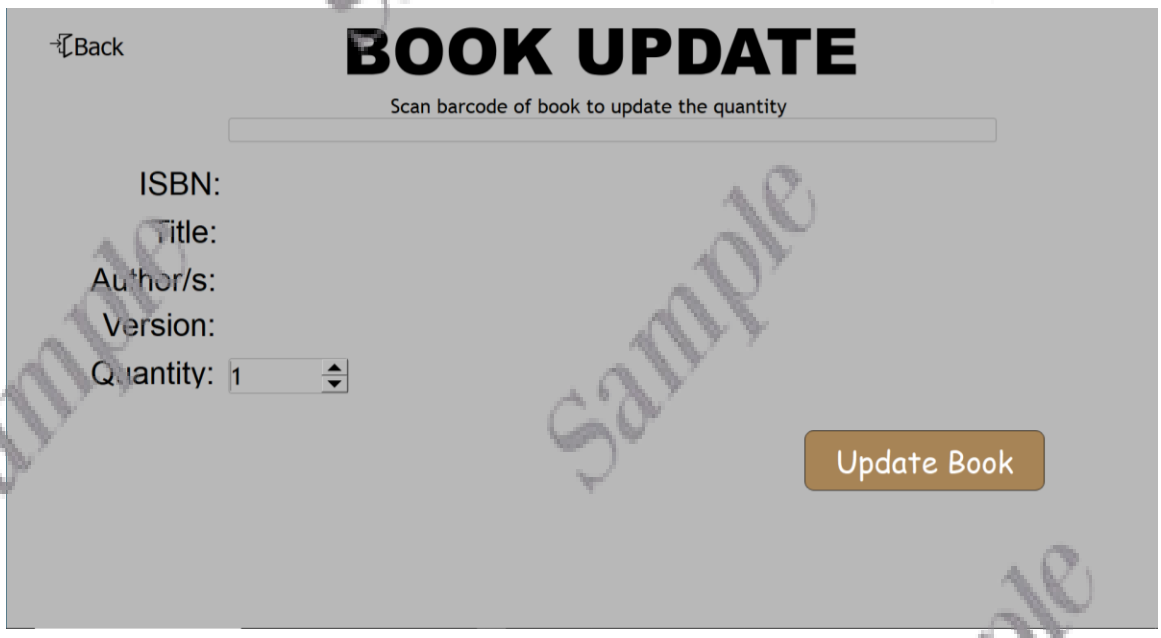
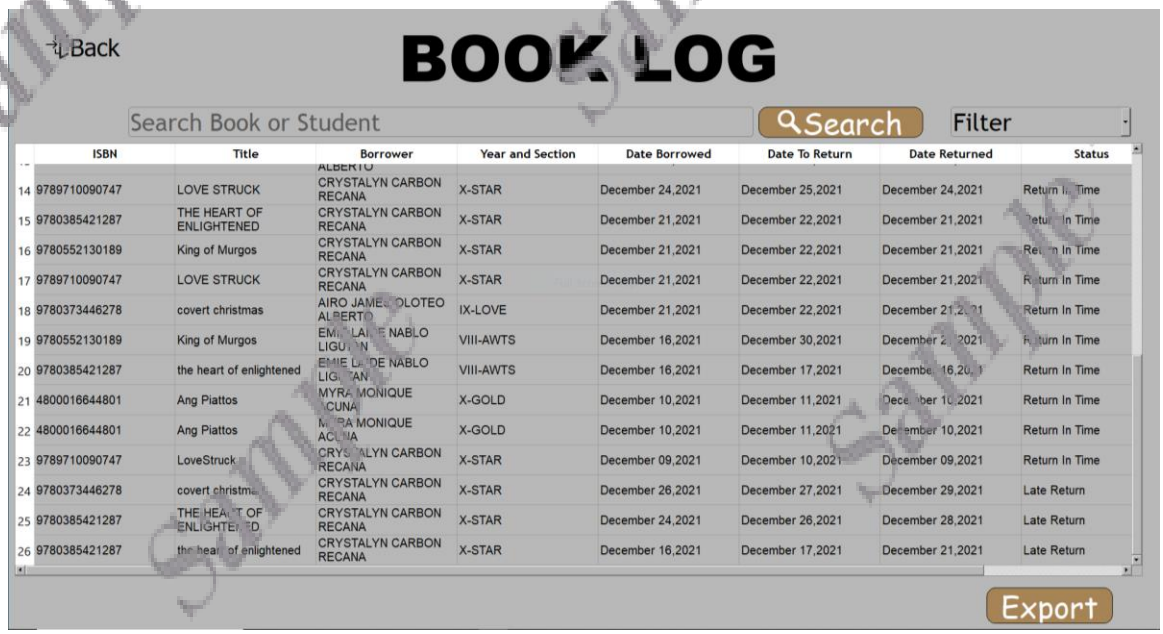


Figure 25. Update Quantity

The table in *figure 26* showed the information of borrowing transactions such as ISBN, title of the book, borrower name, year and section of the borrower, date borrowed, date set to return the book, date that the book returned and the status of the borrowing transaction either return in time or late return. There was also a search input and search button for the searching of borrower name or book title.

A combo-box was present for the filter in the table, it had three choices the "Filter" that showed all the borrowing transaction information, the "Return In Time" that showed only the return in time status and the "Late Return" that showed only the list of information that the status was late return.

The "Export" button was for the exportation of listed information in the table. And the "Back" button for the back navigation to book setting window.



	ISBN	Title	Borrower	Year and Section	Date Borrowed	Date To Return	Date Returned	Status
14	9789710090747	LOVE STRUCK	CRYSTALYN CARBON RECANA	X-STAR	December 24,2021	December 25,2021	December 24,2021	Return In Time
15	9780385421287	THE HEART OF ENLIGHTENED	CRYSTALYN CARBON RECANA	X-STAR	December 21,2021	December 22,2021	December 21,2021	Return In Time
16	9780552130189	King of Murgos	CRYSTALYN CARBON RECANA	X-STAR	December 21,2021	December 22,2021	December 21,2021	Return In Time
17	9789710090747	LOVE STRUCK	CRYSTALYN CARBON RECANA	X-STAR	December 21,2021	December 22,2021	December 21,2021	Return In Time
18	9780373446278	covert christmas	AIRO JAMES OLOTEO ALBERTO	IX-LOVE	December 21,2021	December 22,2021	December 21,2021	Return In Time
19	9780552130189	King of Murgos	EMIE LAIZE NABLO LIGUTAN	VIII-AWTS	December 16,2021	December 30,2021	December 21,2021	Return In Time
20	9780385421287	the heart of enlightened	EMIE LAIZE NABLO LIGUTAN	VIII-AWTS	December 16,2021	December 17,2021	December 16,2021	Return In Time
21	4800016644801	Ang Piattos	MYRA MONIQUE ACUNA	X-GOLD	December 10,2021	December 11,2021	December 10,2021	Return In Time
22	4800016644801	Ang Piattos	MYRA MONIQUE ACUNA	X-GOLD	December 10,2021	December 11,2021	December 10,2021	Return In Time
23	9789710090747	LoveStruck	CRYSTALYN CARBON RECANA	X-STAR	December 09,2021	December 10,2021	December 09,2021	Return In Time
24	9780373446278	covert christmas	CRYSTALYN CARBON RECANA	X-STAR	December 26,2021	December 27,2021	December 29,2021	Late Return
25	9780385421287	THE HEART OF ENLIGHTENED	CRYSTALYN CARBON RECANA	X-STAR	December 24,2021	December 26,2021	December 28,2021	Late Return
26	9780385421287	the heart of enlightened	CRYSTALYN CARBON RECANA	X-STAR	December 16,2021	December 17,2021	December 21,2021	Late Return

Figure 26. Borrowed Log

Figure 27 showed a table consisting of the information of the book that includes ISBN, title of the book, author of the book, overall quantity, number of available books that can be borrowed, publisher, edition, year published and number of pages of the book. There was also a search input and button for the searching of book title or ISBN that can be scanned or typed manually. A combo-box was present for the filter of data, it had three choices the "Filter" that shows all the information of registered books, the "Available Online" that shows the list of books already uploaded online and the "Not Available Online" that shows the list of books that were not yet uploaded for the online website.

The "Delete" button deleted the book information if the book was not currently borrowed. The "Export" button was for the export of listed data in the table in excel file. The "Upload" button that was enabled only when the combo box was on the Not Available Online choice, it exports a CSV file that consists of some book information. And the "Back" button for the back navigation to book setting window.

Figure 27. Book Information

The window in *figure 28* had a label that displayed ISBN and BARCODE cannot be EDITED. There was an input for title, author, edition, publisher, page count and year published. The information of the clicked book ID from the table was already available in the inputs.

The "Download Barcode" was for the re-downloading of the barcode. "Apply Edit" saved the changes made in the inputs. And the "Back" button for the back navigation to the student information window.

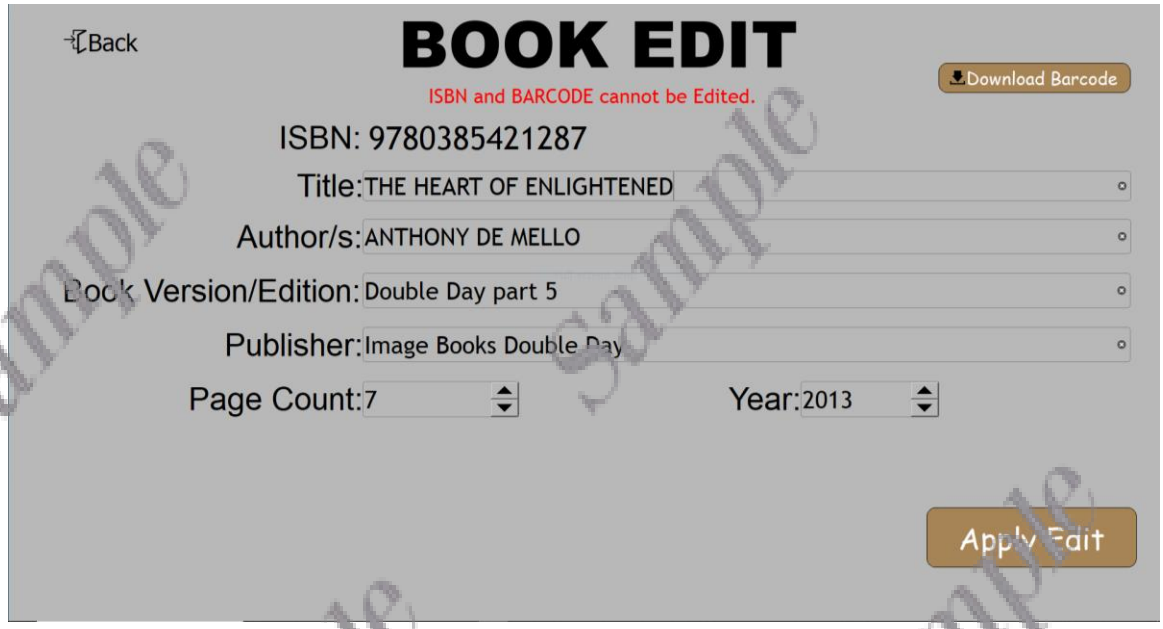


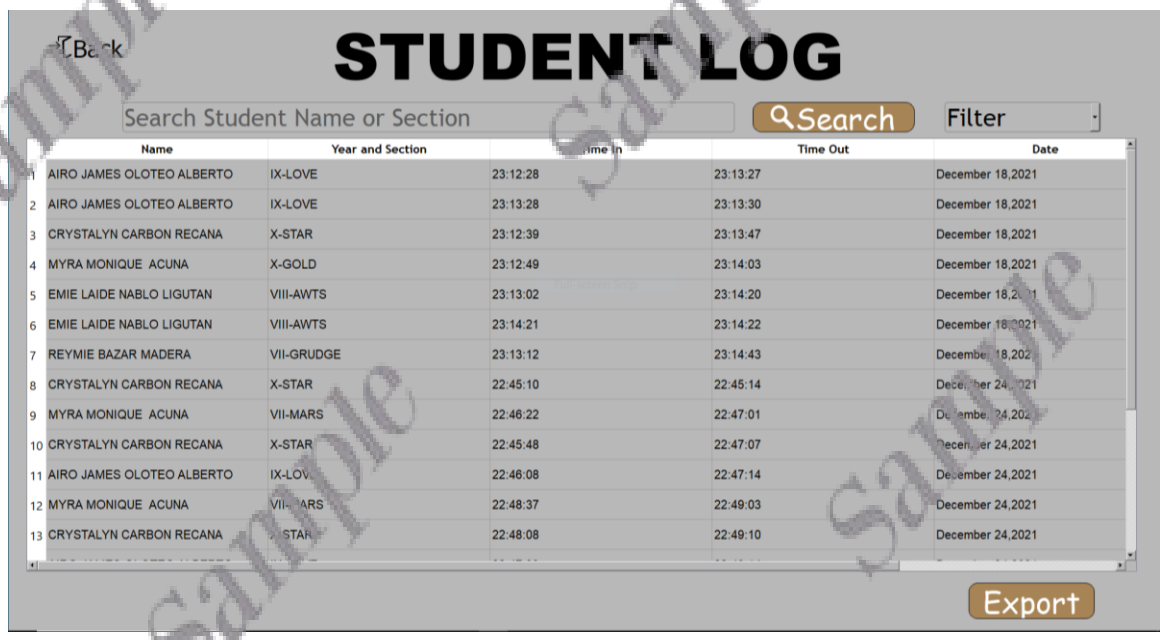
Figure 28. Edit Book Information

Sample

Figure 29 consisted of a table that showed the information of the log history of the student in the library such as student name, year and section, time in, time out and date of the log. There was also a search input and search button for the searching of student name or section.

A combo-box was present for the filter in table, it had three choices the "Filter" that showed all the student log, the "On this Day" that showed only the logs in the current data and the ``By Month that showed only the list of logs of certain month depending on the choice.

The "Export" button was for the exportation of listed information in the table. And the "Back" button for the back navigation to the student setting window.



	Name	Year and Section	Time In	Time Out	Date
1	AIRO JAMES OLOTEO ALBERTO	IX-LOVE	23:12:28	23:13:27	December 18,2021
2	AIRO JAMES OLOTEO ALBERTO	IX-LOVE	23:13:28	23:13:30	December 18,2021
3	CRYSTALYN CARBON RECANA	X-STAR	23:12:39	23:13:47	December 18,2021
4	MYRA MONIQUE ACUNA	X-GOLD	23:12:49	23:14:03	December 18,2021
5	EMIE LAIDE NABLO LIGUTAN	VIII-AWTS	23:13:02	23:14:20	December 18,2021
6	EMIE LAIDE NABLO LIGUTAN	VIII-AWTS	23:14:21	23:14:22	December 18,2021
7	REYMIE BAZAR MADERA	VII-GRUDGE	23:13:12	23:14:43	December 18,2021
8	CRYSTALYN CARBON RECANA	X-STAR	22:45:10	22:45:14	December 24,2021
9	MYRA MONIQUE ACUNA	VII-MARS	22:46:22	22:47:01	December 24,2021
10	CRYSTALYN CARBON RECANA	X-STAR	22:45:48	22:47:07	December 24,2021
11	AIRO JAMES OLOTEO ALBERTO	IX-LOVE	22:46:08	22:47:14	December 24,2021
12	MYRA MONIQUE ACUNA	VII-MARS	22:48:37	22:49:03	December 24,2021
13	CRYSTALYN CARBON RECANA	X-STAR	22:48:08	22:49:10	December 24,2021

Figure 29. Student Log

Sample

The table in *figure 30* showed the information of the student that included the full name of the student, year and section, phone number, email, and username of the student. There was also search input and search button for the searching of section or student name that can be scanned or typed manually. A combo-box was present for the filter in table, it had three choices the "Filter" that showed all the information of registered students, the "Available Online" that showed only the list of students already uploaded online and the "Not Available Online" that showed only the list of students that were not yet uploaded for the online website.

