TECHNIUM

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

Admission and Registrar Office (ARO) Mobile Document Scanner with Archiving System

Dinalyn A. Mallares[1*], Wayne Custer G. Alegata[2], Dennis V. Madrigal[3], and Joel M. Bual[4]

[1]*University of Antique-Libertad Campus, Antique, Philippines*
[2]*Carlos Hilado Memorial State University-Alijis Campus, Bacolod City, Philippines*
[3,4]*University of Negros Occidental-Recoletos, Bacolod City, Philippines*
[*]*Corresponding author: dinalynmallares@gmail.com*

Abstract

Archive document scanning refers to the procedure of converting physical paper records into digital formats, such as images or text files, and establishing a systematic workflow to preserve and access these archived files electronically over an extended period [1]. With the growing acceptance of mobility and digitalization worldwide, institutions such as libraries, government offices, museums, and universities are increasingly adopting document scanning as means to safeguard and preserve historical documents and records. This approach is particularly valuable in preventing the natural degradation and aging of physical documents, as highlighted by Scan2Archive [2]. The purpose of the Admission and Registrar Office (ARO) Mobile Document Scanner with Archiving System is to support the registrar's office in managing student requests and admissions as well as handling the documents that are presented during the enrollment. The office of the registrar will experience a transformation in document handling with the development of a document archiving system, which will promote operational excellence, security, and transparency. With the help of this system, the office's procedures for managing vital records—such as student transcripts, enrollment requirements, and other important paperwork—will be completely transformed. The basis for the development of the system is transforming paper-based records into a digitally accessible format. In evaluating the effectiveness of the application and the system's operation it specified the performance requirements for the software evaluation. The star topology was used as part of the communication interfaces. The thirty (30) respondents tabulated the data in each of the different features of the system are accuracy, user-friendliness, reliability, operability, learning reinforcement, interactivity, compatibility, and the cross-platform environment was rated as "excellent". The application was made to help the whole process become much more convenient to the admin and staff of the university.

Keywords: Archiving, Admission, Document Scanner, Effectiveness, Evaluation

1. INTRODUCTION

Archive document scanning denotes the process of digitizing old paper records and storing them as images or digital text files, as well as an operational workflow that maintains archived files in an electronic format for long-term use [1]. Owing to the development of the internet and ongoing technical advancements, collections are now accessible to audiences both offline and online. As a digital surrogate, replica, digital copy, or digitized product of an original analog good, digitization is the process of producing a digital copy of a physical original [3]. This approach helps prevent natural degradation and aging [2]. The document management system which assists in organizing the documents is essential [16]. Meanwhile, the global document scanning services market is expected to reach a compound annual growth rate of 8.64% during the forecast period (2020-2025). It is projected to be valued at USD 12.5 billion [4]. In doing so, it is important to archive the scanned documents as it ensures easier access, solid security, decreased risk of losing the file copies, and better collaboration when the copies are given in online meetings [5]. It goes over the idea of a record as proof of significant transactions made inside an organization as well as evidence in general. If handled, arranged, and overseen appropriately, records guarantee effective and efficient updates to businesses [6].

Also, information management requires document archiving because it offers the organizations more control over its information process [7].

In Asian countries like India, Bengi [8] dealt on conserving digital archives to safeguard information in the age of cloud computing. This also examines how digital archives emerge due to the fast-paced advancements in information technology. As a result of technological advancements, several solutions have been developed to simplify the process of keeping data and documents. Systems for maintaining records are set up to facilitate the creation, archiving, management, and retrieval of records [9]. These systems facilitate data organization, retrieval, and maintenance by offering a systematic approach to information management. Managing electronic records requires the integration of records management concepts with the information technology system that creates, manages, stores, etc. the information/records [9]. Within the local context, a university in Eastern Visayas has pioneered the development of an archiving system to achieve paperless records management. This system facilitates easier retrieval and recording of data while ensuring the security of a dependable database backup [10]. Likewise, the Sto. Niño National High School initiated an Electronic Document Archiving System (EDAS) transitioning from manual record-keeping to a computerized system. This system involves designing and implementing an electronic system tailored to the public high school needs [11]. Nevertheless, the researcher has not yet come across any record management system created specifically for the registrar's office and has an application for document scanning.

Meanwhile, adapting higher education institutions (HEIs) to digital transformation is crucial in the contemporary tech-centric landscape [12]. Specifically, digitization is crucial in higher education, offering many benefits that transform how students learn and institutions operate. Also, digitizing important papers can help the organization create efficiencies, reduce paper waste, and increase worker productivity as it removes filing cabinets and save storage spaces [13]. The Commission on Higher Education (CHED) and the Department of Information and Communications Technology (DICT) crafted a memorandum of understanding to digitize services offered by CHED and higher education institutions (HEIs), such as diploma and transcript release [14]. Another memorandum between CHED and DICT focuses on e-governance to enhance higher education quality through ICT integration and digitalizing scholarships and other services [15]. This potentially modifies administrative processes by automating data extraction and reducing manual effort. This initiative also implies the importance of document repositories and converting documents into digital form.

The University of Antique (UA)-Libertad Campus is an extension of the UA-Main Campus at Sibalom, Antique. Since the main campus releases transcripts of records, diplomas, certificates of graduation, and other student documents, the original admission requirements submitted by the student during enrollment are sent to the office of the registrar in the main campus. In many cases, requesting documents is the university’s one emerging issue since some students' submitted files to the main campus cannot be found. Some reasons identified were mishandling of documents, and no record has been logged, so there is difficulty tracking to see if they have been received by the office or are being processed. Finding the documents takes time because they are all stored in the steel cabinet alongside other documents, causing the delay of the release. This scenario led the researcher to initiate this study. This may reinforce the efforts of the registrar's office to give students fast and efficient services.

There are commercial systems for document archiving and scanning like OPEX Scan Software, MES Hybrid Document System, and ScanEx Document Scanning and Archiving. These software can scan and process documents but do not have a mobile application. This is

the gap in the literature regarding the specific focus on implementing these systems within State Universities and Colleges (SUCs) and other Higher Educational Institutions (HEI). The researcher has not yet come across any record management system created specifically for the registrar's office that have data archiving and document scanning. Hence, this lack of a document scanning application in managing student records leads to the research gap that this study aims to address. Thus, the purpose of this study was to develop the Admission and Registrar Office (ARO) mobile document scanner with an archiving system that will assist the registrar's office in handling the submitted documents during enrollment and managing the students' data and requests. Specifically, this system was developed to capture the students' admission requirements enter admission and request information, and create a quick and easy way to identify the students' submitted documents.

Significantly, this system includes modifying document processing and enhancing efficiency. By digitizing documents on-the-go, staff can quickly capture and store essential information, reducing manual errors and paperwork clutter. This archiving system ensures seamless retrieval and organization of documents, facilitating quicker access to critical data when needed. It also promotes a paperless environment, aligning with sustainability goals and reducing operational costs associated with traditional document handling. Lastly, the researcher conceptualized an Admission and Registrar Office (ARO) mobile document scanner with an archiving system to optimize administrative workflows, improving overall productivity and customer service within the institution.

2. PRODUCT DESCRIPTIONS

In the product perspective, the document scanning and archiving system, which assist in record organizing, sorting, and storing is one significant modern technique. This web-based system was built for the registrar's office to aid in maintaining, preserving, and retrieving the documents of the students and the alumni who requested credentials from the office. To handle the student data and store files, they use manual processes. The basis for system development is transforming paper-based records into a digitally accessible format. Figure 1 shows the different features of the ARO mobile document scanner with archiving system.

