Republic of the Philippines
Western Mindanao State University
COLLEGE OF COMPUTING STUDIES
DEPARTMENT OF INFORMATION TECHNOLOGY
Zamboanga City

FINQUANT: A MOTION RECOGNITION-BASED FISH COUNTING APPLICATION

A CAPSTONE PROJECT

Presented to the Faculty of the College

of Computing Studies

Western Mindanao State University

In Partial Fulfillment

Of the Requirements for the Degree

Bachelor of Science in Information Technology

By
ARAT, CHERRY LOU O.
ENOLPE, CRISTON JADE B.
LADAO, RENEL JOY

JOHN ED AUGUSTUS A. ESCORIAL, MIT
Adviser

July 14, 2023

APPROVAL SHEET

WESTERN MINDANAO STATE UNIVERSITY
Zamboanga City, 7000 Philippines

College of Computing Studies
Information Technology Department

CERTIFICATE OF PANEL APPROVAL

The Capstone Project, attached hereto, entitled **"FINQUANT: A MOTION RECOGNITION-BASED FISH COUNTING APPLICATION",** prepared and submitted by **CHERRY LOU O. ARAT, CRISTON JADE B. ENOLPE, RENEL JOY LADAO** in partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY,** is hereby recommended for approval.

MS. LUCY F. SADIWA
Chairperson

_____
Date

MR. JASON A. CATADMAN
Member

_____
Date

MR. JHON PAUL I. ARIP
Member

_____
Date

MS. PAULEEN JEAN A. GREGANA
Member

_____
Date

MS. JUSTINE ANN C. ALBAY
Adviser

_____
Date

This Capstone Project is approved in partial fulfillment of the requirements for the degree **BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

JOHN ED AUGUSTUS A. ESCORIAL, MIT
Department Head, IT

_____
Date

DR. RODERICK P. GO
Director, ICS

_____
Date

EXECUTIVE SUMMARY

FinQuant is a revolutionary mobile application designed exclusively for small businesses in the fish industry, offering an innovative solution to simplify fish detection and counting. With a focus on ease of use and accuracy, FinQuant transforms the way fish sellers manage their inventory, ensuring a streamlined and efficient process for businesses of all sizes.

This project aims to provide instant fish recognition through a smartphone camera in order to save time from manual counting and tedious inventory management. The application automates the counting process, allowing small businesses to effortlessly track their fish stock in real-time. The user-friendly interface ensures accessibility for all, while the enhanced accuracy of the application prevents counting errors and facilitates informed decision-making regarding restocking and sales strategy.

In conclusion, FinQuant stands as a transformative solution for small enterprises, reshaping the landscape of fish management in an era where efficiency is important. With its cost-effective approach, simple user interface, and precise fish detection capabilities, FinQuant emerges as an important device for fish vendors. This project not only simplifies the intricate process of fish counting but also empowers enterprises to elevate their operations to an unprecedented degree.

DEDICATION

This effort serves as proof of the numerous and laborious sacrifices that have been accomplished. The dedicated researchers would like to extend their sincere appreciation to those who have provided them with unwavering love and support.

A heartfelt acknowledgment extends from the nurturing care of our parents to the consistent encouragement provided by our close circle of friends. Throughout periods of success and difficulty, these people have not only served as pillars of encouragement but also a source of motivation that propelled our efforts. We extend our heartfelt gratitude for the invaluable support provided by our loved ones, whose unwavering commitment has had an enormous impact on the development of this project.

Above all, we express our utmost gratitude to the Almighty God for giving His blessings, which have provided us with the strength and understanding required to conduct this research.

ACKNOWLEDGEMENT

We extend our sincere gratitude and appreciation to all those who have contributed to the successful completion of this project. This work has been shaped by the support, encouragement, and guidance of people, and we wish to express our heartfelt thanks.

First and foremost, we would like to acknowledge the unwavering support of our families and parents, whose love and encouragement have been constant sources of our strength, we deeply appreciate the sacrifices they have made for us.

Our deepest thanks also go to our close friends and colleagues for making this journey enjoyable. Your assistance and support were crucial to the accomplishment of this project.

We also extend our sincere appreciation to our respected advisor, Ms. Ceed Jennelle Lorenzo, who generously shared her knowledge and insights, contributing to the intellectual richness of this work.