The "Delete" button deleted the student information if the student had no pending borrowing transaction. The "Export" button was for the exportation of listed information in the table as excel format. The "Upload" button that was enabled only when the combo box was on the Not Available Online choice, it exported a CSV file that consisted of some student information that was imported to the website. And the "Back" button for the back navigation to the student setting window.

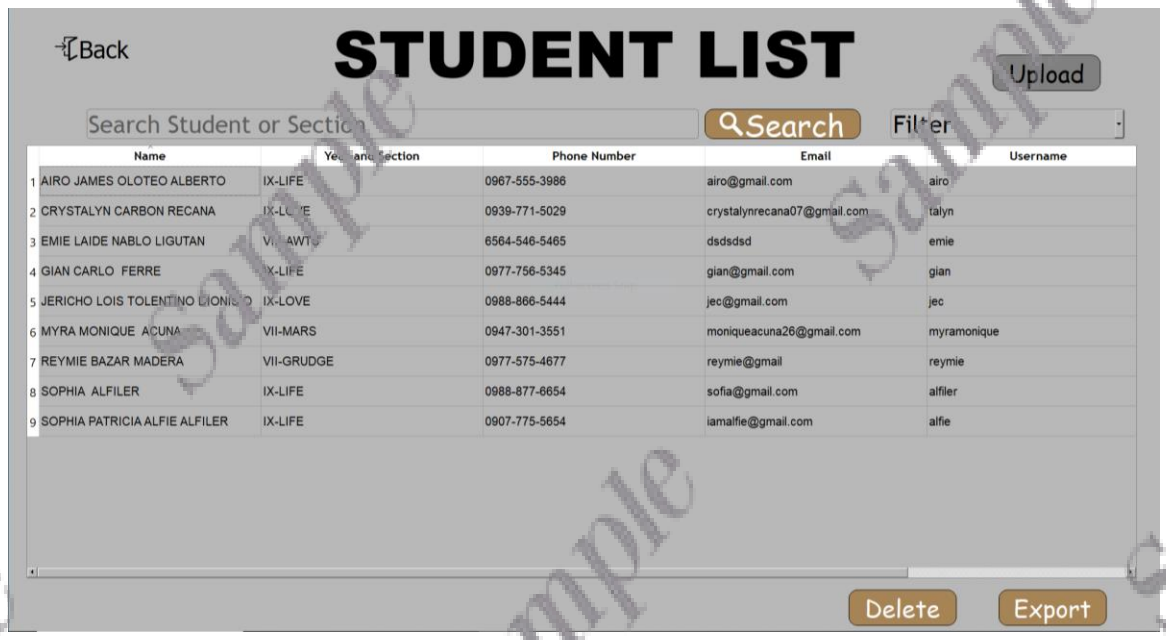


Figure 30. Student Information

For the window of editing of student information, the full name of the student cannot be edited. There was an input for year, section, phone number, email, username, and password. The password had a "Show" button beside it, to show the input of the password in readable format. The information of the clicked student ID from the table was already available in the inputs.

The "Download QR" was for the re-downloading of the student QR code. "Apply Edit" saved the changes made in the inputs. And the "Back" button for the back navigation to the student information window. Window visual was shown in *figure 31*.

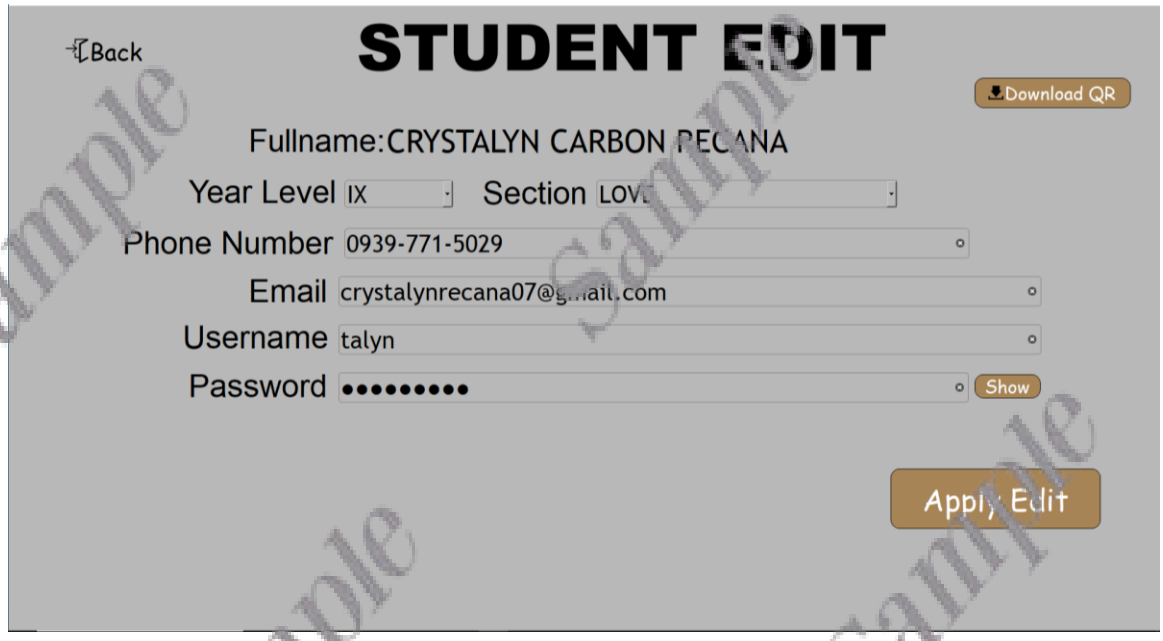


Figure 31. Edit Student Information

Sample

As the "BOOK REGISTRATION" button was clicked, it opened a small window shown in *figure 32* for the input of ISBN either by scanning or by manually typing. If the "Ok" was clicked the system was checked if the input was a 10 or 13-digit number. The "Cancel" declined the attempted book registration transaction.

Figure 32. ISBN Scanning

Sample

The *figure 33* showed the book registration window. From the ISBN scanning the ISBN cannot be edited in this window. There were inputs shown first for the title and author. The author input had a checkbox beside for the adding of et.al at the end of listed authors and a "Apply" button for either adding or deleting the author to the list. As the "Proceed" button was clicked the system verified the inputs that were proceeded to inputs for the book edition, publisher, quantity, page count and year published. The "Register Book" was for the registration of books that saved the inputs of the user. The "View" button in the upper corner viewed the generated barcode. The "Back" button will go back to the main admin view. And the buttons beside navigated the window based on the choice of the user.

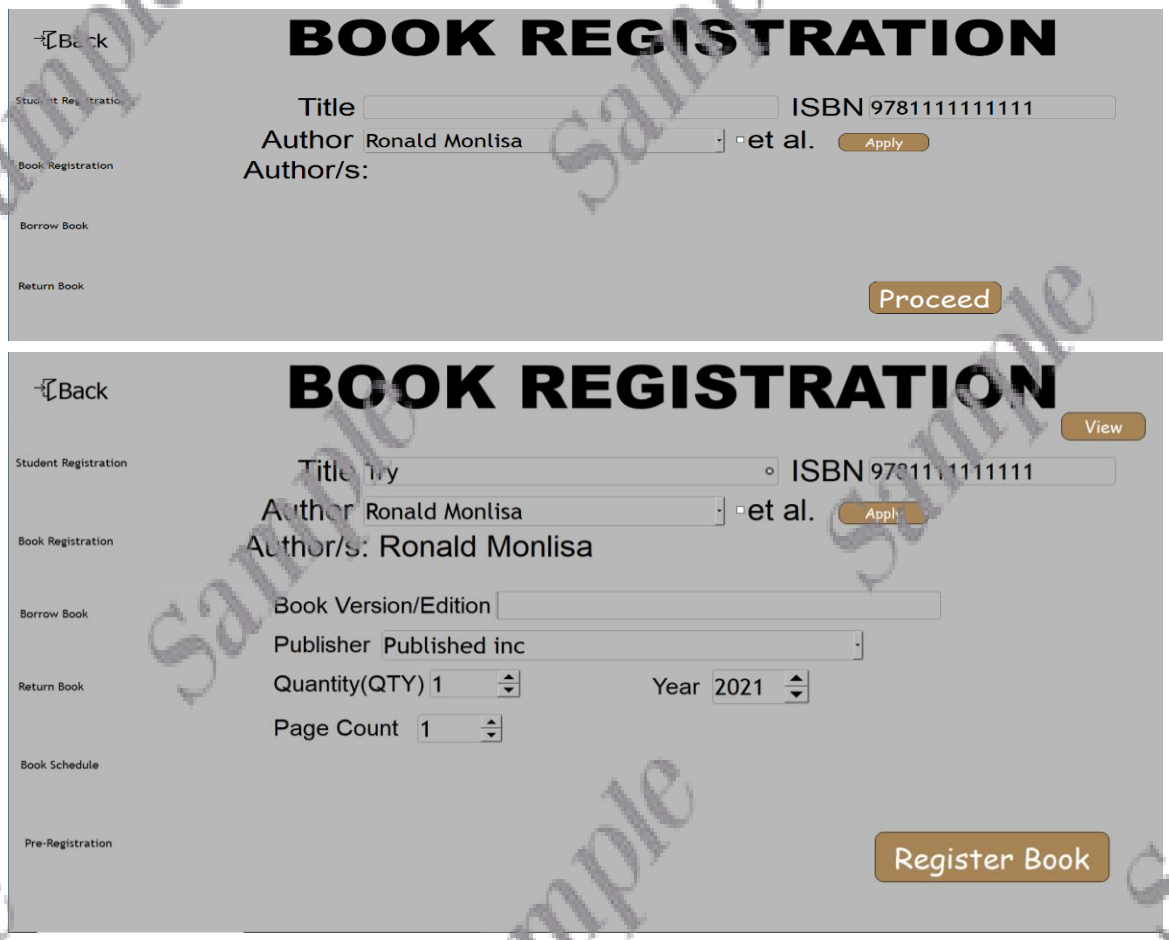


Figure 33. Book Registration

The photos in *figure 34* showed the student registration transaction window. There were four tabs with a total of eleven inputs. The first tab was for the personal identification of the student such as name and section, the second tab was for the contact information of the student such as phone number and email, the account registration with username and password, last tab was for the verification of the admin. The "View" button in the upper corner viewed the QR code. The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

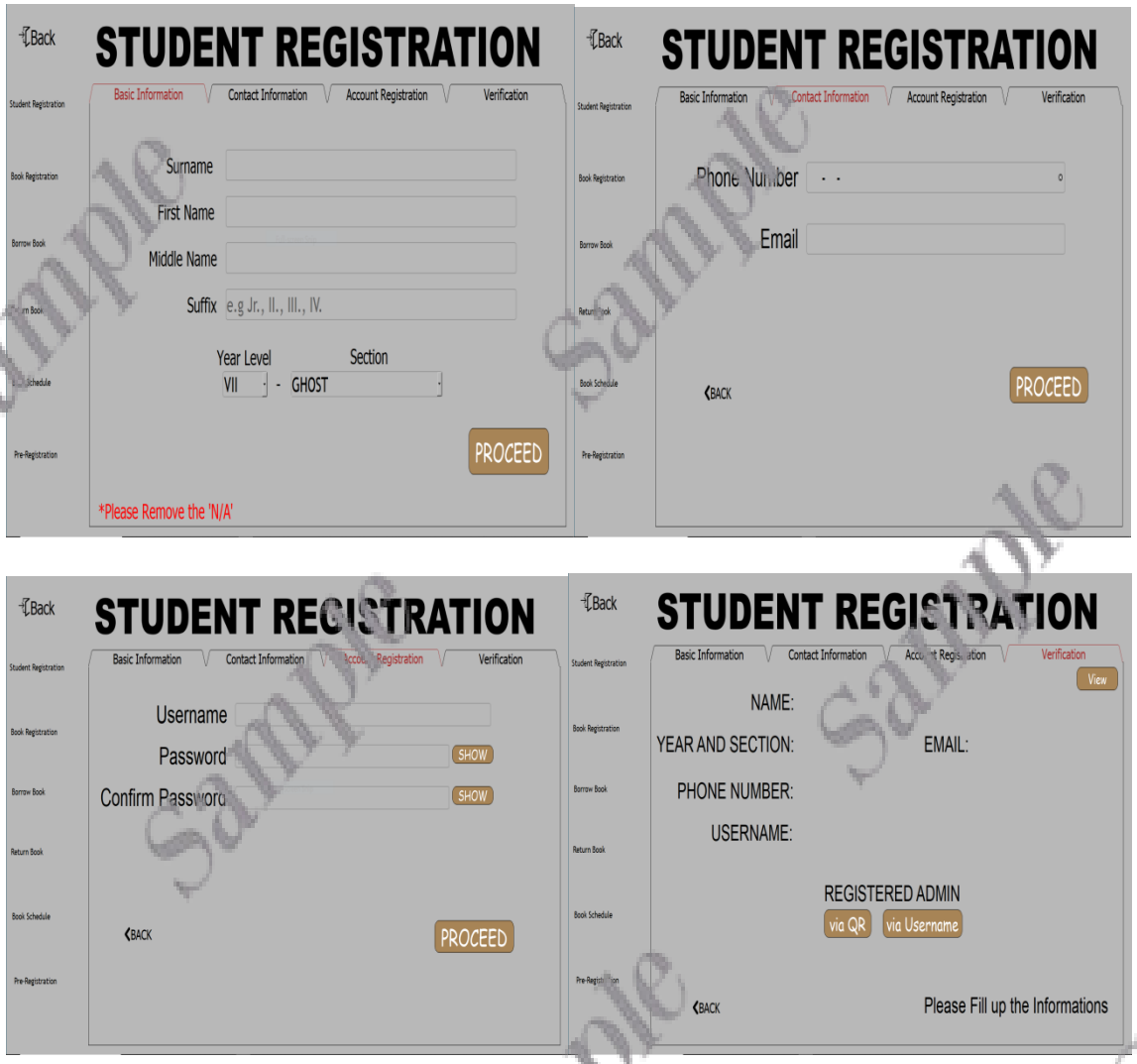


Figure 34. Student Registration

The f*igure 35* presented the table with a list of borrowed books. There was also a

search input and search button for the searching of book title or student name that can be scanned or typed manually. The "Extend Due" button was for the navigation for the extending of the book due date window when there was a chosen row in the table. The "Back" button will go back to the main admin view. And the buttons beside navigated the window based on the choice of the user.