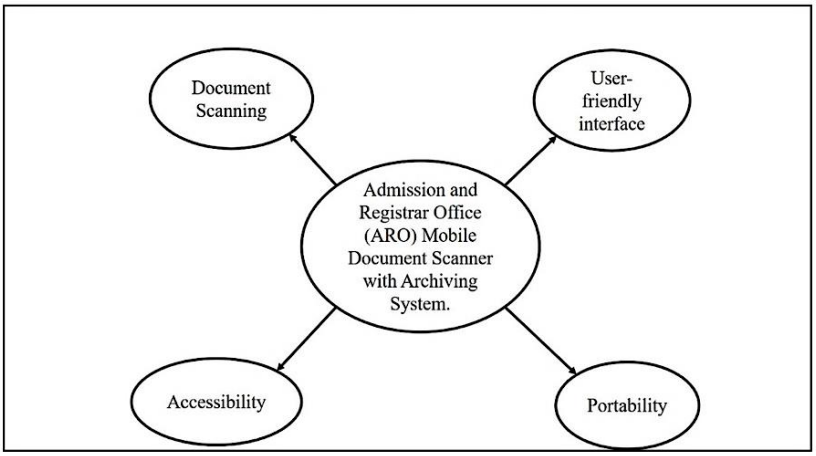
Meanwhile, this system has a user-friendly interface, portability, accessibility, and document scanning features. In terms of the user-friendly interface feature, the study focuses on providing user-system interaction to better comprehend the system's workflow. Since some users are students, having a user-friendly interface will help them use the application efficiently and with minimal supervision. In portability, the application has been uploaded to the Play Store, so users can easily download it. It can be used anytime for document scanning purposes, as it is a web-responsive application. Its versatility and user-friendly interface provide a seamless experience for the users. In accessibility, the system may be set up on the internet or a local network. Given the risks of handling data, it might be considered that local networks are more secure than the internet. Lastly, the document scanning function captures the hardcopy documents submitted by the students during enrollment, like Form 138, certificate of good moral character, and birth certificate. It transforms physical documents into digital copies and store them within the system. This process allows for seamless retrieval and efficient searching of these digitized documents.

In the operational environment, the system's hardware and software components are made to meet some specifications. Regarding the hardware components, the system performs best with a quantity of storage, a CPU speed, and an amount of memory. The first hardware

requirement in the system memory, the Random Access Memory (RAM) needs at least 8 GB. The application's graphical user interfaces appear better with this memory capacity. The processor speed rate is another factor to consider and it is important when it comes to data processing effectiveness. The system requires at least 2 GHz clock speed to support the processing demand. Lastly, the system requires at least 500 GB SSD of disk space due to the large amount of databases that must be stored and maintained. Android devices like tablets and mobile phones are also used for the application, and they have at least 8 GB of RAM and 128 GB of internal storage.

Regarding the software components, this system was developed using the following software: ReactJS, NextJS, Typescript, and MUI for the front end, as well as Docker, NestJS, Typescript, JSON Web token, and REST API for the back end. Considering the strength of open-source technologies, the most probable suggested operating systems for executing apps are Windows, Linux, Ubuntu, and Mac OS. The recommended software for implementing this system is Windows 10/11 and Linux Ubuntu Server. Anything on the internet is accessible with a web browser. The internet is a huge and effective instrument. It uses web browsers like Mozilla Firefox, Google Chrome, Microsoft Edge, and Apple Safari. The database tool appropriate for this system is MYSQL. Lastly, relative to the design and implementation constraints, the issues which the developer may encounter are the hardware, software, and communication interfaces.

Figure 1. *ARO Mobile Document Scanner with Archiving System Scanner Features*



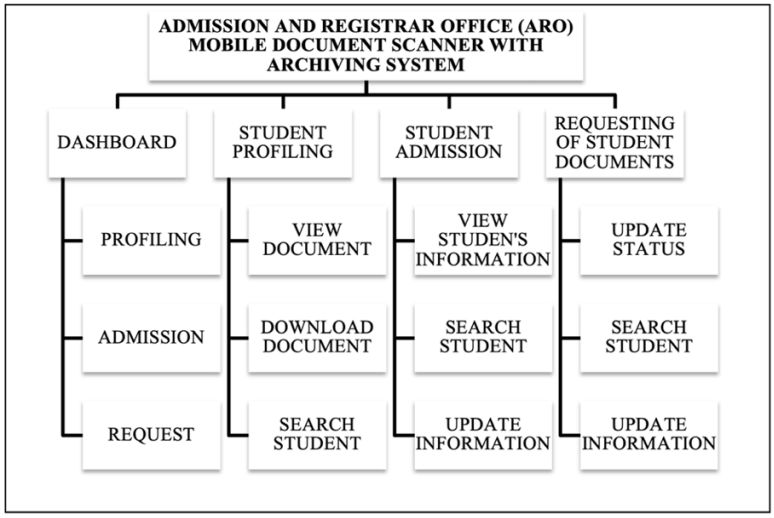
3. SYSTEM FEATURES

There are three types of users for system access: the students, who will use the application in the admission and request of documents; the staff, who scans different documents submitted by the students; and the admin, who is the overall system function. The admin needs to log in to access the system to use it by providing the username and password and oversees monitoring the overall system function. After students fill out the admission and request form, it will be saved in the system. Staff will scan every document that students submit during enrollment.

Figure 2 shows the process flow of the user's staff and admin. It also shows the process of accessing each function from the admin, where the documents and requirements are viewed and monitored. The profiling tab saves all the student documents captured and can be printed or downloaded as requested. The admission tab contains student information that can be

accessed and updated by the user as needed. In the request tab, the system helps the user identify the status and the pending documents requested by the students.

Figure 2. *System Decomposition*



The system features include the following: scan student documents, fill up admission forms, fill up request form, monitor student submitted documents for profiling, manage student records, monitor student request, manage student request, and download application from the Play Store.

Regarding the scanning of students' documents, the staff in charge of scanning will use a tablet or any android device to capture the students' submitted documents and save in the database. To begin scanning the document, you must first click the profiling button. Entering the student ID number is the first step. The system will recognize the student data once the ID has been encoded, and then the document scanning process will start. After scanning all the documents, the user can click the save button. The user can scan the documents successfully if the application is installed on the recommended device. The camera should also be clear to capture the document properly.

In filling up of admission form, the students or staff will fill out the application form and data collected will be saved in the database. The user can access the admission by clicking its icon in the application. The user will provide by inputting all the necessary data in the form. After completing all the data, the user can save it. The saved admission will be stored in the database. The user needs to complete the admission form with the correct information where text, numbers, and dates are acceptable inputs.

Regarding the filling up of request form, the student will input all the data needed to complete the form. He/she must complete the request form when they request their credentials, whether they need it for work, scholarship, or transfer to another institution. This request form will be saved in the database, making it simpler to track requests. Specifically, the user will make use of the app to request any documents. In the application window, you must click the request document icon. The student ID number, last name, and first name will show once the user enters their ID number. The user can choose the documents they request by clicking the

add button. The user may begin selecting by clicking the drop-down button on the select document to request screen, which will now display. The number of documents requested should be complete. The user must click the add button in the upper right corner of the app to add another document. The request will be saved in the database when you click the save button. The user will select the documents the students or graduates need to request. After selecting a document, the user needs to input the number of copies of the requested documents and save them.