Finally, we acknowledge the Almighty God for His blessings and grace, which have been the guiding force behind our efforts. The divine support has provided us with the resilience, wisdom, and determination needed to navigate challenges and persevere in our pursuit of knowledge.

TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF APPENDICES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

This section of a research paper or project establishes the context and boundaries of the study. It includes the following components: Project Context, Purpose and Description, Objectives, Scope and Limitations, Significance of the Project, and Definition of Terms. It ensures that the reader understands the research problem and the approach that the study will take to address it.

1.1. PROJECT CONTEXT

The business has been valuable to individual success and economic growth for centuries. Entrepreneurship, as a driving force behind economic progress, has been widely recognized and acknowledged. One of many businesses here in Zamboanga City is selling aquarium fish. The small business in the fish industry in Zamboanga City specializes in selling aquarium fish, which are widely kept as pets and play an important role in the city. Accurate fish counting is essential for aquarium fish businesses as they rely on maintaining a diverse range of fish species to meet customer demands. It plays a vital role in inventory management, pricing, and ensuring the health and well-being of the fish. Traditional methods of fish counting, such as manual visual inspection or net-based sampling, have proven to be time-consuming and complex. Additionally, these methods can cause stress and potential harm to the fish. Furthermore, inaccurate fish counts can lead to overstocking, causing overcrowded and stressful environments that compromise water quality and increase the risk of disease outbreaks. On the other hand, underestimating fish populations can result in inadequate resources for fish care. Misrepresenting the available stock to customers can lead to dissatisfaction, negative reviews, and potential loss of business. Proper inventory management based on accurate fish counts also allows businesses to set appropriate pricing, maximizing profitability. The FinQuant project incorporates several key processes to enable accurate and efficient fish counting for aquarium fish businesses. It leverages advanced motion recognition technology, employing computer vision algorithms to automatically detect and track fish movement within aquarium tanks. The user-friendly interface of the application enables businesses to 2 easily set up cameras and monitor fish counts in real time, with minimal technical expertise required. This comprehensive approach ensures that aquarium fish businesses can efficiently manage their inventory, optimize pricing, and provide exceptional care for their fish, ultimately enhancing their operations and customer satisfaction.

1.2. PURPOSE AND DESCRIPTION

Accurate fish counting is crucial for inventory management, pricing, and maintaining the health and well-being of the fish. However, traditional methods of fish counting are often labor-intensive, time-consuming, and prone to errors. These issues can lead to overstocking, inadequate resources for fish care, misrepresentation of available stock to customers, and potential negative impacts on fish health and customer satisfaction. Below are the identified several problems encountered by businesses that sell aquarium fish, which necessitated the development of FinQuant. These problems include:

- Inaccurate Fish Counts - Manual fish counting methods are prone to human error, leading to inaccurate fish counts. This can result in overstocking or underestimating stock levels, disrupting inventory management and profitability.

- Labor-Intensive Processes - Traditional fish counting methods involve manual labor, requiring significant time and effort. This hinders the efficiency of businesses and may lead to delays in restocking or misjudgment of customer demands

FinQuant a motion recognition-based fish counting application specifically designed for aquarium fish businesses proposed as a solution to address the problems of inaccurate fish counts, labor-intensive processes, and limited data insights in aquarium fish businesses. By providing accurate and efficient fish counting, it enables businesses to improve inventory management, optimize pricing strategies, and ensure the health and well-being of the fish, as well as, enhancing their operations and customer satisfaction.

1.3. OBJECTIVES

FinQuant generally aims to develop a motion recognition-based fish counting application that addresses the challenges faced by businesses selling aquarium fish. This is to ensure accurate and efficient fish counting, automating data logging processes, and providing users with the ability to archive data and generate PDF summaries for better data management and analysis.

To meet the general objective, the following **specific objectives** include:

1. **Accurate Fish Counting**
    - Develop and implement a precise and reliable motion recognition algorithm that ensures the accurate counting and tracking of individual fish within aquariums under varying conditions.
2. **Automated Data Logging**
    - Design and deploy a system that automates the logging of fish count data in real-time, reducing manual efforts and improving overall efficiency in data collection and storage.
3. **Archiving and PDF Generation**
    - Create a feature that organizes historical fish count data into an easily accessible archive, allowing users to generate PDF summaries for specific time frames. This facilitates organized record-keeping and analysis.