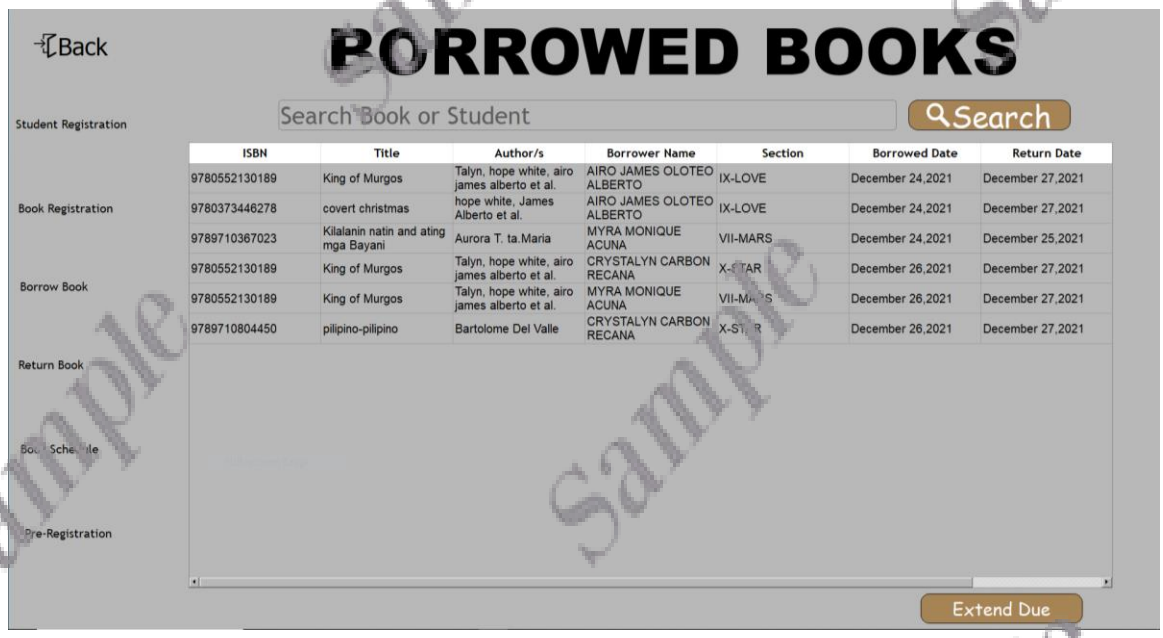


Figure 35. Borrow List

The borrowed book window shown in *figure 36* consisted of an input for the book ISBN. After scanning or typing the ISBN, the book information was shown at the labels below. For the student information to be shown, the student should choose verification either "via QR" or "via Username". There was also date input for the date to return. And two buttons below the "REGISTERED ADMIN" for the verification choice of admin. The "Borrow Book" button checked the data and confirmed the transaction.

The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

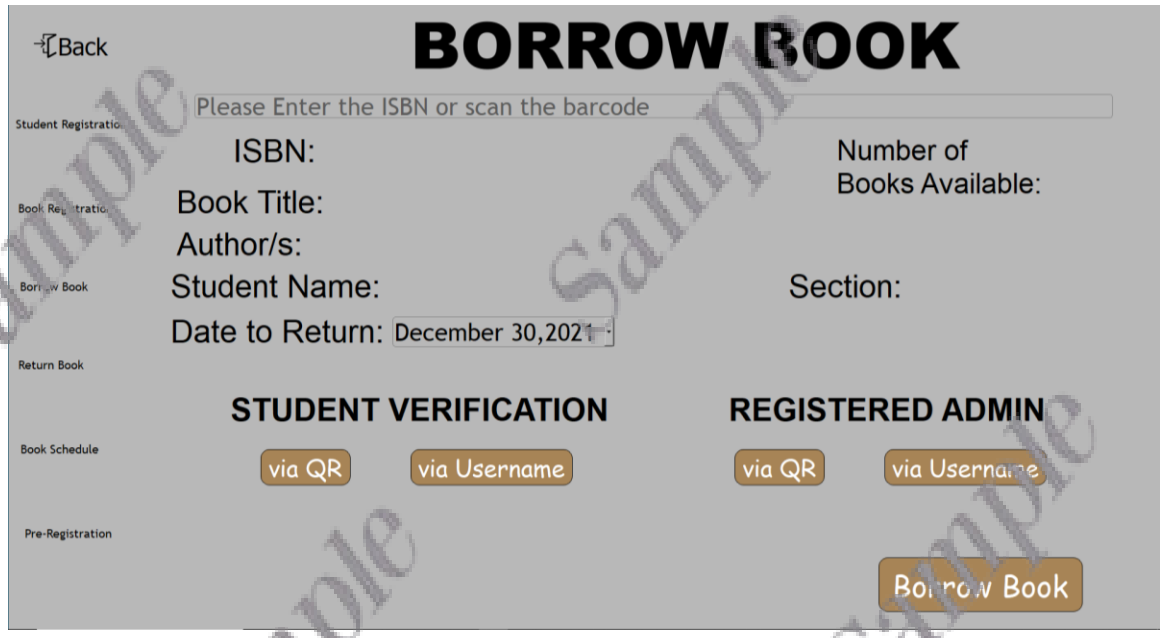


Figure 36. Borrow Book

The extension of the borrowing book window shown in *figure 37* consisted of an input for the new date to return. For the student information to be verified, the student should choose verification either "via QR" or "via Username". The two buttons below the "REGISTERED ADMIN" were for the verification choice of admin. The "Extend Due" button saved the data and confirmed the transaction.

The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

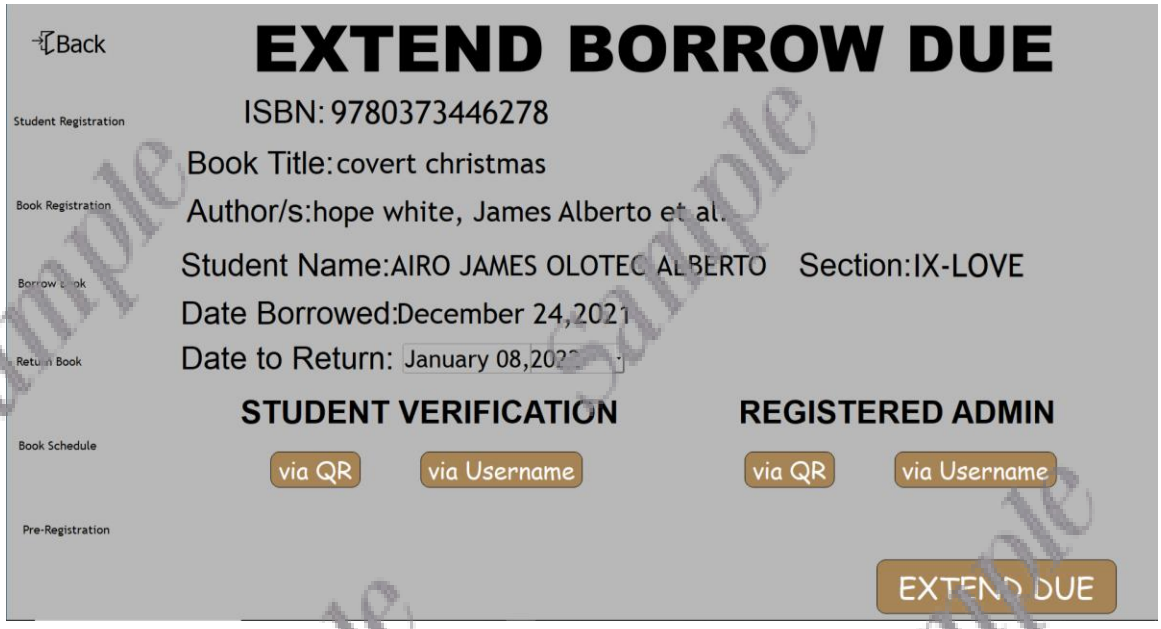


Figure 37. Extend Due Date

The window for returning the book was shown in *figure 38*. For the student to be acknowledged in returning the book, the student should choose verification either "via QR" or "via Username". The two buttons below the "REGISTERED ADMIN" were for the verification choice of admin. The "Return Book" button saved the data and confirmed the transaction.

The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

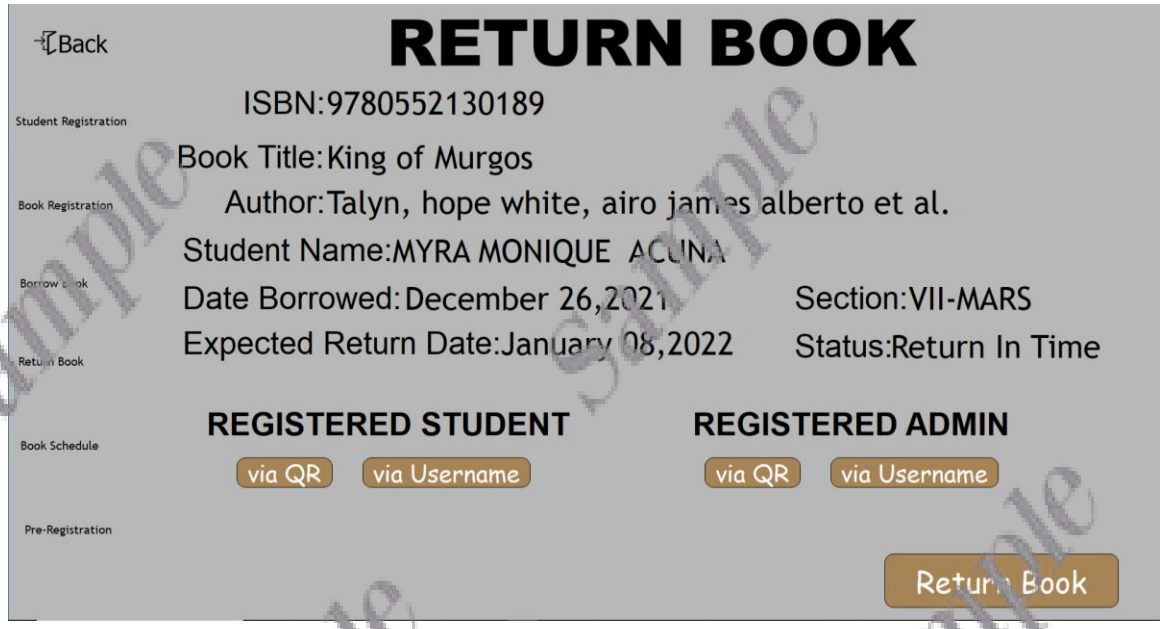


Figure 38. Return Book

The *figure 39* consisted of a table with scheduled transactions for borrowing. There was also a search input and search button for the searching of book title or student name that can be scanned or typed manually. The "Download" button was for the downloading of CSV files generated by the website to be imported in the desktop application. The "Decline" button deleted the borrowing schedule. There was a label below that displayed "Schedule with past due was automatically excluded", the system automatically checked if the date was past the current date.

The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

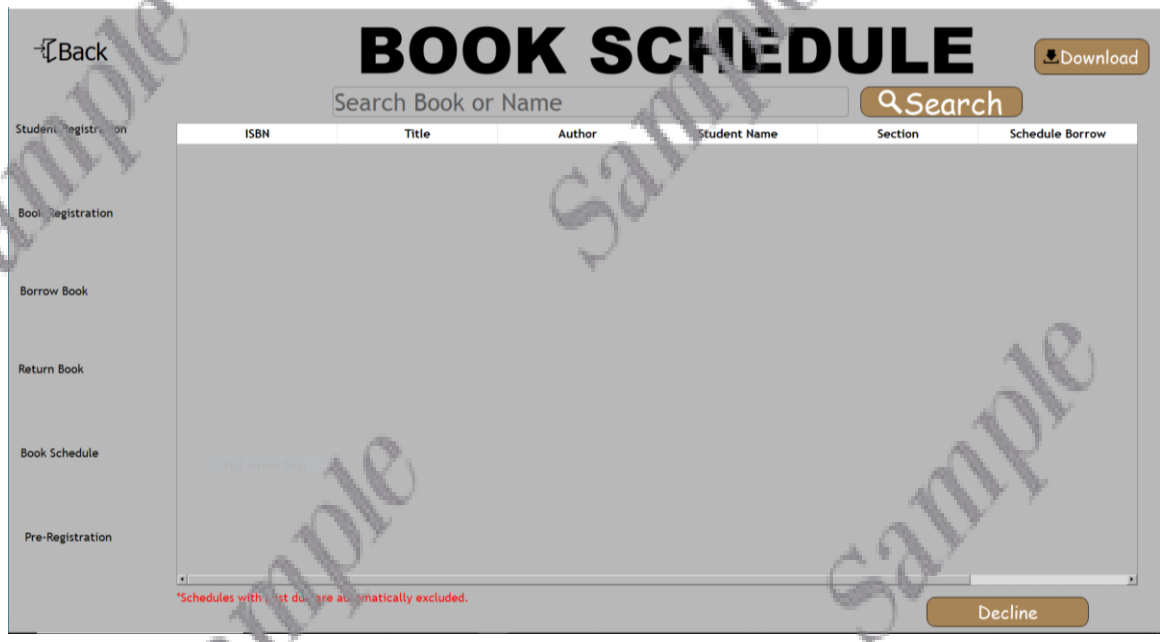


Figure 39. Book Schedule

Figure 40 consisted of a table with pre-registered student data. There was also a search input and search button for the searching of student name or section that can be scanned or typed manually. The "Download" button was for the downloading of CSV files generated by the website to be imported in the desktop application. The "Delete Application" button deleted the student application. There was a label below that displayed "Applications to be clicked was automatically deleted", that once the user double clicked the application it was deleted.

The "Back" button will go back to the main admin view. And the buttons beside the navigated window based on the choice of the user.

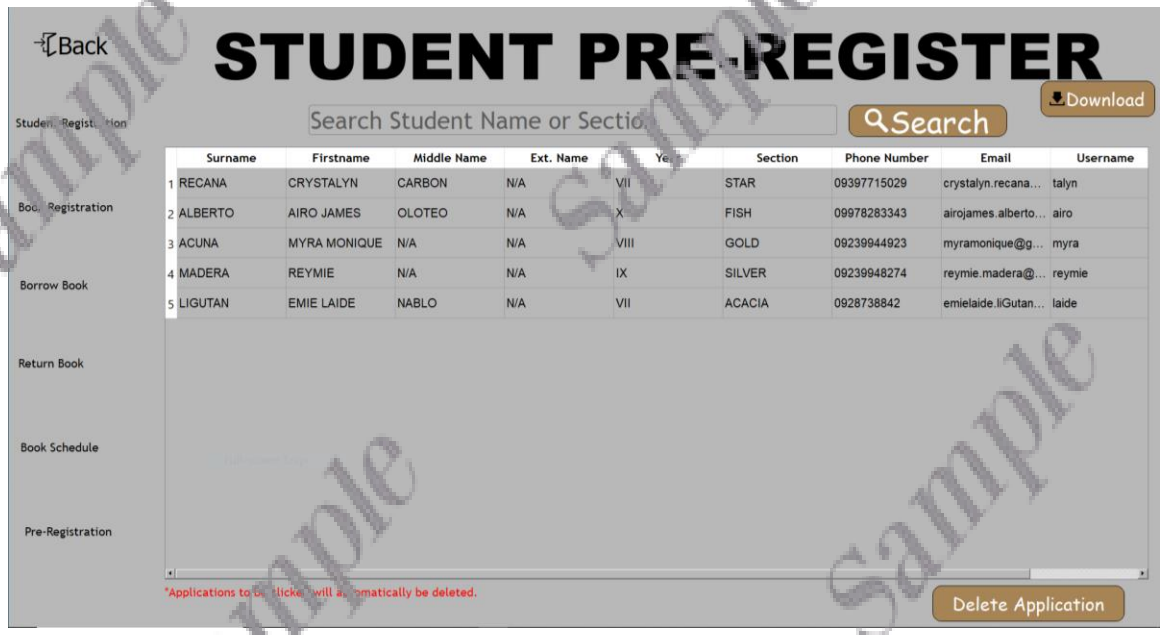


Figure 40. Student Pre-Registration

Sample

Project Test Results

This section contained the results of the tests conducted for the functionality, reliability, and accuracy of the project.