In monitoring the student's submitted documents, the user initially needs to click the profiling tab. Then, a profiling form containing information such as the student's name, student ID number, the date the documents were added, and the documents the student submitted will appear. The user will enter the student's name into a search engine to identify the student's submitted documents by clicking the view button. The user can monitor the submitted documents to see if all the documents have already been scanned and saved in the system.

In managing the student records, this allows the system user to edit some records if there are updates about the student. Here, the information should be exact and correct because student records are significant. Using the edit feature, the admin can also modify some data. The admission menu will be displayed when a user clicks the admission tab. The student records will be displayed if the user searches for the student's name in the search bar. The user must click the view button to update some records, and the admission view will appear. If there are some changes, the user will click the field to be edited and click update to save the updated student record. The user can monitor the record if the student or staff completed the admission form.

In monitoring the student request, the user will check the request status, whether it is pending, unpaid, claimed, or ready for release. This system will make it simpler for students to keep track of and manage their requests by informing them of the request status. The user will click the request tab to monitor the students' requests. Then, a request table will appear containing the student ID number, name, date of request, and status. To make it easier to look for the record of the student request, there is a search engine where the user can type the student's name. The user can monitor the student's request when the application form has been filled out.

In managing the request, the students who ask documents for transferring will be evaluated based on their courses, and it also implies that they have been properly dismissed from the institution. Thus, it must be done correctly, and all requests must be fulfilled. Here, the user will click the request tab. The user clicks view or update status after looking up the student's name. The user can override the students by adding or removing documents and by clicking the view button. To add documents, the user will click the add button and select a document to be requested. The added document will be saved in the database. To remove documents, click on the "x" button. The documents will be removed if the user clicks the "x". However, there is a confirmation message to avoid the deletion of the document in case the user accidentally clicks the remove button. The user can monitor and manage student requests whenever some data is not filled out correctly.

In downloading the application from the Play Store, the student can download it anytime and anywhere. Here, the admin will provide a link to download the application. He/she will install the program on their devices. The administrator will provide the program password once the installation is finished. The user can successfully download the application if it is installed on the recommended device. This application is suggested for use with any android smartphone or tablet.

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

4. EXTERNAL INTERFACE REQUIREMENTS

The user interface design field focuses on how the system looks when the user interacts with it. Creating a friendly user interface will ensure that the users can engage with the system efficiently and effectively, creating an enjoyable and hassle-free experience. First, the user needs to enter a password to use the application. Only those officially enrolled as university students are provided with the password to access the application documents button.

Figure 3. *Document Scanner Login Screen*

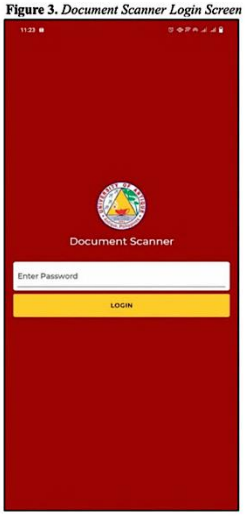
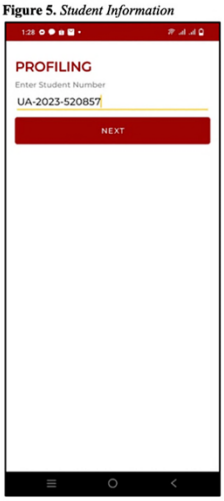


Figure 4. *Document Scanner Screen*

Figure 3 shows the document scanner login screen while figure 4 displays the document scanner screen. This includes the profiling, admission, request document, setting and log-out features. The user must configure the IP address of the application to match the IP address of the administrator's computer when they start using it. Profiling is used for scanning the documents while the admission is for the admission form that the user needs to fill out. Those who will request the documents, the user can click the request document button. If the user wishes to exit the application, there is a log-out button.

Figure 5. *Student Information*



After opening the document scanner application, the user scans the documents by clicking the profiling button. First, the user must enter the student number, and the application will automatically identify the student's last and first names. Figure 5 shows the student information.

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

Figure 6. *Scan Documents*

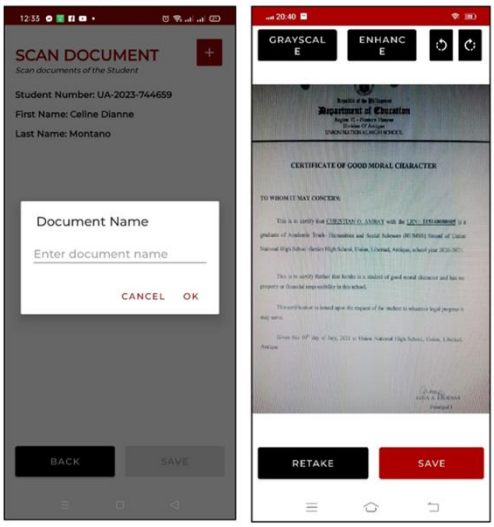


Figure 6 shows the scanning documents feature of the application. After the documents are scanned and the student information is identified, the application will start scanning the documents submitted by the students during admissions like form 138-a or report card, transcript of record, honorable dismissal, PSA birth certificates, marriage certificates if the female student are married and Form 137-A or permanent record. The plus button is used to add the different documents mentioned. After scanning all the students' documents, the user must click the save button to store them in the database.

Figure 7. *Admission Form*

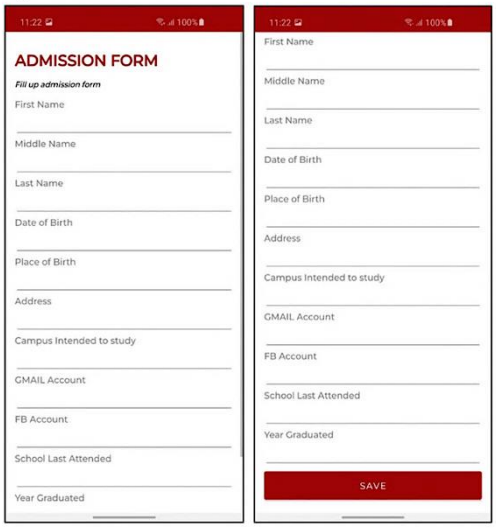


Figure 7 shows the admission form. The user must complete the form by entering all the required data. Then, to save the data in the database, the user must click the save button.

Figure 8. *Request Documents*

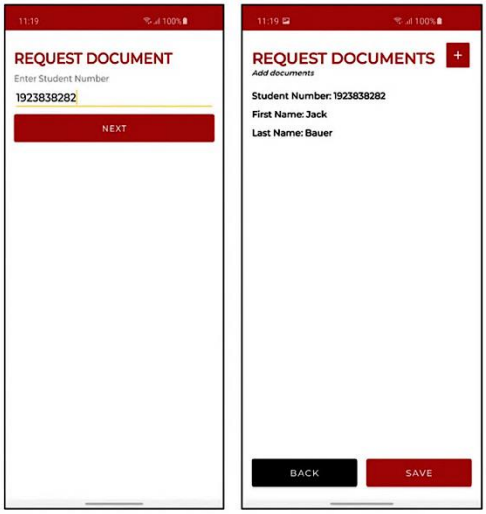


Figure 8 shows the request documents feature. This button in the application must be clicked to request the student's documents. The user must enter the student ID number to proceed to the next step. The student's information, such as the student number, first name, and last name, will appear after entering the student ID number.