1.4. SCOPE AND LIMITATIONS

1.4.1. Scope

The project focuses on providing a mobile-based application of motion recognition for accurate fish counting specifically designed for aquarium fish sellers in Zamboanga City. It aims to cater to their specific needs and requirements in accurately counting and managing fish populations. The primary function of FinQuant is fish counting using motion recognition technology. It automates the process of detecting fish movement within aquarium tanks, providing accurate and reliable fish counts. Additionally, it includes a history feature that allows users to view the counted fish sorted by day, providing a record of the past fish counts. The application also allows users to rename and save the fish count data for easy organization and reference. Specifically, the target users of FinQuant are aquarium fish sellers in Zamboanga City which includes aquarium shops or pet shops. FinQuant will be deployed in the environment of Zamboanga City's aquarium fish sellers. It will be designed to run on Android phones. The deployment environment will include the necessary hardware, such as phone cameras by aquarium fish sellers in Zamboanga City.

1.1.1. Limitations

Technical Limitations - The accuracy and performance of the fish counting function in FinQuant may be influenced by factors such as camera quality, tank setup, and environmental conditions. This will also not be applicable for iOS devices.

Specific to Zamboanga City - The scope of the project is limited to aquarium fish sellers in Zamboanga City. The application may not address the specific needs and requirements of aquarium fish sellers in other locations.

Language Support - Initially, the application may support a limited number of languages, with a primary focus on one language. This may limit accessibility for businesses operating in non-supported languages.

Training and Support - The level of training and support provided for users of FinQuant may be limited initially.

1.4. SIGNIFICANCE OF THE PROJECT

Through leveraging advanced technology, the project positively impacts the profitability and overall success of aquarium fish businesses while promoting responsible practices within the industry. The FinQuant holds significant significance for businesses involved in selling aquarium fish these includes:

- Accurate Inventory Management through providing businesses with an accurate fish counting solution, enabling them to effectively manage their inventory. Accurate stock counts help prevent overstocking or understocking, ensuring that businesses have the right number of fish available to meet customer demands. This leads to better inventory planning, reduced costs, and increased operational efficiency.

- Improved Pricing Strategies via accurate fish counting data obtained through FinQuant allows businesses to set appropriate pricing for their fish species. They can adjust prices based on availability, rarity, and market demand, leading to optimized pricing strategies. This helps businesses maximize their profitability by ensuring competitive pricing while maintaining healthy profit margins.

- Enhanced Customer Satisfaction by accurately counting fish populations, businesses can provide reliable information to customers about the availability of specific fish species. This transparency builds trust and improves customer satisfaction. Customers can make informed purchasing decisions, confident that the fish they desire are in stock. It reduces disappointment and fosters positive customer experiences.

- Streamlined Operations by streamlining fish counting processes, saving time and effort for businesses. With an intuitive user interface, businesses can easily set up cameras, and monitor fish counts in real-time. This efficiency translates into streamlined operations, allowing businesses to focus on other critical aspects of their operations.

- Sustainability and Conservation since accurate fish counting is essential for promoting sustainable practices in the aquarium fish industry. By maintaining accurate stock counts, businesses can ensure responsible sourcing and avoid depleting natural populations. This contributes to the conservation of fish species and the long-term sustainability of the industry.

1.5. DEFINITION OF TERMS

Below are some definitions of terms related to FinQuant:

- **Entrepreneurship** - The process of designing, launching, and running a new business, often in response to identified market needs or opportunities.

- **Aquarium Fish** - Fish species that are kept in aquariums as pets or for display purposes.

- **Inventory Management** - The process of managing and controlling the flow of goods or products in a business, including tracking inventory levels, ordering and receiving products, and managing stock levels.

- **Motion Recognition** - The process of using computer vision algorithms to detect and track movement in a video stream.

- **Computer Vision** - The field of artificial intelligence that focuses on enabling computers to interpret and understand visual data.

- **Machine Learning** - A subset of artificial intelligence that involves training algorithms to learn from data and make predictions or decisions based on that data.

- **User Interface** - The visual and interactive elements of a software application that allow users to interact with and control the application.

- **Accuracy** - The degree to which a measurement, calculation, or prediction is correct.

- **Reliability** - The degree to which a system or process consistently produces accurate results.

- **Performance -** The speed, efficiency, and effectiveness of a system or process in achieving its intended goals or objectives.

- **Sustainability** - The ability to maintain or support a process or system over time, without depleting resources or causing harm to the environment or society.