Testing Results for Functionality

Table 3 showed the testing results for the barcode scanner in scanning 2 types of code: the barcode and QR code. The duration of the whole process from the scanning till reading from each different distance.

Table 3

Testing Results for Barcode Scanner Process

Trials	ID Type	Duration	Distance	Result
1	Student QR Code	1.97s	5 inches	Captured
2	Book Barcode	1.22s	5 inches	Captured
3	Student QR Code	1.17s	10 inches	Captured
4	Student QR Code	0	15 inches	Not captured
5	Book Barcode	0	10 inches	Not captured

Sample

The results for the time spent on each transaction were shown in table 4. In making transactions the system should function and consume less than 2 minutes per transaction in support of the objective that it will lessen the time consumed by 60% compared to manual transactions.

Table 4

Testing Results for Transactions Duration

Trials	Student ID	Duration of Login	Duration of Logout	Duration of Borrowing	Duration of Returning
1	1	3.18	7.36	35.77	45.84
2	2	2.46	2.41	31.23	26.11
3	3	6.64	4.93	30.32	26.04
4	4	2.56	3.16	38.74	40.35
5	5	2.38	2.57	33.87	29.42

Sample

The results for the need for verification of the student and admin were shown in table 5. In order to proceed with the transaction, the system asked for the student and admin verification. The verification was done via username and password or via scanning the QR Code. If either the student or admin verification were not filled, the transaction will be declined.

Table 5

Testing Results for the Verification of Transactions

Trials	Registered Student	Transaction	Registered Admin	Result
1	Yes	Borrow Book	No	Declined
2	Yes	Return Book	Yes	Success
3	No	Extend Due Date	Yes	Declined
4	Yes	Return Book	No	Declined
5	No	Register Student	No	Declined

Sample

Table 6 showed the result for the checking of the admin account. For every transaction with the student the registered admin was needed for verification. The system declined the verification of an unauthorized admin either by the use of an account or by the use of QR code in every transaction.

Table 6

Testing Result for the Verification of Admin

Trials	Registered Admin	Transaction	Result
1	Yes	Borrow Book	Accepted
2	Yes	Return Book	Accepted
3	No	Extend Due Date	Declined
4	No	Borrow Book	Declined
5	Yes	Register Student	Accepted

Sample

Table 7 showed the results for checking the student account. In borrowing a book, returning of borrowed book and extension of due date. The verification of registered students was needed for the validation of transactions. The system rejected the verification of an unregistered student either via user name and password account or via QR code.

Table 7

Testing Result for the Verification of Student

Trials	Registered Student	Transaction	Result
1	Yes	Borrow Book	Accepted
2	Yes	Extend Due Date	Accepted
3	No	Borrow Book	Declined
4	Yes	Return Book	Accepted
5	No	Return Book	Declined

Sample

Testing Results for Reliability

Table 8 showed the result for the performance of the system in a long period of time. The system was expected to be open for more or less than 13 hours since the junior high school has a 6 hour morning shift and 6 hours afternoon shift. The system continued to operate its functions many times over a long period of time.

Table 8

Testing Result for the Performance of System

Trials	Duration	Number of Transactions	Performance
1	1 hour	25	Working
2	3 hours	75	Working
3	8 hours	90	Working
4	11 hours	125	Working
5	13 hours	150	Working

Sample

The table 9 showed the change in the number of available books per transaction. In every transaction that occurred, the system updated the number of books available and displayed the updated availability status of the book. The book with zero (0) total number of available books declined all the borrowing transaction requests.

Table 9

Testing Result for Availability of a Book

Trials	No. of Book Available	Transaction	Total No. of Book Available	Availability Status
1	2	Borrow	1	Available
2	1	Return	2	Available
3	2	Borrow	1	Available
4	1	Borrow	0	Not Available
5	0	Return	1	Available

Sample

Table 10 showed the results for the requested transactions chosen to be taken by the user. As the user chose the transaction to take, the system was able to gather correct data, save and make transactions based on the user request.

Table 10

Testing Result for the Chosen Transaction

Trials	Type of Transaction Chosen	Transaction Taken
1	Returning of Book	Return Book
2	Extend of Due Date	Extend Due Date
3	Borrowing of Book	Borrow Book
4	Registration of Student	Student Registration
5	Registration of Book	Book Registration

Sample

The results for the return status were shown in table 11. As the student brought the borrowed book in the facility for return. With the guidance of the librarian the system showed the borrowing information of the student. It showed the expected return date of the borrowed book and the status of the return whether it was Return in Time or Late Return.

Table 11

Testing Result for the Status of Return

Trials	Return Date	Current Date	Status
1	December 29, 2021	December 28, 2021	Return In Time
2	December 26, 2021	December 28, 2021	Late Return
3	December 28, 2021	December 28, 2021	Return In Time
4	January 01, 2022	December 28, 2021	Return In Time
5	December 30, 2021	December 28, 2021	Return In Time

Sample

The results for the need of complete data were shown in table 12. The system was able to identify if the student and book data were filled with needed information in order to accomplish the borrowing transaction. The system declined the transaction if the needed data were not filled.

Table 12

Testing Result for Data Filing in Borrowing of a Book

Trials	Filled Student Data	Filled Book Data	Result
1	Yes	No	Declined
2	Yes	Yes	Accepted
3	No	Yes	Declined
4	No	Yes	Declined
5	Yes	Yes	Accepted

Sample

The results for borrowing of the student chosen book were shown in table 13. The student brought the book and scanned for the ISBN Barcode of the book. Every registered book was acknowledged by the system and able to display the book information for the student to borrow it successfully.

Table 13

Testing Result for the Borrowing the Chosen Book

Trials	Chosen Book ID	Borrowed Book ID
1	Book 1	Book 1
2	Book 3	Book 3
3	Book 1	Book 1
4	Book 2	Book 2
5	Book 4	Book 4

Sample

Testing Results for Accuracy

Table 14 showed the results for readings of the barcode scanner. With the use of a scanner, it scanned and read the ISBN barcode and student QR code correctly.

Table 14

Testing Result for the Barcode Reader

Trial	ID	Read
1	9789710804450	9789710804450
2	Student 1	Student 1
3	Student 2	Student 2
4	9780373446278	9780373446278
5	Student_3	Student_3

Sample

Table 15 showed the log date and time of the student and the current date and time. Every login or logout of the student the system saved the correct time and date for the data backup in the student's log.

Table 15

Testing Result for the Log Time

Trials	Logged Time	Current Time	Logged Date	Current Date
1	22:39	22:39	December 18, 2021	December 18, 2021
2	22:45	22:45	December 18, 2021	December 18, 2021
3	23:15	23:15	December 18, 2021	December 18, 2021
4	23:18	23:18	December 18, 2021	December 18, 2021
5	23:33	23:33	December 18, 2021	December 18, 2021

Sample

Table 16 showed the result for the borrowing transactions of students. Each student can borrow many books at one time. However, a student can only borrow one of each book ID. Whenever the system detects the same student ID borrowed the same book ID it will deny the transaction.

Table 16

Testing for the Borrowing Transaction

Trials	Book ID	Student ID	Result
1	Book 1	Student 1	Borrowed
2	Book 1	Student 2	Borrowed
3	Book 1	Student 1	Denied
4	Book 2	Student 1	Borrowed
5	Book 2	Student 2	Borrowed

Sample

The results for returning the transaction of a borrowed book were shown in table 17. As the student brought the borrowed book into the facility with the guidance of the librarian. In the shown borrowing information the student ID should be able to be the same with the borrower ID in order to accomplish the return transaction.

Table 17

Testing for the Returning Transaction

Trials	Book ID	Borrower ID	Student ID	Result
1	Book 1	Student 1	Student 1	Returned
2	Book 2	Student 2	Student 2	Returned
3	Book 1	Student 2	Student 1	Denied
4	Book 2	Student 1	Student 2	Denied
5	Book 2	Student 3	Student 3	Returned

Sample

Project Capabilities and Limitations

The Development of the Library Management System was a kiosk machine that was for the Junior High School students of Dasmariñas East Integrated High School. The kiosk machine automated the students' log, borrowing and returning of books. The system had five major functions, the registration, the student login, the student logout, the borrowing of books and returning of books.

The following were the capabilities of the developed prototype:

1. Registration of the new admin.
2. Registration of students and generate of student QR code.
3. Registration of books and generating book barcodes.
4. Book information can be edited for updating purposes.
5. Student accounts can be edited with the verification of students.
6. Students and Admin can verify their identity using QR Code.
7. Student and Admin can verify their identity by the use of username and password.
8. Admin can download the information or logs through a spreadsheet file.

However, the following were the limitations of the developed prototype.

1. The number of registered admin is limited to one (1).
2. Each student can only borrow one of each book ID.
3. The collected data can be gathered by the use of flash drives.

Sample

Chapter 5

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

After conducting the series of tests with acceptable results for the functionality of the Automated Library Management System for the DEIHS, the researchers proceeded in summarizing the study.

The purpose for the designing and development of the prototype was to create a kiosk machine that automated the transactions for a not time-consuming saving of data in the library. There were three main components connected to each other in the prototype. The mini PC served as the heart of the prototype. It was the one responsible for the connection of components and running the admin and software program. The desktop applications were made using the python programming language. It had a MySQL database that was used for saving and summarizing the data for the documentation of the library. The saved data collected by the admin can gather through flash drives.

The barcode scanner was connected to the mini PC. It was the one responsible for scanning and reading either ISBN barcode or student QR Code. The read data was used for the easy identification of the book and for the verification of admin or student in every transaction.

The monitor served as the communicator from the system to the user. As it is used to display the GUI of the software application for the user communication. The monitor was connected to the mini PC, it was a touchscreen type of monitor for the users to easily choose from the options provided in the screen without the use of external components such as mouse or keyboards.

Sample

From the tests conducted, the Automated Library Management System successfully worked according to the designed functions and met the expected outputs.

Conclusions

In consideration for the listed objectives of the study and results from the series of tests, the researchers concluded:

1. Successfully designed and created a library management system that uses QR code as the verification of students.
2. Developed a kiosk machine that lessened the time consumed for every transaction in the library.
3. Developed a kiosk machine that can record and present needed data.
4. Passed the tests according to the planned design.

Recommendations

The following recommendations are offered for the future innovations and improvement of the prototype, Automated Library Management System:

1. Direct communication of data online and offline.
2. Have an electronic generated copy of the registered books. For free viewing online.

Sample

REFERENCES

Okundamiya, M. S., & Nwokolo, U. E. (2018). Design and Implementation of an Automated Library System using Biometric Technology. Journal of Communications Technology, Electronics and Computer Science, 16, 1-5.

Araya, T. W., & Mengsteab, A. P. A. (2020). Designing Web-based Library Management System. International journal of engineering research and technology, 9, 272- 277.

Kiosk. (n.d.) *Computer Desktop Encyclopedia*. (1981-2019). Retrieved June 2 2021 from https://encyclopedia2.thefreedictionary.com/kiosk

Schofield, J. (2018). What is the point of mini PCs? https://www.theguardian.com/technology/askjack/2018/nov/08/what-is-the-point- mini-pcs

What is an operating system? (n.d.). Retrieved May 23, 2021, from https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/

Rathoone, A. (n.d.). How Does the Windows 10 Desktop Work? Retrieved May 23, 2021, from https://www.dummies.com/computers/operating-systems/windows-10/how- does-the-windows-10-desktop-work/

Beal, B. (1996-2021). Programming Language. Retrieved May 23, 2021, from https://www.webopedia.com/definitions/programming-language/

What is PHP? Retrieved from https://www.php.net/manual/en/intro-whatis.php

What is XAMPP? Retrieved from https://www.apachefriends.org/index.html

Database. Retrieved from https://www.britannica.com/technology/database MySQL.

Retrieved from https://www.mysql.com/

MariaDB Server: The open source relational database. Retrieved from https://mariadb.org/

Sirkin, J. (n.d.). SQL (Structured Query Language). Retrieved May 23, 2021, from https://searchdatamanagement.techtarget.com/definition/SQL

What is InfinityFree? Retrieved from https://infinityfree.net/

Touch screen. (n.d.) Computer Hope. (2020). Retrieved May 23, 2021, from https://www.computerhope.com/jargon/t/toucscre.htm#:~:text=A%20touch%20sc
reen%20is%20a,using%20their%20finger%20or%20stylus.&text=Some%20touc
h%20screens%20use%20a,of%20utilizing%20touch%2Dsensitive%20input.

Teja, R. (2021). What is a Sensor? Different Types of Sensors and their Applications. Retrieved May 23, 2021, from https://www.electronicshub.org/different-types- sensors/

Barcode. Retrieved from https:// www. britannica. com/ technology/ barcode

Merriam-Webster. (n.d.). Catalog. In Merriam-Webster.com dictionary. Retrieved May 23, 2021, from https://www.merriam-webster.com/dictionary/catalog

Muhammad, M. A. (2018, April). IKiS Self Service Kiosk for Library Service. In International Conference on Information Technology and Business (ICITB) (pp. 137-142).

Bodomo, A., Lam, M. L., & Lee, C. (2003). Some students still read books in the 21st century: A study of user preferences for print and electronic libraries. The Reading Matrix, 3(3).

Sample

APPENDICES

Sample

Appendix A

SAMPLE EVALUATION INSTRUMENT

Dear Respondents:

We are the students of Bachelor of Engineering Technology Major in Computer Engineering Technology humbly asking for your assistance in evaluating our project entitled "Development of Library Management System in Dasmariñas East Integrated High School".

Your assistance will be highly appreciated. Thank you.