Figure 9. *Select Documents to Request*

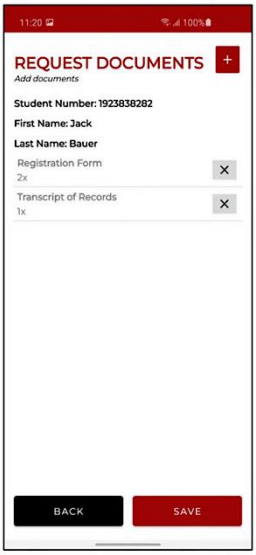


Figure 9 shows the select documents to request button as well as the adding requested documents feature. To request documents, the user must select them from the drop-down list and enter the quantity. Meanwhile, in adding requested documents feature, the user must first click the add button before selecting the additional documents to be requested. Then, the user must click the save button to store the information in the database.

Figure 10. *Admin Login Page*

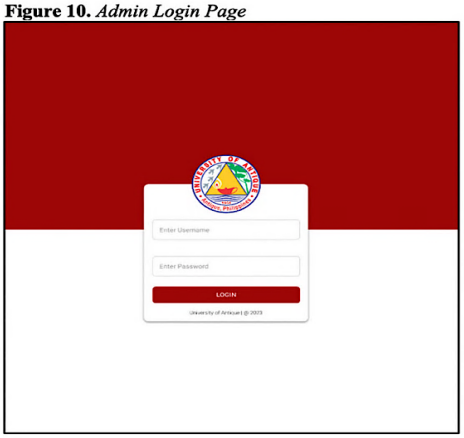
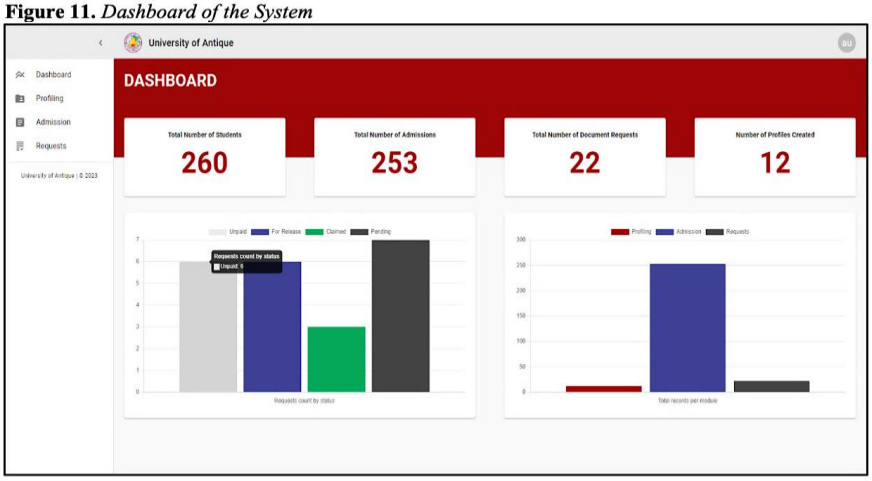


Figure 10 shows the admin login page. Here, the administrator must input the correct username and password to access the system. When the registrar is absent, the staff members are permitted to use the system. To protect the system's data, unauthorized login is not permitted.

Figure 11 shows the dashboard of the system. It will show different information, such as the total number of students, admission, documents requested, and profiles created. There is also a graphical information showing the total records per module. The requests are also counted per status, so it will be easy for the user to identify how many have pending, unpaid, for release, and claimed requests for documents.

Figure 11. *Dashboard of the System*



Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

Figure 12 shows the profiling. Included here are all the submitted documents of the students. The user can use the search button to look for the names of students and then use the view button to check the scanned documents those students have submitted during enrollment.

Figure 12. *Profiling*

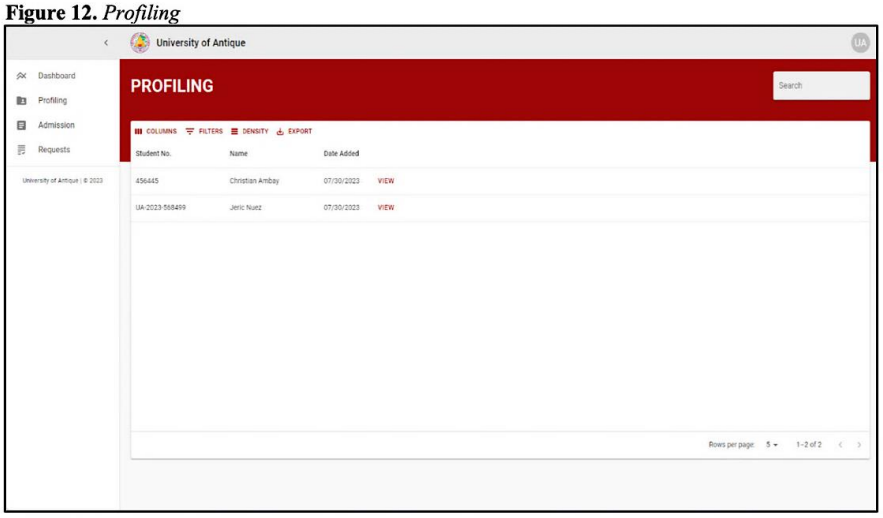


Figure 13 shows the information the students provided when filling out the admission in the document scanner application. There is admission number, student's name, campus to study, last school attended, year graduated, and the date they were added. The admission form is displayed when you click on view, and the admin may change and edit some data if needed. A search option is also provided if the user wants to look up a student's details.

Figure 13. *Admission*

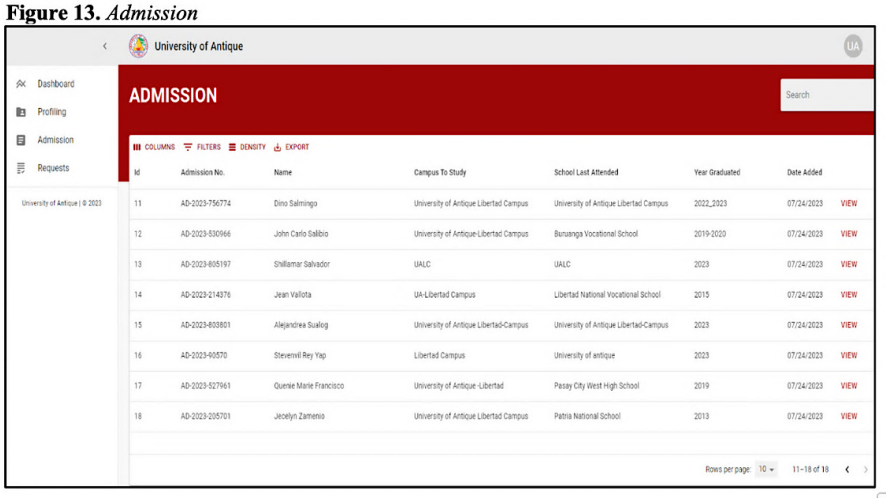


Figure 14 shows all the students who have requested their documents. A student's name, ID number, request date, and request status are included. The admin might change the status of the student's request to show it as pending, unpaid, claimed, or ready for release, among others. The user may be able to identify the document requested by the students by using the

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

view option, which is also available. There is a search button as well, making it simple for the user to see if the students have checked the progress of their request.