Numerical Rating	Descriptive Rating
5	Highly Acceptable
4	Very Acceptable
3	Acceptable
2	Fairly Acceptable
1	Not Acceptable

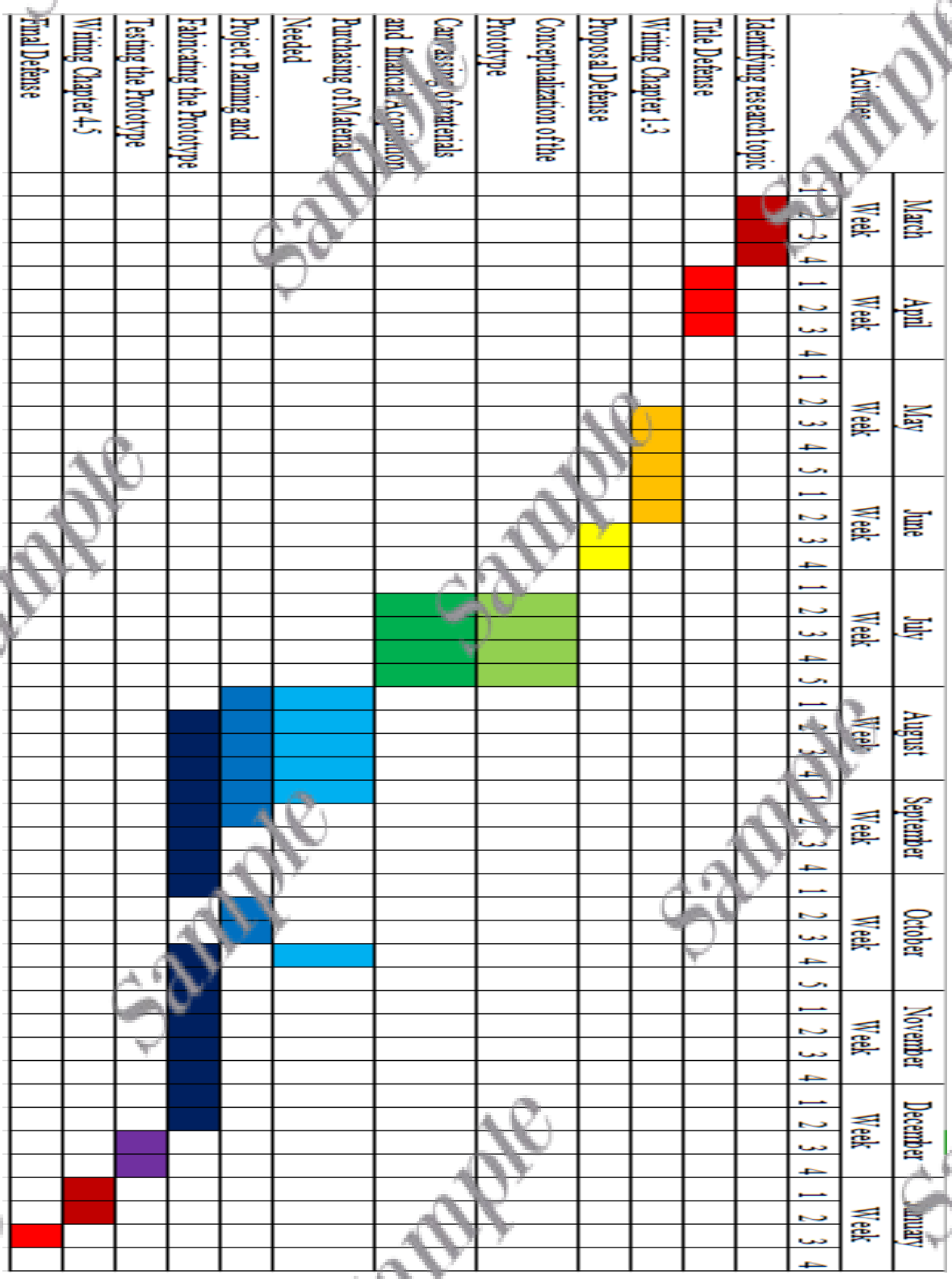
	5	4	3	2	1
A. Functionality					
1. Ease of Operation					
2. Provision of Comfort and convenience					
3. User Friendliness					
B. Aesthetics					
1. Color					
2. Attractiveness of design					
3. Appropriateness in size					
C. Workability					
1. Availability of materials					
2. Availability of expertise					
3. Availability of tools and machine					
D. Durability					
1. Quality of materials					
2. Quality of workmanship					
3. Quality of design					
E. Safety					
1. Absence of toxic/hazardous materials					
2. Absence of sharp edges					
3. Provision for protection devices					

Comments or Suggestions: _____

Sample

Appendix B

GANTT CHART



Sample

Appendix C

CORRESPONDENCE

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**RESEARCH ADVISER CONFORME**	Page 1/1

Date: January 27,2022

Prof. Beverly M. De Vega,
TUP-CAVITE

Dear Mam:

You are hereby chosen as adviser of **Myra Monique Acuña (BET-CoET), Airo James O. Alberto (BET-CoET), Crystalyn C. Recaña (BET-CoET),** who proposed to work on a project entitled **Development of Library Management System in Dasmariñas East Integrated High School** as a partial fulfillment of the requirements for the degree, Bachelor of Technology.

It is hoped that through your expert guidance, your advisee will strive for the early completion of the project and the accompanying project report.

Very Truly Yours,

Prof. Jay Victor G. Gumboc
Department Head

Conforme:

Prof. Beverly M. De Vega
Thesis Adviser

January 27,2022
Date

TUPC-F-OAA-DIT-002 ØØ (1.23.18)

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**PANEL CONFORME**	Page 1/1

Date: January 27, 2022

Prof. Arnold G. De Vega,
TUP-CAVITE

Dear Sir:

You are hereby chosen as panel member of **Myra Monique Acuña (BET-CoET), Airo James O. Alberto (BET-CoET), Crystalyn C. Recaña (BET-CoET),** who proposed to work on a project entitled **Development of Library Management System in Dasmariñas East Integrated High School** as a partial fulfillment of the requirements for the degree, Bachelor of Technology.

It is hoped that through your expertise the project will be finished, and accompanying papers be submitted accordingly.

Very Truly Yours,

Prof. Jay Victor G. Gumboc
Department Head

Conforme:

Prof. Arnold G. De Vega
Panel Member

January 27, 2022
Date

TUPC-F-OAA-DIT-005 ØØ (1.23.18)

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**PANEL CONFORME**	Page 1/1

Date: January 27, 2022

Prof. John Paulo M. Diaz,
TUP-CAVITE

Dear Sir:

You are hereby chosen as panel member of **Myra Monique Acuña (BET-CoET), Airo James O. Alberto (BET-CoET), Crystalyn C. Recaña (BET-CoET),** who proposed to work on a project entitled **Development of Library Management System in Dasmariñas East Integrated High School** as a partial fulfillment of the requirements for the degree, Bachelor of Technology.

It is hoped that through your expertise the project will be finished, and accompanying papers be submitted accordingly.

Very Truly Yours,

Prof. Jay Victor G. Gumboc
Department Head

Conforme:

Prof. John Paulo M. Diaz
Panel Member

January 27, 2022
Date

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**PANEL CONFORME**	Page 1/1

Date: January 27, 2022

Prof. Ma. Juliet Patria D. Escalona,
TUP-CAVITE

Dear Mam:

You are hereby chosen as panel member of **Myra Monique Acuña (BET-CoET), Airo James O. Alberto (BET-CoET), Crystalyn C. Recaña (BET-CoET)**, who proposed to work on a project entitled **Development of Library Management System in Dasmariñas East Integrated High School** as a partial fulfillment of the requirements for the degree, Bachelor of Technology.

It is hoped that through your expertise the project will be finished, and accompanying papers be submitted accordingly.

Very Truly Yours,

Prof. Jay Victor G. Gumboc
Department Head

Conforme:

Prof. Ma. Juliet Patria D. Escalona
Panel Member

January 27, 2022
Date

TUPC-F-OAA-DIT-005 ØØ (1.23.18)

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**PANEL CONFORME**	Page 1/1

Date: January 27, 2022

Prof. Melchor P. Fernando,
TUP-CAVITE

Dear Sir:

You are hereby chosen as panel member of **Myra Monique Acuña (BET-CoET), Airo James O. Alberto (BET-CoET), Crystalyn C. Recaña (BET-CoET),** who proposed to work on a project entitled **Development of Library Management System in Dasmariñas East Integrated High School** as a partial fulfillment of the requirements for the degree, Bachelor of Technology.

It is hoped that through your expertise the project will be finished, and accompanying papers be submitted accordingly.

Very Truly Yours,

Prof. Jay Victor G. Gumboc
Department Head

Conforme:

Dr. Melchor P. Fernando
Panel Member

January 27, 2022
Date

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**RESEARCH PROPOSAL DEFENSE FORM**	Page 1/1

Examinee : Myra Monique Acuña

: Airo James O. Alberto

: Crystalyn C. Recaña

Degree : Bachelor of Engineering Technology Major in Computer Engineering Technology

Title of Research : Development of Library Management System in Dasmariñas East Integrated High School

Date : April 14, 2021

Time : 8:00 AM

Thesis Adviser : Ms. Beverly M. De Vega

Panel Members	Accepted with Revision	Deferred for Revision	Not Accepted
Mr. Arnold G.De Vega			
Mr. John Paulo M. Diaz			
Dr. Melchor P. Fernando			
Ms. Ma. Juliet Patria D. Escalona			

This is to certify the authenticity of the above evaluation of the panel of examiners whose signatures are herewith affixed.

Ms. Ma. Juliet Patria D. Escalona
Panel Chairman
(Signature over printed name)

This report on the proposal defense for a thesis is hereby accepted.

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**RESEARCH TITLE DEFENSE FORM**	Page 1/1

Examinee : Myra Monique Acuña

: Airo James O. Alberto

: Crystalyn C. Recaña

Degree : Bachelor of Engineering Technology Major in Computer Engineering Technology

Title of Research : Development of Library Management System in Dasmariñas East Integrated High School

Date : June 23, 2021

Time : 10:00 AM

Thesis Adviser : Ms. Beverly M. De Vega

Panel Members	Accepted with Revision	Deferred for Revision	Not Accepted
Mr. Arnold G.De Vega			
Mr. John Paulo M. Diaz			
Dr. Melchor P. Fernando			
Ms. Ma. Juliet Patria D. Escalona			

This is to certify the authenticity of the above evaluation of the panel of examiners whose signatures are herewith affixed.

Ms. Ma. Juliet Patria D. Escalona
Panel Chairman
(Signature over printed name)

This report on the title defense for a thesis is hereby accepted.

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**RESEARCH FINAL DEFENSE FORM**	Page 1/1

Examinee : Myra Monique Acuña

: Airo James O. Alberto

: Crystalyn C. Recaña

Degree : Bachelor of Engineering Technology Major in Computer Engineering Technology

Title of Research : Development of Library Management System in Dasmariñas East Integrated High School

Date : January 27, 2022

Time : 12:00 PM

Thesis Adviser : Ms. Beverly M. De Vega

Panel Members	Accepted with Revision	Deferred for Revision	Not Accepted
Mr. Arnold G.De Vega			
Mr. John Paulo M. Diaz			
Dr. Melchor P. Fernando			
Ms. Ma. Juliet Patria D. Escalona			

This is to certify the authenticity of the above evaluation of the panel of examiners whose signatures are herewith affixed.

Ms. Ma. Juliet Patria D. Escalona
Panel Chairman
(Signature over printed name)

This report on the final defense for a thesis is hereby accepted.

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
DIT	**CRITIQUE FORM**	Page 1/1

SUMMARY:

The respective panels bequeathed us with the following remarks:

- The prototype should be able to be available for other kiosks. On the presentation day, the researchers may use one laptop as representation for other kiosk.
- The books can be browse within a network (Online).
- The student can reserve a book for borrowing within a network (Online).

Mr. Arnold G. De Vega
Member

Dr. Melchor P. Fernando
Member

Mr. John Paulo M. Diaz
Member

Ms. Ma. Juliet Patria D. Escalona
Panel Chair

Date: June 23,2021

TUPC-F-OAA-DIT-001 ØØ (1.23.18)

Sample

	TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES **CAVITE CAMPUS** Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines Telefax: (046) 416-4920 Email: cavite@tup.edu.ph | Website: www.tup.edu.ph	
ORS	**TURNOVER FORM** **(STUDENT RESEARCH)**	Page 1/1

This is to certify that the following item(s) of:

Project No.: _____

Project Title: Development of Library Management System in Dasmariñas East Integrated High School

Researcher(s): 1. Acuña, Myra Monique

2. Alberto, Airo James O.

3. Recaña, Crystalyn C.

Faculty Adviser(s): Ms. Beverly M. De Vega

Source of funds:

☐ Internal; Please specify

☐ External; Please specify

Others: ☑ Please specify Scholarship

has/have been turned over to the Technological University of the Philippines - Cavite.

This/These item(s) is/are as follows: *(Include and describe parts)*

Kiosk Machine – Includes the 13.3 inch touchscreen monitor, mini PC, barcode scanner and kiosk base.

Cleared for Turnover:

Prof. Daniden F. Yulde 2/22/22
Signature over Printed Name / Date
Designation

Prof. Jay Victor G. Gumboc
Signature over Printed Name / Date
Designation

Received by:

Ms. Beverly M. De Vega 2/22/22
Signature over Printed Name / Date
Designation Adviser

TUPC-F-ORE-ORS-008 Ø1 (03.12.21)

Sample

Appendix D

TOTAL BUDGET REQUIREMENTS

ITEM	QUANTITY	AMOUNT
Barcode Scanner	1	₱1,613.50
13.3”Touchscreen Monitor	1	₱6,799.00
Mini PC	1	₱5,754.50
Plywood 3/4	1	₱935.00
Finishing Nail 1 1/2	1/4	₱23.00
Nylon Caster Wheel	4	₱115.43
Paint	2	₱300.00
Thinner	1	₱40.00
Primer	1	₱175.00
Wall Putty	1	₱110.00
Bisagra 2”	1	₱19.00
Roller Catches	1	₱8.50
		Total Amount:₱16,466.75

Sample

Global Collection TOMTOP

Free Shipping Fee)Aibecy Omnidirectional Barcode Scanner Platform 1D/2D/QR Bar...

Color Family:Black

No Warranty

₱1,572.00 Qty:1

Write A Review

Chat Now

Order No. 399489019757799 Copy

Placed on 08 Jul 2021 22:51:07

Paid on 08 Jul 2021 22:51:11

Subtotal(1 Item)	₱1,572.00
Shipping Fee	₱41.50

Bmax B1 Mini PC All In One Desktop Intel Celeron J3060 Dual Core 1.6GHz up to...

Color Family:Black

1 Year International Seller Warranty

₱5,713.00 Qty:1

Write A Review

Chat Now

Order No. 403829778595024 Copy

Placed on 17 Jul 2021 12:39:22

Paid on 17 Jul 2021 12:39:24

Subtotal(1 Item)	₱5,713.00

Global Collection ZSCMALL Portable Monitor

HONGO 13.3 inch 1080P/3k Touchscreen Portable Monitor USB C Monitor FHD Eye...

Color Family:13.3 inch 1080P Touchscreen...

2 Years International Seller Warranty

₱6,799.00 Qty:1

Return/Refund Write A Review

Chat Now

Order No. 436374262757[illegible] Copy

Placed on 24 Oct 2021 21:05:29

Paid on 24 Oct 2021 21:05:30

Subtotal(1 Item)	₱6,799.00
Shipping Fee	₱40.50
Lazada Voucher	-₱5.00
Shipping Fee Promotion	-₱40.50
Shop Voucher	-₱300.00
	₱6,494.00

CINCO CENTRO HARDWARE
Non-Vat Reg. TIN 103-851-596-000
Blk C-14 Lot 10, San Simon, Dasmarinas City, Cavite
Mobile No: 0928 476 2964 / Landline No: 046 238 0083
DELIVERY RECEIPT

Delivered to: ROBERTO RUECAS Delivered by:
Address: BLK 14 LOT 10 ACACIA Date: 02 JAN 2022

QTY.	UNIT	DESCRIPTION	Unit Price	AMOUNT
1/4	PC	PLYWOOD ORD 3/4	935	935 -
1/4	KG	FINISHING NAIL 1½		23
			TOTAL	958 -

№ 001187

CINCO CENTRO HARDWARE
Blk 14 Lot 10 San Simon (Barangay 7) 4114,
City Of Dasmarinas Cavite, Philippines
GRUBAT, FEDERICO A. – Prop. Non-VAT Reg. TIN: 103-851-596-00000
Landline No.: (046) 238-0083 Mobile No.: 0928-476-2964

№ 001056

SALES INVOICE
Sold to:
Address:
Bus. Style:
Date: 05 JAN 2022
OSCA/PWD ID No.
SC/PWD Signature:

QTY	UNIT	ARTICLES	Unit Price	AMOUNT
1	LTR	PREPA WHITE PAINT	175	175

Total Sales
Less: SC/PWD Disc.
Amount Net
Add: VAT
Tax
TOTAL AMOUNT DUE 175

TRUSERV CONSTRUCTION SUPPLIES
B2 L9 CONG. SOUTH BUROL 1 DBB-B DASMARIÑAS CITY, CAVITE
[redacted] 0956-268-4953
(046) 416-5123.[redacted]
FAX (046) 416-5682

Acknowledgement Receipt

SOLD TO:
DATE: 01-05-22
ADDRESS:
CONTACT NO.:

QTY	DESCRIPTION	AMOUNT	TOTAL
1 pc	ROLLER CATCHES		8.50
1 pcs	BISAGRA 2"		19
1 pc	WALL PUTTY		110

Appendix E

TOOLS AND EQUIPMENT USED

TOOLS		SPECIFICATIONS
1.	Hammer	N/A
2.	Saw	N/A
3.	Grinder	Power:800Watts Voltage:220V
4.	Driller	Power:650Watts Voltage:220V

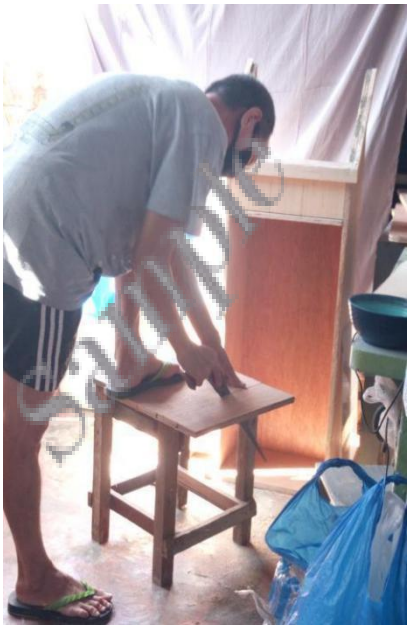
Sample

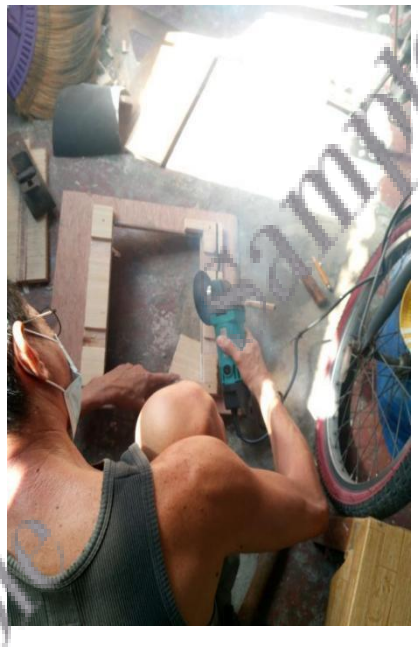
Appendix F

PICTURES TAKEN DURING FABRICATION AND TESTING

I. FABRICATION

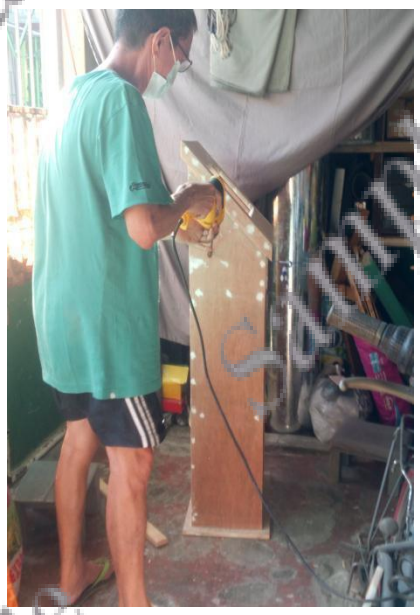
1. Cutting and assembling the plywood.



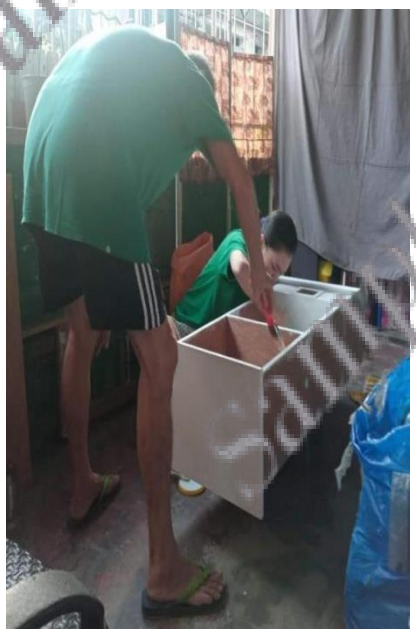


Sample

2. Polishing the prototype.

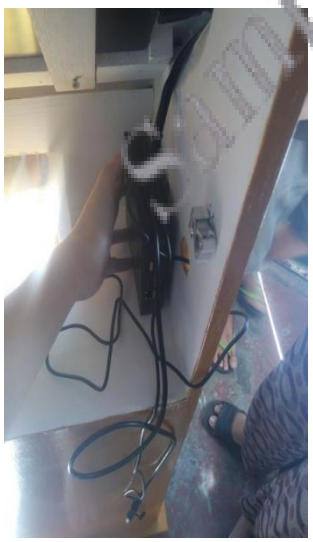


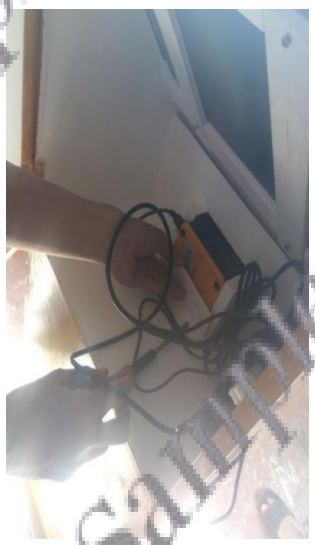
3. Painting and finalizing the case



Sample

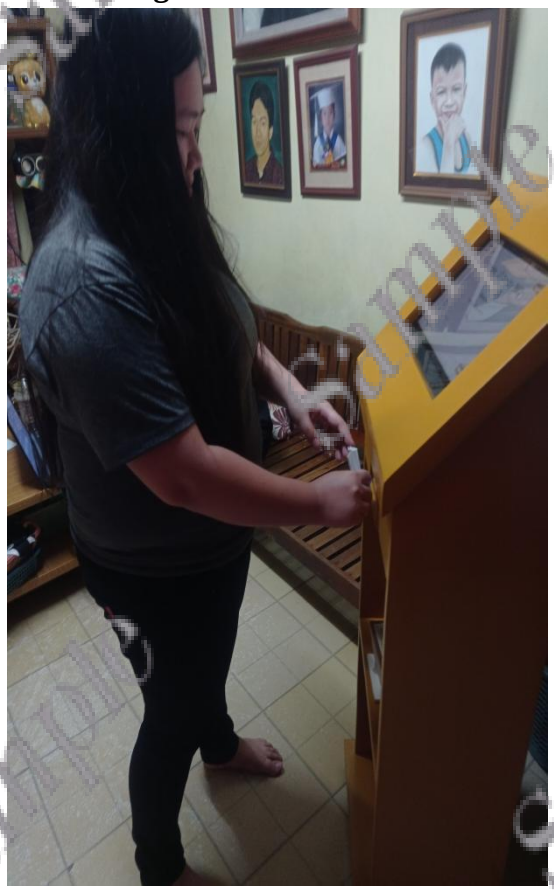
4. Setting up the components to prototype

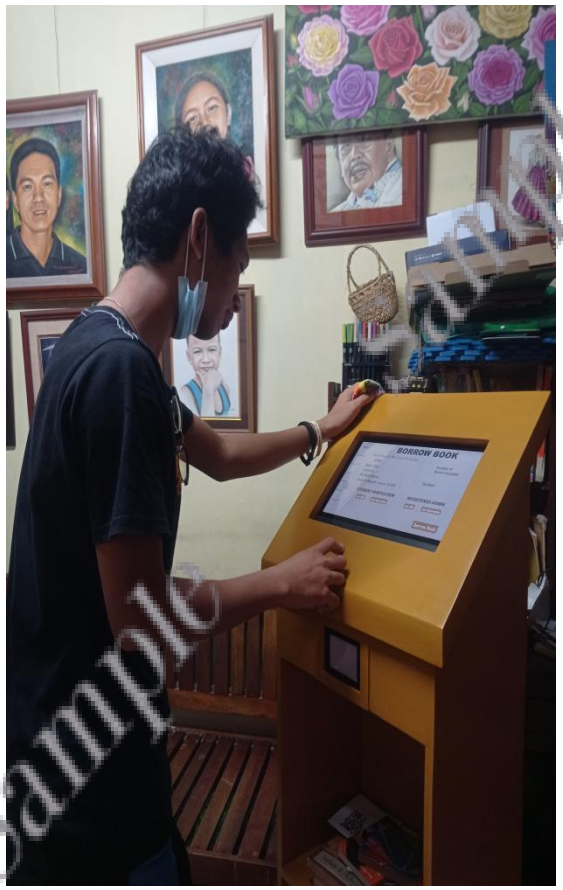




Sample

II. Testing



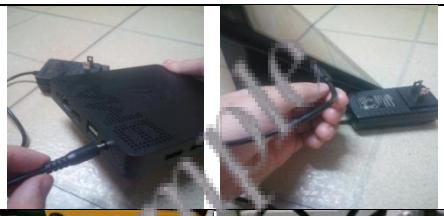
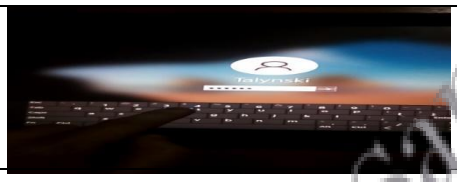


Sample

Appendix G

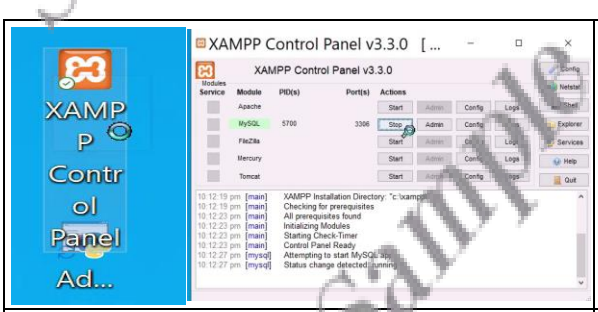
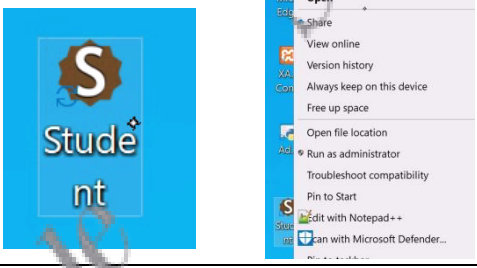
USERS MANUAL

SETTING UP THE CONNECTION OF THE PROTOTYPE

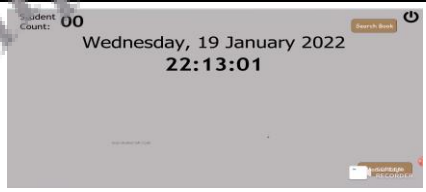
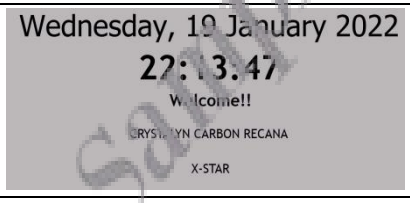
	1. Prepare all the devices needed such as touchscreen monitor, mini PC, Barcode Scanner and all the cables needed for the connection of components.
	2. Connect the USB type-B data line in Barcode scanner and the USB data line to the mini PC.
	3. Connect the mini HDMI data line to the monitor and HDMI data cable to the mini PC.
	4. Connect the type-C in the monitor and USB data line for the mini PC.
	5. Connect the power cables in mini PC and monitor.
	5. Plug in the adapters and torn on the mini PC.
	6. Type “library” for the password.

Sample

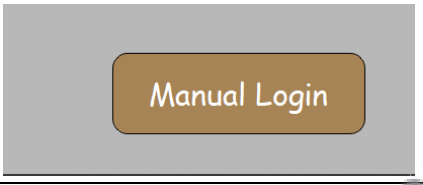
ACCESSING THE STUDENT APPLICATION

	1. Open the XAMPP control panel application and click the start button beside MySQL.
	2. Long press the student application for 2 secs and choose the Open.

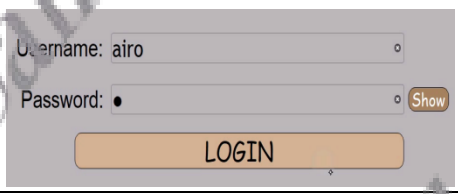
Login of Student via QR Code

	1. If the Student Application is in its main window. Tap the input for the login of student.
	2. Scan the generated QR Code.
	3. Wait for the "Welcome!!" and student information to show.

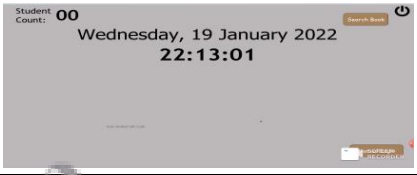
Login of Student via Username

	1. From the Main Window. Click the Manual Login Button.

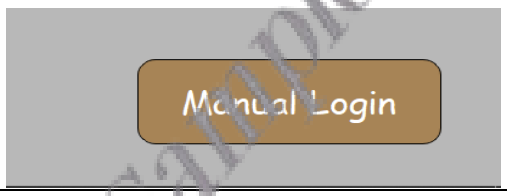
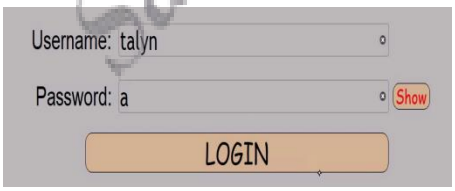
Sample

	2. Input the registered username and password of student. Then click the LOGIN button.
	3. Wait for the "WELCOME!!" and student information to show.

Logout of the Student via QR Code

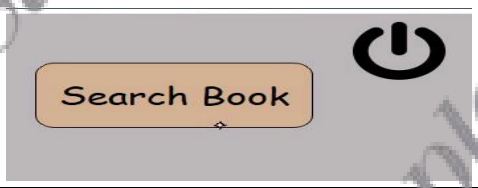
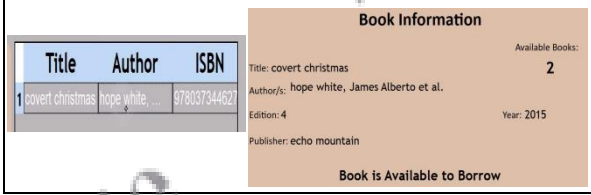
	1. If the Student Application is in its main window. Tap the input for the login of student.
	2. Scan the generated QR Code.
	3. Wait for the GoodBye!!" and student information to show.

Logout of Student via Username

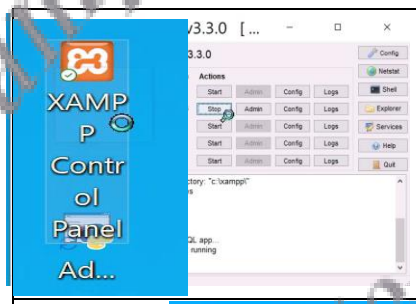
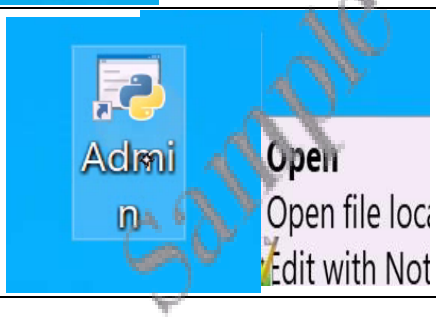
	1. From the Main Window. Click the Manual Login Button.
	2. Input the registered username and password of student. Then click the LOGIN button.
	3. Wait for the "GOODBYE!!" and student information to show.