Figure 14. *Request*

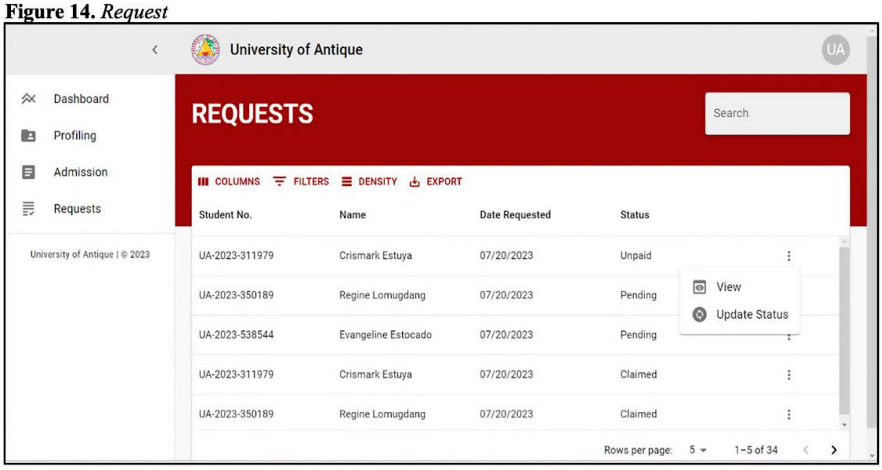


Figure 15 displays if view button in the profiling is clicked. This includes the student number, first name, and last name, which the user can edit for updates. The document that the student provided displays when clicking view document, and it may then be printed as necessary.

Figure 15. *Profiling View*

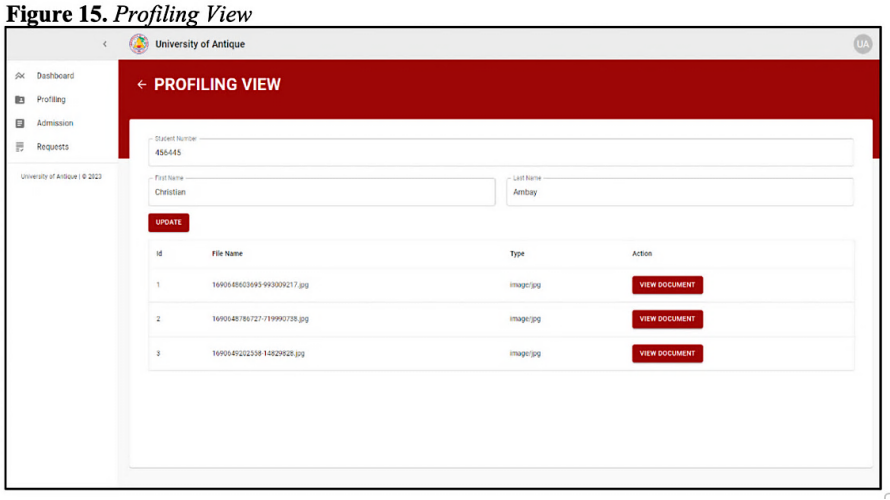
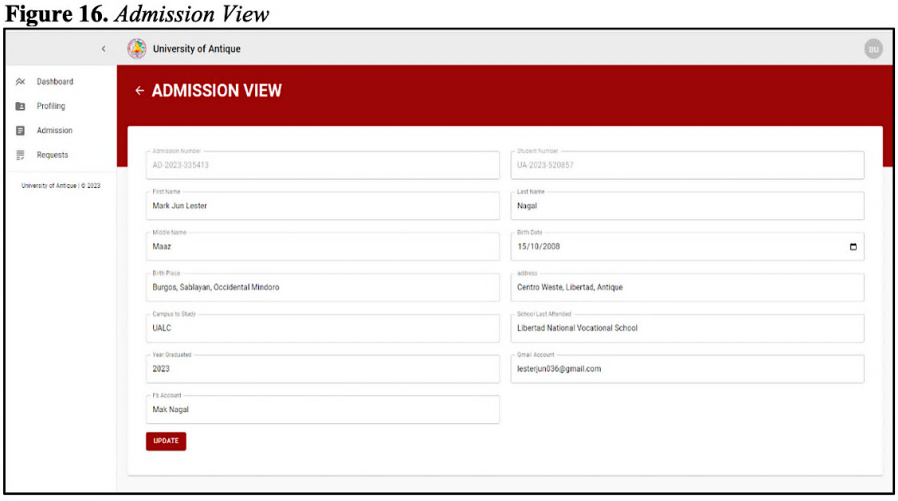


Figure 16 displays when the user clicks the view button in the admission. If data needs to be edited, the user can click any fields that need some update and save it by clicking the update button.

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

Figure 16. *Admission View*



When the user clicks the view button on the request form, the data of the student request will be shown as displayed in figure 17. This will present the student's number, first and last name, and the requested documents. When a student forgets to add a document, the admin may use the add button to add another request, and the delete button can be used to remove the requested document.

Figure 17. *Request View*

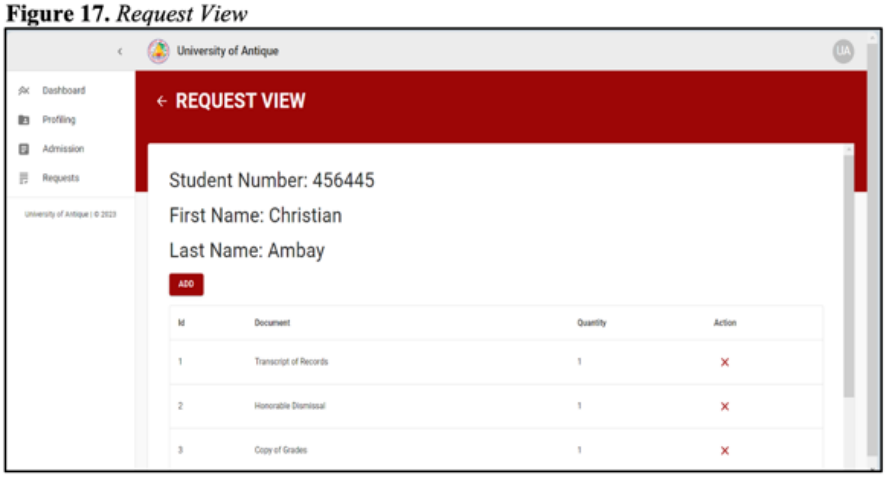


Figure 18. *Tablet/Android Phone*

Figure 18 presents the tablet/android phone as one of the system's hardware interfaces. The proposed system will capture the documents and forms using a tablet or android device. It should be an android with a marshmallow version. To capture the documents and forms clearly, it must have at least a 64 MP camera with 4 GB RAM and 128 GB internal memory.