Sample

Searching of Book

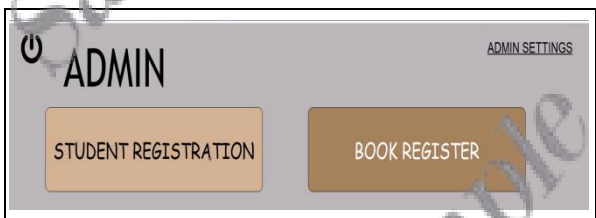
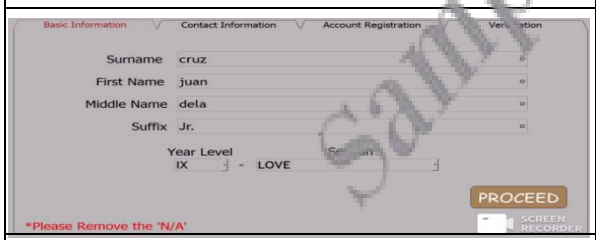
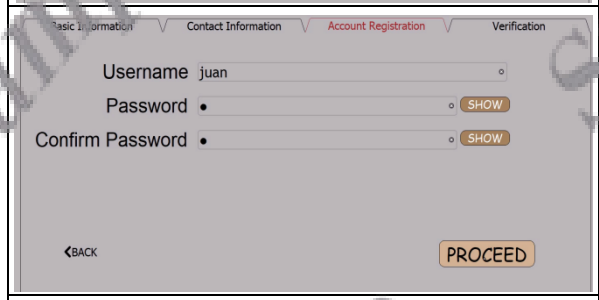
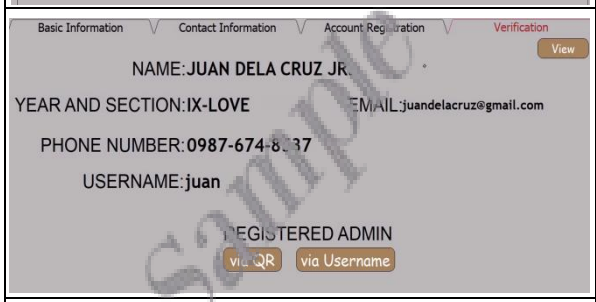
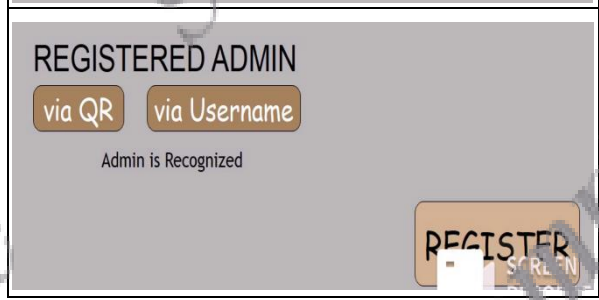
	1. From the Main Window. Click the Search Book Button.
	2. Search for Book Title or Author.
	3. Double click the data in the table. To see the information of the book.

ACCESSING THE ADMIN APPLICATION

	1. Open the XAMPP control panel application and click the start button beside MySQL.
	2. Long press the admin application for 2 secs and click Open.

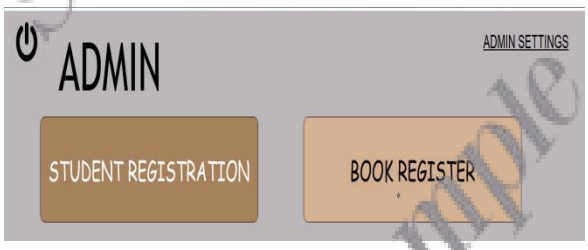
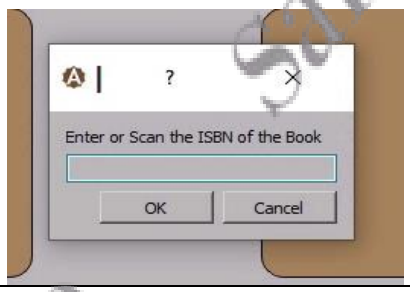
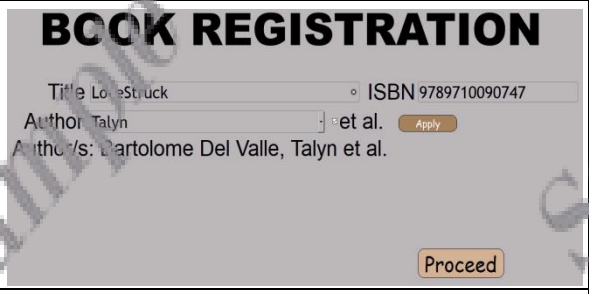
Sample

Student Registration

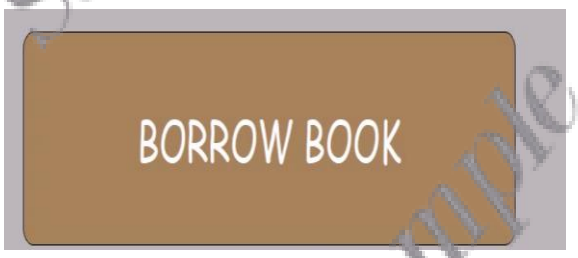
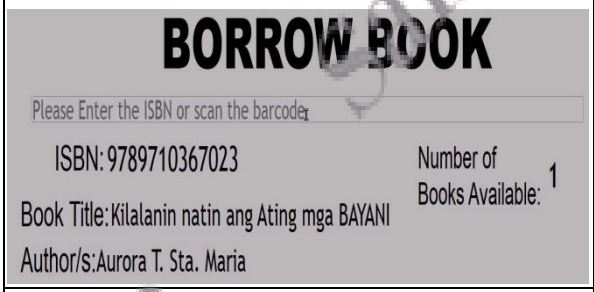
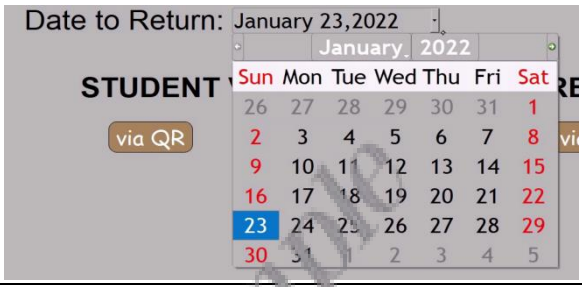
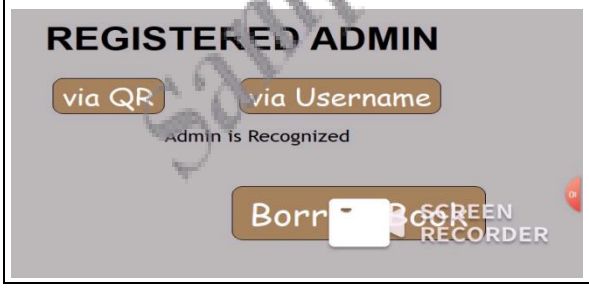
	1. From the main window of admin application. Click the Student Registration.
	2. Fill up the needed information in the Basic Information tab then click PROCEED.
	3. Fill up the needed information in the Contact Information tab then click PROCEED.
	4. Fill up the needed information in the Account Registration tab then click PROCEED.
	5. Check the information in the Verification tab then the admin will choose a verification way.
	6. If the Admin is Recognized shown. Click the REGISTER button.

Sample

Book Registration

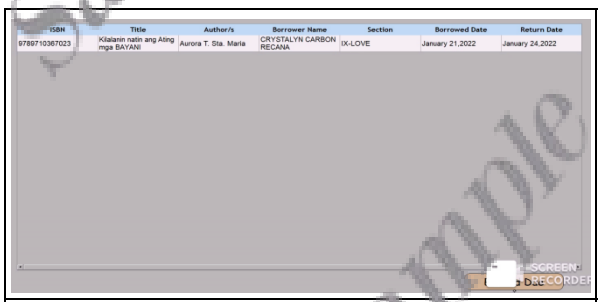
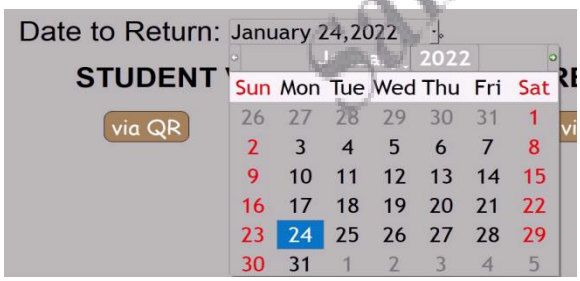
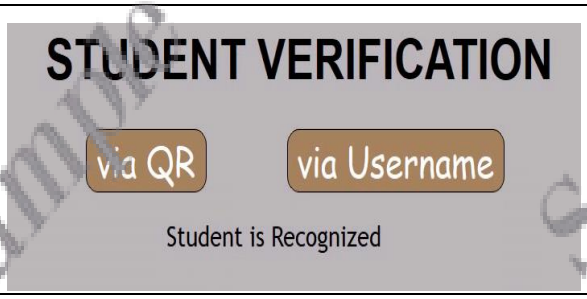
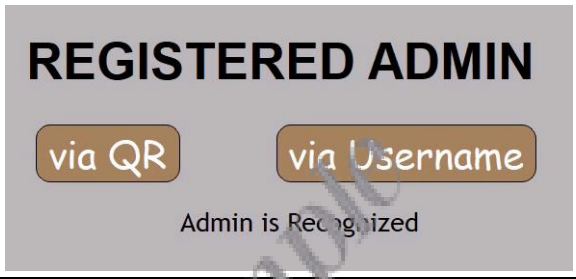
	1. From the main window of admin application. Click the Book Register button.
	2. Scan or Enter the ISBN of the book and click OK.
	3. Fill up the title and author then click Proceed
	4. Fill up the other book information then click Register Book.

Borrow Book

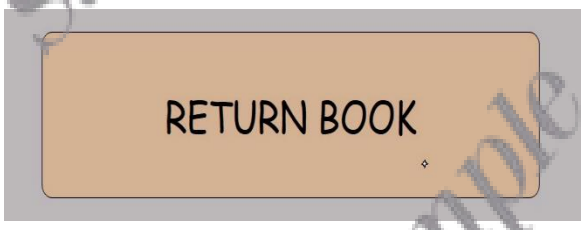
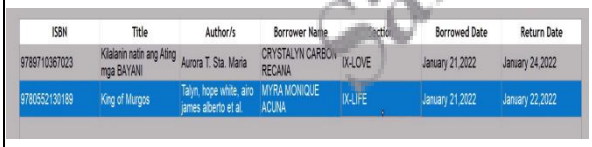
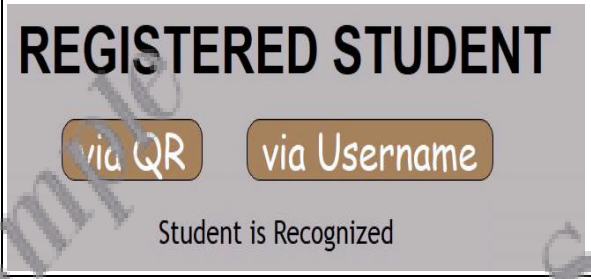
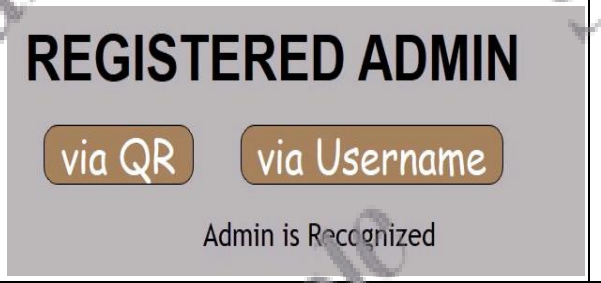
	1. From the main window of admin application. Click the Borrow Book button.
	2. Scan or enter the ISBN of the Book and wait for the book information to show.
	3. Choose student identification either via QR Code or via Username. Wait for the student information to show.
	4. Choose the date to return the book.
	5. After the admin choose a verification way and Admin is Recognized shown. Click the Borrow Book button.

Sample

Extend Due Date

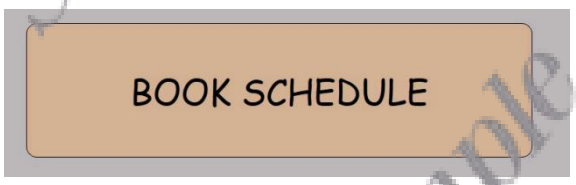
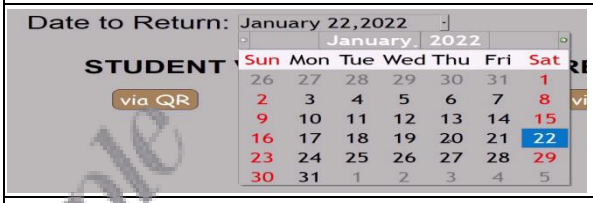
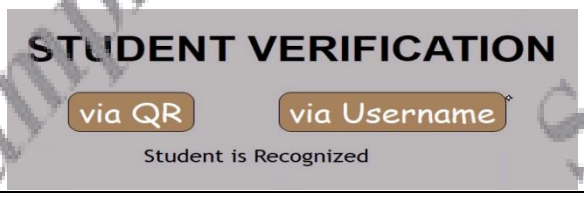
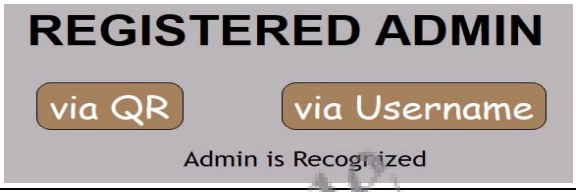
	1. From the Borrowed Books window. Select the borrowing transaction to extend. Click the Extend Due button
	2. Set the new date for returning the book.
	3. Choose student verification either via QR Code or via Username. Wait for the Student is Recognized to show.
	4. Choose admin verification either via QR Code or via Username. Wait for the Admin is Recognized to show.
	5. Click the Extend Due Button.

Return Book

	1. From the main window of admin application. Click the Return Book button.
	2. Double click the borrowing transaction to return in the table.
	3. Choose student verification either via QR Code or via Username. Wait for the Student is Recognized to show.
	4. Choose admin verification either via QR Code or via Username. Wait for the Admin is Recognized to show.
	5. Click the Return Book button.

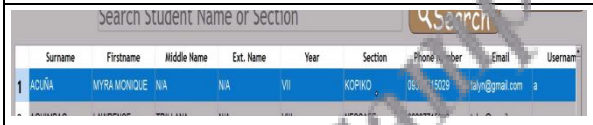
Sample

Borrowing the Scheduled Book

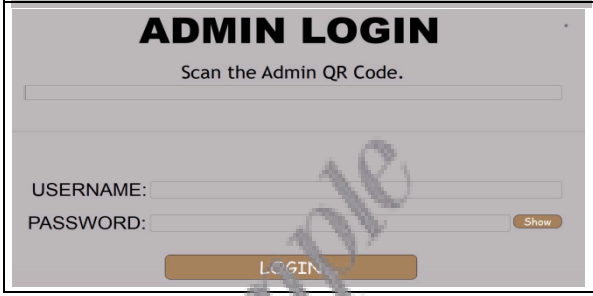
	1. From the main window of admin application. Click the Book Schedule button.
	2. Double click the schedule information in the table to proceed.
	3. Set the date to return the book.
	4. Choose student verification either via QR Code or via Username. Wait for the Student is Recognized to show.
	5. Choose admin verification either via QR Code or via Username. Wait for the Admin is Recognized to show.
	6. Click the Borrow Book button.