Figure 19. *Desktop Computer*

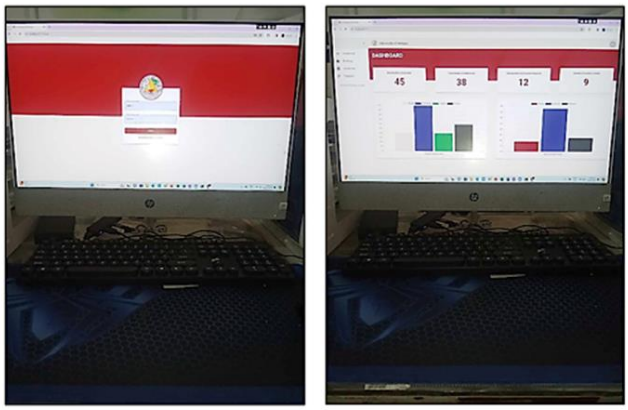
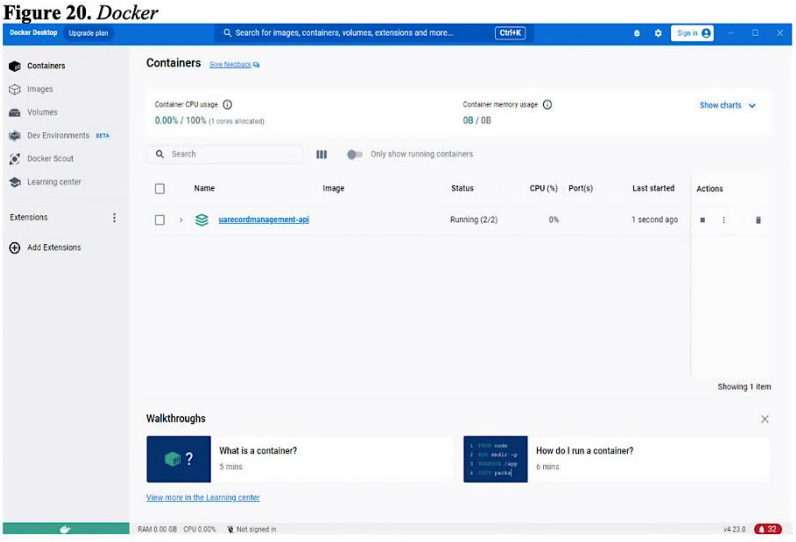


Figure 19 shows the computer device that the Admin user will use during the implementation of the system.

Docker is one of the software interfaces. It allows developers to package applications and their dependencies into lightweight, portable containers that can be run on any system that supports docker. It also makes it easier to develop, deploy, and manage applications by abstracting away the underlying infrastructure and providing a consistent environment across platforms. It is used to build more reliable, scalable, and efficient applications which are easier to manage.

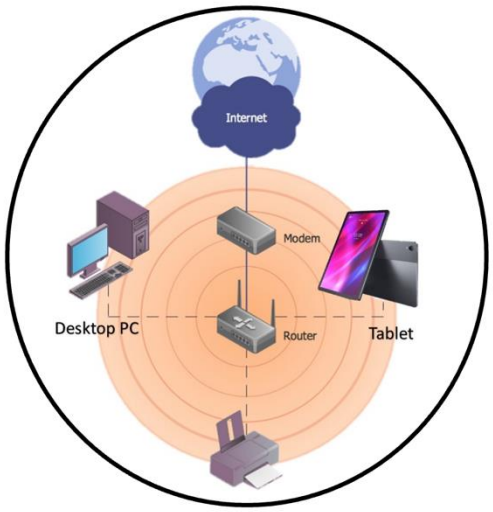
Figure 20. *Docker*



The university now employs star topology. A star topology connects all nodes (computers, servers, or other devices) to a single hub or switch in a computer network. With a star topology, all data passes via the central hub, which is the focus of the network's control. Each node is connected to the hub by a different cable or connection, creating a physical network that resembles a star. This architecture is frequently utilized in LANs due to its high speed, reliability, and scalability (local area networks). Star topology has the advantage of being direct to operate and troubleshoot since each item may be removed or replaced individually without compromising.

Technium Vol. 22, pp.33-54 (2024)
ISSN: 2668-778X
www.techniumscience.com

Figure 21. *Communication Interfaces*



5. OTHER NONFUNCTIONAL REQUIREMENTS

Performance Requirements. The features that the ARO mobile document scanner with archiving system needs to perform are the online environments that a server will host, the downloading of the application in the Play Store for the users, the profiling of students, the admissions of students that were not found in the profiling with the documents which were scanned and uploaded, and the viewing of request for some necessary actions to be taken by the system administrator. As part of the data gathering, 30 respondents were selected to test the proposed system for evaluation: 20 students and 10 professionals. It used a 5-point Pomel scale: Excellent, good, average, low, and very low. The different features of the system are accuracy, user-friendliness, reliability, operability, learning reinforcement, interactivity, compatibility, and cross-platform environment. The programmer should meet these features for a good result and reliable data. Each attribute is described in Table 1.

Table 1. *Summary of Features and Attributes of ARO Mobile Document Scanner with Archiving System*

Product Features	Software Quality Attributes
1. User-Friendliness (Usability)	Operability, Training, and Communicativeness
2. Compatibility (Adaptable)	Operability and Consistency
3. Reliability (Reliability)	Accuracy, Consistency, and Simplicity
4. Interactivity (Human Engineering)	Simplicity and Communicativeness
5. Learning Reinforcement (Understandability)	Consistency, Conciseness, and Modularity
6. Dynamic Environment (Flexibility)	Operability, Expandability, and Modularity

Table 2 presents the system features using several types of documents uploaded by the students with corresponding quality attributes, mean, and interpretation, which are the results based on the formulas presented.

Table 2. *Mapping of Features and Relevant Measures*

Product Features	Software Quality Attributes	Mean	Interpretation
User-Friendliness (Usability)	Operability	4.89	Excellent
	Training	4.89	Excellent
	Communicativeness	4.90	Excellent
Compatibility (Adaptable)	Operability	4.89	Excellent
	Consistency	4.87	Excellent
Reliability (Reliability)	Accuracy	4.91	Excellent
	Consistency	4.90	Excellent
	Simplicity	4.91	Excellent
Interactivity (Human Engineering)	Simplicity	4.90	Excellent
	Communicativeness	4.91	Excellent
Learning Reinforcement (Understandability)	Consistency	4.90	Excellent
	Conciseness	4.86	Excellent
	Modularity	4.87	Excellent
Dynamic Environment (Flexibility)	Operability	4.89	Excellent
	Expandability	4.90	Excellent
	Modularity	4.89	Excellent

The study used a five-point Pomel scale to measure the system. The proponent used google forms because the interfaces are easy for the respondents to use, and it is easy to integrate data aside from being user-friendly. After the data were collected through the survey, the proponent got the results instantly from the 30 respondents and tabulated the data in each feature.

User-Friendliness. The system is reliable and user-friendly for each client. Clients can easily operate the system using the mobile application, especially when scanning documents. The system administrator can easily locate the files uploaded and store those documents in the admission panel. For this attribute, the results are as follows: Operability (m = 4.89), Training (m =4.89), and Communicativeness (m = 4.90). This results in a mean score of 4.89, which is "excellent".

Compatibility. It is a system feature that software can work on different platforms regardless of the operating used by the client and the administrator. These are the quality attributes and their scores: Operability (m = 4.89) and Consistency (m = 4.87), in which the two have a mean value of 4.88 and were rated as "excellent."

Reliability. It is a system feature referring to the capability of the archiving system to maintain its level of performance under stated conditions for a stated period. These are the quality attributes and their scores: Accuracy (m=4.91), Consistency (m=4.90), and Simplicity (m=4.91). This results in a mean score of 4.91, which is "excellent".

Interactivity. This system feature allows interaction between clients who will serve as the administrator. These are the quality attributes, and their scores are Simplicity (m=4.90) and Communicativeness (m=4.91). This results in a mean score of 4.90, which is "excellent".

Learning Reinforcement. This system feature helps the clients upload their documents by scanning materials, and the administrator tracks those students with requests. For this

feature, these are the quality attributes, and their scores: Consistency (*m*=4.90), Conciseness (*m*=4.86), and Modularity (*m*=4.87). This results in a mean score of 4.88, which is "excellent".

Dynamic Environment. This system feature that the interface changes every time there is progress, or the client will be directed to another level. For this feature, these are the quality attributes, and their scores: Operability (*m*= 4.89), Expandability (*m*=4.90), and Modularity (*m*= 4.89). This results in a mean score of 4.89, which is "excellent".

Safety and Security Requirements. This section discusses the security and safety requirements of the system, which should be included in the orientation before using the system.

Data Authorization. Strong access control measures should be built into the system to guarantee that only people with permission may view the system. The admin system can only be accessed by authorized users to protect student information. System admin access is restricted to registrar-designate only. Limiting the people who can access the important information of students will ensure its protection and safety.

Data Backup. A server with a big storage capacity was utilized because the system relies on offline technologies since it uses local hosting, and the different data to be saved needs a large capacity because it includes different records of the students. Alternative choices for data backup include utilizing an external hard drive and other portable or removable media.

Software Quality Attributes and Metrics. In this section, all measures are discussed, and other criteria are presented to explain the relationship of these system features. Each feature is mentioned in the ARO mobile document scanner with archiving system, which has a corresponding software quality attribute and ensures that these are clear and detectable to the users. The respondents rated all the attributes as easy, cost-effective to obtain, consistent, and validated for accuracy and reliability.

Data Analysis. After the data were gathered, the proponent used frequency distribution to determine if the purpose of the mobile application had been achieved. Then, the average results were generated, and mean scores and percentile rank were computed. Formula 1 was used to compute the percentile rank after the survey. Formula 2 was used to compute the mean score. This is to compute the attributes' percentage of the system.

Formula 1. *Percentile Rank*

$$\text{Percentile Rank of x} = \frac{\text{No. of values below x}}{\text{n}} \times 100$$

Formula 2. *Mean*

$$\text{Mean} = \frac{\text{Sum of All the Scores.}}{\text{Number of Scores}}$$

Operability. It is an attribute that determines whether the mobile application is fit and desirable and ensures that the software can accomplish a task by the user. Based on the evaluation, the system has a mean rating of 4.89 and is interpreted as "excellent."

Training. It is an attribute of the software that familiarizes the user with the mobile application so they can use it properly. During the development of the system interfaces, proper documentation was made based on the application interfaces, including the user manual. Users can familiarize themselves with the different buttons or interfaces on the offline system and the mobile application for the clients. The attribute means the score is 4.89, which implies that the application is "excellent" in Training.

Communicativeness. It is a software attribute that provides the system with inputs and outputs to the application. The input and output can help the user in using the application. Results are generated based on the user's performance. The attribute mean score is 4.90, which implies that the application is "excellent" in communication.

Completeness. It is a software attribute that provides all the information necessary for the full implementation of the application. The ARO mobile document scanner with archiving system provides all the functionalities, interfaces, and issues related to connectivity and the desired outputs per user. The attribute means the score is 4.89, which implies that the application is "excellent" in terms of completeness.

Consistency. It is a software attribute that provides a uniform implementation regardless of the user. The ARO mobile document scanner with archiving system provides consistent interfaces, buttons, and designs so that the user can easily understand the function of the mobile application. The attribute mean score is 4.87, implying that the application is "excellent" in Consistency.

Accuracy. Software's ability to deliver correct and precise application output is one of its attributes. The attribute mean score is 4.91, which implies that the application is “excellent” in terms of accuracy.

Simplicity. It is a system attribute that implements humanly readable and easily testable functions. The system provides well-implemented functions where users can use mobile applications easily. The attribute mean score is 4.91, which implies that the application is "excellent" in terms of simplicity.

Conciseness. In program codes or commands, this attribute describes how compact the program is. The attribute mean score is 4.86, which implies that the application is "excellent" in terms of Conciseness.

Hardware Independence. This attribute refers to the degree to which the software differs from the hardware it uses. The attribute mean score is 4.89, which implies that the application is "excellent" in terms of hardware independence.

Testing Requirements. Product testing was done to ensure the mobile application's functionality was met. The developer must test the target users. There are no perfect systems or applications. Therefore, to detect the defects or errors in the application, the application must be tested.

Unit Testing. Unit testing is a software testing technique in which individual components of the software, like groups of computer program modules, usage procedures, and operating procedures, are examined to determine suitability. It is a testing method in which the developer tests each module to see whether there is a problem.

Integration Testing. Integration testing is a kind of testing in which software modules are logically integrated and tested as a group. A typical software project comprises several software modules written by various programmers. This level of testing aims to identify flaws in the interaction of various software modules when combined. The tools that are used to perform this testing on the system are Selenium Java with Maven and Cucumber framework. Using automation testing, integration testing can be done quickly by running test scripts combining modules of the system/application.

Validation Testing. Testing the system was done by the clients and the university registrar to check if the proposed system was implemented correctly. The ARO mobile document scanner with archiving system is still being developed and needs improvements. A questionnaire created using Google forms was given to the users to check the reliability and validity of the system and its functionalities. The survey helps the proponent improve the system through their feedback and suggestions. Respondents were students/clients and IT professionals. As seen in the results in table 3, the mobile application is excellent since all the descriptions are met to give an "excellent" remark. This clearly indicates that the application gives an accurate and complete result.

Table 3. *Results of Validation Testing of the Application*

Software Quality Attributes	Mean	Interpretation
Accuracy	4.91	Excellent
Audibility	4.90	Excellent
Communication	4.90	Excellent
Completeness	4.93	Excellent
Conciseness	4.86	Excellent
Consistency and Understandability	4.90	Excellent
Data Commonality	4.91	Excellent
Decomposability	4.87	Excellent
Error Tolerance	4.89	Excellent
Execution Efficiency	4.87	Excellent
Expandability	4.91	Excellent
Generality	4.89	Excellent
Hardware Independence	4.89	Excellent
Instrumentation	4.87	Excellent
Modularity	4.90	Excellent
Observability	4.87	Excellent
Operability	4.89	Excellent
Security	4.87	Excellent
Simplicity	4.90	Excellent
Software System Independence	4.89	Excellent
Traceability	4.91	Excellent
Training	4.91	Excellent

Other Testing Procedures. This study employed the regression testing. When the code is changed, regression testing is required to evaluate whether the modified code will affect other portions of the software application. Furthermore, this test is required when a new feature is added to the software application. Regression tests may be performed when a functional or performance defect/issue is resolved. It is done by using automation testing. The same goes for the tools that are used during integration testing.

6. PROJECT MANAGEMENT

Hardware Recommendations. The system developer considered the peripherals required to provide the customers with proper product throughout the system's creation. Performance, efficiency, and output quality are typically used to evaluate hardware needs since they are considered key components in the system. The developer suggests the minimum requirements for hardware devices and is open to upgrading the hardware specifications to meet the user's demands. If the right hardware requirements support the product, it functions effectively. In this section, the developer also suggests the minimum computer hardware to maximize the program's use. The following lists the hardware recommendations that are most compatible with the system.

Table 4. *Hardware Specification*

Computer Requirements: (Admin or Server)	
Processor	Intel Core i5 or i7 processor with at least 2 GHz clock speed.
RAM/Memory	At least 8 GB of RAM
Hard Drive	500 GB SSD
Tablet/ Android Phone: (Staff and Student)	
Internal Storage	128 GB
RAM	4 GB
Camera	Mega Pixel
Actual Hardware Specification	
Computer Specification: (Admin or Server)	
Processor	12th Gen Intel Core i5 processor with at l800 MHz clock speed.
RAM/Memory	16 GB of RAM
Hard Drive	1.5 TB SSD

Software Recommendations. The developer has considered certain computer software to support the system's functions and operations. The proponent recommends the appropriate software throughout the implementation phase so that the product can run properly. The list of recommended software specifications is provided below to address the system compatibility issue.