Sample

Registering the Pre-Registered Student

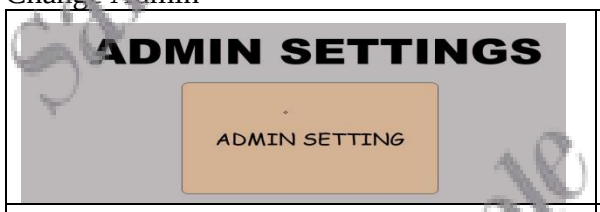
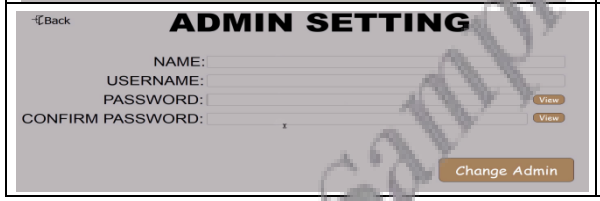
	1. From the main window of admin application. Click the Student Pre-Registered button.
	2. Double click the application information in the table to proceed.
	3. Proceed with the student registration.

Login of Admin

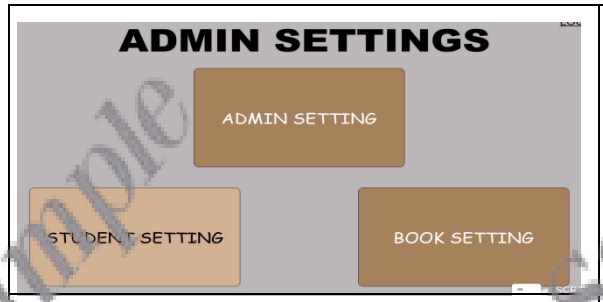
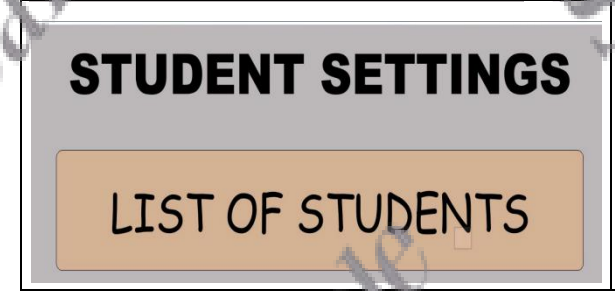
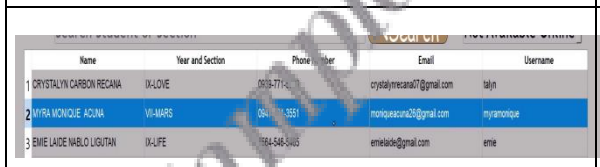
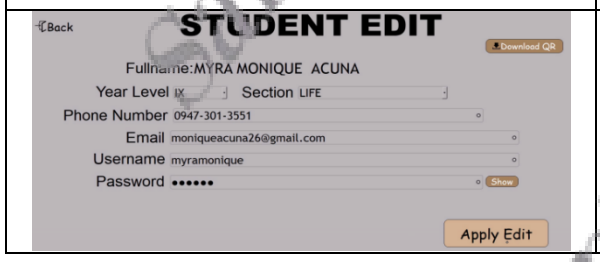
	1. From the main window of admin application. Click the Admin Settings button.
	2. Choose for login way. Either via QR Code or via username.

Sample

Change Admin

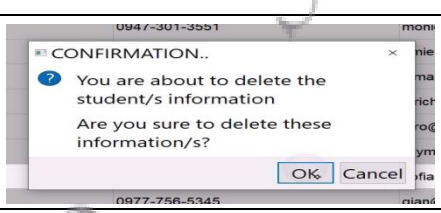
	1. From the admin settings window. Click the Admin Setting button.
	2. Fill up the information. Then click Apply Edit.

Edit the Student Data

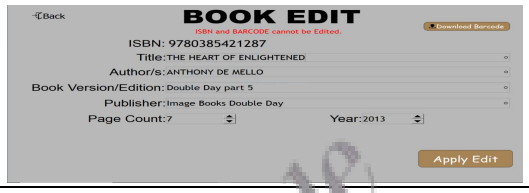
	1. From the admin settings window. Click the Student Setting button.
	2. Select the List of Students.
	3. Double click the student information to edit.
	4. After changing the student information click the Apply Edit button.

Sample

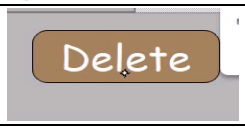
Delete the Student Data

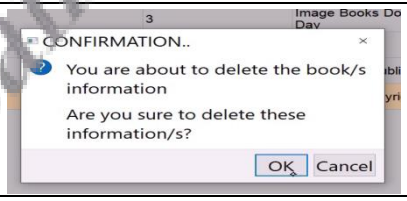
	1. From student list window. Select the student information to delete.
	2. Click the Delete button.
	3. Click OK in the confirmation window.

Edit the Book Data

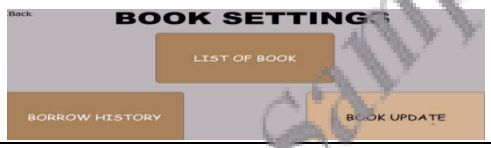
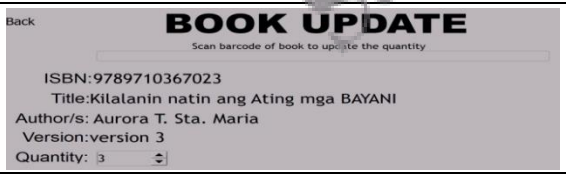
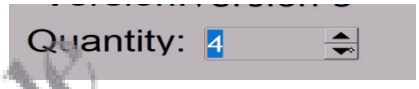
	1. From the Book List window. Double click the book information to edit.
	2. After changing the book information click the Apply Edit button.

Delete the Book Data

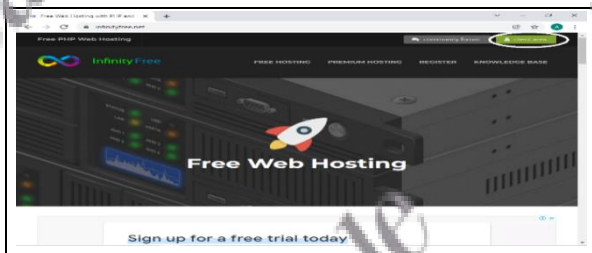
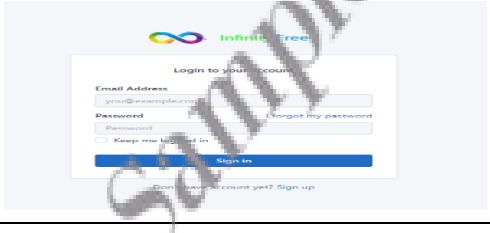
	1. From the Book List window. Select the book information to delete.
	2. Click the Delete button.

	3. Click OK in the confirmation window.

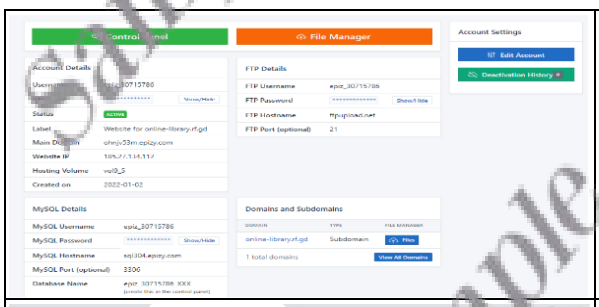
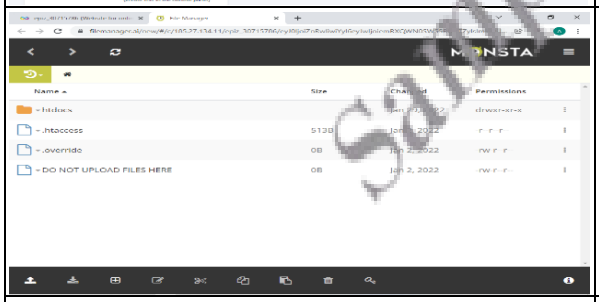
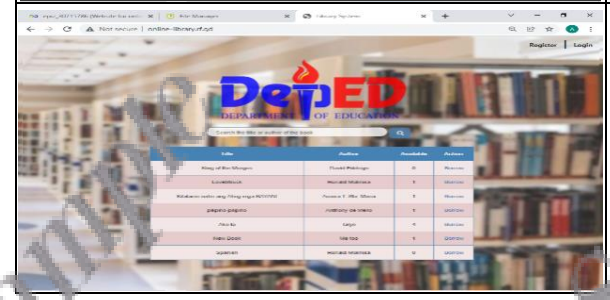
Update the Book Quantity

	1. From the Book Settings window. Click the Book Update button.
	2. Scan or enter the ISBN of the Book. Wait for the information of book to show up.
	3. Set the quantity of the book.
	4. Click the Update Book button.

ACCESSING THE WEB APPLICATION DEPLOYMENT

	1. Open your browser in the search tab type "https://app.infinityfree.net/". Then click the client area.
	2. Sign up using project.akawnt@gmail.com as username and pyduino_for56 as password.
	3. In the dashboard you can see the Your Accounts, select the Website for online-library.rf.gd then click manage.

Sample

	4. You will see the website information, website link, username, passwords and database. You can navigate by clicking the Control Panel button or File Manager Button.
	5. In the File Manager window click the htdocs folder to view or edit the website html, css, php and javascript files.
	6. In search tab enter http://online-library.rf.gd/ to access the web application.

Sample

Appendix H

CERTIFICATE OF SIMILARITY INDEX USING TURNITIN

REPUBLIC OF THE PHILIPPINES
TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES
CAVITE CAMPUS
Carlos Q. Trinidad Avenue, Salawag, Dasmariñas City, Cavite, Philippines
Telefax: (046) 416-4920
Email: cavite@tup.edu.ph | Website: www.tup.edu.ph

Management System ISO 9001:2015
TÜVRheinland CERTIFIED
www.tuv.com ID 9108652165

OFFICE OF RESEARCH SERVICES

CERTIFICATE OF PLAGIARISM CHECK

This is to certify that the research entitled, **"DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM IN DASMARIÑAS EAST INTEGRATED HIGH SCHOOL",** of **Myra Monique Acuña, Airo James O. Alberto, and Crystalyn C. Recaña** advised by **Ms. Beverly M. De Vega** was submitted to this office on **February 15, 2022**.

On verification using the **TURNITIN Software** for the purpose of plagiarism check, the uploaded research file of **92 pages (includes Abstract and Chapters 1-5)** contains lower than 20 percentage of similarity and is within the permissible standard for **student research projects** as per the university research policy.

Prepared by:

ENGR. MARCO U. FIGUEROA
(Signature over printed name)

Staff, Office of Research & Extension
(Designation)

Reviewed by:

JEAN ROSE A. ESGUERRA, MSc
(Signature over printed name)

Asst. Director for Research & Extension
(Designation)

TUPC-F-OQA-DCG-14 ØØ (11.19.18)

Sample

February 14, 2022

CERTIFICATION

Research Title: "DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM IN DASMARIÑAS EAST INTEGRATED HIGH SCHOOL"

Researchers: MYRA MONIQUE ACUÑA, AIRO JAMES O. ALBERTO, CRYSTALYN C. RECAÑA

Name of Grammarian/Validator : Lester Calungsod, LPT, Ma.Ed.

Highest Educational Attainment : Bachelor of Secondary Education and Master of Arts in

Education Position Held/Years of Service : Research Professor (LPU) / 10 years **Field of**

Specialization : Research Writing (All Discipline), Statistics, Language and Grammar Checking

Grammarian's Signature : _____

Remarks:

This is to certify that the research entitled "DEVELOPMENT OF LIBRARY MANAGEMENT SYSTEM IN DASMARIÑAS EAST INTEGRATED HIGH SCHOOL" prepared and submitted by MYRA MONIQUE ACUÑA, AIRO JAMES O. ALBERTO, CRYSTALYN C. RECAÑA, in partial fulfillment of their requirements of the research course leading to the Bachelor of Engineering Technology has been reviewed and evaluated grammatically.

This certification is issued upon the request of the above-mentioned names for whatever legal purposes may serve their best.

Overall Rating

___x___ Approved to be used as presented

_____ Approved to be used with revision as indicated

Sample

RESEARCHERS' PROFILE

Sample

MYRA MONIQUE ACUÑA
Blk d8 Lot 3 Barangay San Andres II
Dasmarinas City Cavite
09473013551
myramonique.acuna@gsfe.tupcavite.edu.ph

EDUCATIONAL BACKGROUND

2018 – Present

Technical University of the Philippines

C.Q.T. Ave. Salawag, Dasmariñas City, Cavite

Bachelor of Engineering Technology Major in Computer Engineering Technology

2016 – 2018

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Contact Center Services/Technical Drafting, with High Honors

2012 – 2016

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Junior High Completer

SKILLS AND QUALIFICATIONS

- ✓ Computer Literate
- ✓ Computer Programming
- ✓ Problem-solving abilities
- ✓ Leadership Experience
- ✓ Attention to Details
- ✓ Good Communication Skills

PERSONAL INFORMATION

Date of Birth: July 5, 1999

Age: 22 years old

Sex: Female

Civil Status: Single

Sample

AIRO JAMES O. ALBERTO
Blk E14 lot 14 Barangay San Mateo
Dasmarinas City, Cavite
09235933267
airojames.alberto@gsfe.tupcavite.edu.ph

WORK EXPERIENCE

SM Dasmariñas Jollibee

Service Crew

EDUCATIONAL BACKGROUND

2018 – Present

Technical University of the Philippines

C.Q.T. Ave. Salawag, Dasmariñas City, Cavite

Bachelor of Engineering Technology Major in Computer Engineering Technology

2016 – 2018

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Computer System Services, with Honors

2012 – 2016

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Junior High Completer

SKILLS AND QUALIFICATIONS

- ✓ Good Communication Skills
- ✓ Decision Making
- ✓ Computer Programming
- ✓ Computer Literate

PERSONAL INFORMATION

Date of Birth: September 25, 1999

Age: 22 years old

Sex: Male

Civil Status: Single

Sample

CRYSTALYN C. RECAÑA

Blk 14 Lot 10 Acacia Homes Burol III
Dasmarinas City Cavite
0939715029
crystalyn.recana@gsfe.tupcavite.edu.ph

WORK EXPERIENCE

SM Hypermarket Kadiwa Jollibee
Service Crew

EDUCATIONAL BACKGROUND

2018 – Present

Technical University of the Philippines

C.Q.T. Ave. Salawag, Dasmariñas City, Cavite

Bachelor of Engineering Technology Major in Computer Engineering Technology

2016 – 2018

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Accountancy, Business, and Management, with Honors

2012 – 2016

Dasmarinas East Integrated High School

Barangay San Simon, Dasmariñas City, Cavite

Junior High Completer

SKILLS AND QUALIFICATIONS

- ✓ Good Leadership Skills
- ✓ Great Adaptability and Interpersonal Skills
- ✓ Computer Literate (Microsoft/WPS Office Word, Excel, PowerPoint)
- ✓ Computer Programming
- ✓ Decision Making

PERSONAL INFORMATION

Date of Birth: November 07, 1999

Age: 22 years old

Sex: Female

Sample

Sample