Table 5. *Software Recommendations*

Computer Requirements: (Admin or Server)	
Operating System	Windows 10/11, Linux Ubuntu Server
Database	MySQL
Browser	Google Chrome
Tablet or Android Phone: (Staff and Students)	
Operating System	Android
Android Version	Marshmallow

Product Feasibility Assessment. The proponent then undertakes a plan to evaluate the viability of the new product after determining the technical needs and the user criteria. It is a marketing strategy to test the product's advantages and disadvantages and the effects of outside variables like potential threats and opportunities. Doing this study is important for business decisions regarding the product. The following sections will continue to cover these and other criteria used to determine whether a product is viable, including marketing strategy, management and staff, economic factors, and the production plan. At least three (3) IT specialists will review the proposed system to determine whether it has significant advantages and complies with the technical committee's standards.

Time Management. The admin will monitor the system while the staff captures the documents submitted by the students. This process is for planning the conscious control of time on a specific activity, especially on how to increase the effectiveness, productivity, and efficiency of the system.

Communication, Coordination, and Team Composition. In this project, the proponent conducted interviews and observations among the staff and students. The data gathered was used to formulate the system's goals and objectives. This system was made to make the whole process much more convenient for the admin, staff, and students.

Risk Management. There are three potential risks: data breaches and loss, technological risk, and operational risk. In terms of the data breaches and loss, unauthorized access to sensitive data stored in the system poses a significant risk, potentially leading to breaches of privacy, misuse of data, losses of data and violations of data protection laws. Regarding the technological risk, the security and operation of a system can be seriously threatened by hardware malfunctions, vulnerabilities in software, or system failures. These problems might lead to data damage, loss, or illegal access. Relative to operational risk, this may include but not limited to human error, inadequate training, and a lack of backup procedures can all severely compromise an archiving system's operation and security. Meanwhile, there are ways to mitigate the risks. First is access control. Here, to enhance the security, it is important to strictly implement the access control to limit the user of the system. Only the staff and admin, who are authorized users, have access to the system. Secondly, there should be regular back-ups. There must be a weekly backup that should be implemented to prevent loss in case of system failures. Lastly, there should be training and awareness for all the users on data handling best practices to reduce the risk of mishandling sensitive information and documents.

Policy Development. Policies should be established in terms of data retention policy, incident response plan, and training policy. Regarding the data retention policy, a clear guideline shall be established on how long should data be kept and when should it be securely disposed. In terms of incident response, a plan for quickly and efficiently handling system malfunctions, data breaches, and other security issues will be developed. This plan will lessen or prevent system risk in the future. Lastly, implementing comprehensive training is essential to all users to educate them on data security protocols. These initiatives seek to raise user’s awareness of the value of data security and provide them with the skills and knowledge needed to secure confidential data.

7. SUMMARY

Admission and Registrar Office (ARO) Mobile Document Scanner with Archiving System came from a vision of organizing documents of the students in the school. Documents were scanned using a mobile application to automatically be uploaded in the system as a profiling of students. The documents uploaded will be stored as a basis for the submitted student's credentials. Administrators can easily access and review the uploaded documents, facilitating a more streamlined and accurate verification process. Additionally, the centralized storage of student profiles simplifies data management and retrieval, making it easier to maintain up-to-date and comprehensive records. On that note, the university can easily track the students' documents and process them once the student requests them. This eliminates the need for manual searching through physical files and reduces the risk of misplaced or lost documents. As a result, universities can promptly process student requests, such as registration forms, copies of grades, and more. The streamlined process not only improves efficiency but also enhances the overall student experience and makes it considerably more convenient for the university's administration and staff.

8. ACKNOWLEDGEMENT

The main author express her deepest appreciation to her dedicated thesis adviser, Dr. Wayne Custer Alegata, and her respected committee members for their invaluable support and guidance throughout her journey. She is also grateful to her husband, daughters, family, friends, the University of Negros-Recoletos Graduate School and the University of Antique-Libertad Campus for their unwavering support, which has been instrumental in the successful completion of this research.

9. REFERENCES

[1] MES Hybrid Document Systems (MESHDS). Archive document scanning: The affordable road to entirely paperless. 2020. https://blog.mesltd.ca/archive-document-scanning-the-affordable-road-to-entirely-paperless

[2] Scan2Archive. 7 most important benefits of document scanning and digitisation. 2023. https://www.scan2archive.com.au/7-most-important-benefits-of-document-scanning-digitisation/

[3] Corona L. Digitization: An overview of the advantages and disadvantages. 2023. https://www.intechopen.com/online-first/1149791

[4] Verified Market Reports. Global document scanning services market by type (Online Service, Offline Service), by application (Large Enterprises, SMEs), by geographic scope and forecast. 2023. https://www.verifiedmarketreports.com/product/global-document-scanning-services-market-2019-by-company-regions-type-and-application-forecast-to-2024/

[5] OSGConnect. Why you need to consider document scanning and archiving for four business. 2023. https://osgconnect.com/why-you-need-to-consider-document-scanning-and-archiving-for-your-business/

[6] Yusuf S, Odekoya O. Trend in contemporary record management. 2021. https://www.researchgate.net/publication/353495526_Trends-in-Contemporary-Record-Management

[7] Lee K. What is document archiving, and why is it important? 2019. http://virtualvds.com/2019/01/17/what-is-document-archiving-and-why-is-it-important/

[8] Bengi NI. Preservasi arsip digital sebagai upaya penyelamatan informasi di era cloud computing. IJAL (Indonesian Journal of Academic Librarianship). 2021 Oct 31;5(1):35-41. http://journals.apptisjatim.org/index.php/ijal/article/view/93

[9] University of Wisconsin. Records management guidelines for information technology systems. 2020. https://www.wisconsin.edu/compliance/records-management/records-management-resources/records-management-guidelines-for-information-technology-systems/

[10] Villarosa EC. Developing a record archiving system in Eastern Visayas State University–Burauen Campus. https://rb.gy/tqucmg

[11] Cuevas LA, Casauay RP. Electronic document archival system of Sto. Niño National High School. International Journal of Scientific and Management Research, 5(6). 2022. http://doi.org/10.37502/IJSMR.2022.5601

[12] Gkrimpizi T, Peristeras V, Magnisalis I. Classification of barriers to digital transformation in higher education institutions: Systematic literature review. Education Sciences. 2023 Jul 20;13(7):746. https://doi.org/10.3390/educsci13070746

[13] Rajeev R. Digitization of historical manuscripts now a global trend. Managed Outsource Solutions, Inc. 2015. https://www.managedoutsource.com/blog/digitization-of-historical-manuscripts-now-global-trend/

[14] Balancio J. CHED, DICT to digitize release of diplomas, transcripts, and certifications. ABS-CBN News. 2023. https://rb.gy/b9q88r

[15] Sevillano S. CHED wants scholarships and other services digitalized. Philippine News Agency. 2023.

[16] Condez GT. Digital document repository system of researches utilizing search engine tools. South Asian Journal of Engineering and Technology. 2022 Mar 31;12(1):18-23. https://doi.org/10.26524/sajet.2022.12.04