- **Conservation** -The protection and preservation of natural resources, including fish species, to ensure their long-term viability and sustainability.

- **Mobile-based -** Developed for use on mobile devices such as smartphones, providing a user-friendly experience tailored to smaller screens.
- **Rarity -** The quality of being uncommon or infrequently found, often indicating uniqueness or scarcity.

- **Intuitive -** Characterized by ease of use and natural understanding, requiring minimal instruction for user interaction.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

This section provides a comprehensive overview of the existing literature and studies related to the research topic. The review of related literature aims to identify the gaps in the current knowledge and provide a theoretical framework for the research.

2.1. INTRODUCTION

Fish for pets plays a significant role in many households around the world. The species represents an important element for many of the subsistence artisanal fisher folks. That is why entrepreneur makes develop a profitable business in the aquarium fish trade industry. many millions of hobbyists worldwide participate in this industry, leading to the rapid expansion of the aquarium fish trade over the past 50 years. The popularity of keeping fish as pets is evidenced by the estimated 10% of households in the United States and 13% of households in the United Kingdom that have fish as pets.

Furthermore, the trade in ornamental fish species not only relieves the captured pressure on dwindling wild stocks but also contributes significantly to the economic growth of the industry (Sharon et al., 2014). But aquarium fish sellers had difficulties in accuracy specifically in fish counting which leads to several consequences such as overstocking, inadequate resources for fish care, misrepresentation of available stock to customers, and potential negative impacts on fish health and customer satisfaction. This is because traditional fish counting in aquariums can be time-consuming and prone to errors. A study conducted by researchers in the field of aquarium fish trade has find that through the advent of technology there is a need for accurate and timely fish-counting methods to address these issues and ensure sustainable practices within the industry specifically for the aquarium fish sellers of Zamboanga City.

2.2. The Application of Computer Vision Technologies to Aquaculture

Aquaculture, also known as fish farming, has emerged as a crucial industry to meet the increasing global demand for seafood. Computer vision refers to the field of artificial intelligence (AI) that focuses on enabling computers to interpret and understand visual data. By leveraging image and video processing techniques, computer vision technologies enable machines to analyze and extract meaningful information from visual inputs. In the context of aquaculture, computer vision offers numerous applications that can enhance productivity, efficiency, and sustainability in fish farming operations. Computer vision technologies have immense potential to revolutionize the aquaculture industry by providing valuable insights and automating various processes. From fish behavior monitoring to fish health assessment and farm management, computer vision enables more efficient and sustainable practices in fish farming. According to Zion (2021) computer vision technologies have been explored to assist fish farming, not only in estimating fish mass but also in counting, monitoring, and behavior analysis. Several studies have reviewed the use of computer vision technologies in aquaculture, including fish detection and behavior analysis (Yang et al., 2021).

The use of machine learning and computer vision in aquaculture has been explored for measuring fish size, fish disease and health management, counting, classification, and identification (Vo et al.,2021). Fish tracking based on computer vision is a complex and challenging task in fishery production and ecological studies. A review of computer vision technologies for fish tracking has been conducted, which discusses the challenges of fish tracking based on computer vision and provides an overview of the different computer vision technologies used for fish tracking (Zhenbo et al., 2021). Additionally, a review on the use of computer vision and artificial intelligence for fish recognition, monitoring, and management has been conducted, which characterizes the current state of the art by identifying the main studies on the subject and briefly describing their approach (Barbedo,2022). Another review article has discussed recent advances of machine vision technology in fish classification, which would help researchers and practitioners to understand the applicability of machine vision in fish classification and encourage them to develop (Li et al., 2022).

2.3. A Programmed Fish Counting System to Boost the Fisheries Industry and Ecology

In recent years, there has been a growing need for accurate and efficient methods to count and monitor fish populations in aquatic ecosystems. This demand stems from both ecological concerns and the fisheries industry's need to manage and sustainably exploit fish stocks. Traditional fish counting methods, such as manual surveys or the use of nets, are time-consuming, labor-intensive, and often prone to human error. Researchers from the Curtin Institute for Computation are developing an automated fish detection and counting solution that offers exciting economic and ecological benefits (Curtin University,2021). The system, called Automated Fish Detection (AFID), autonomously detects the head and tail of fish and uses calibration methods to accurately measure the length of the fish. Fish biodiversity and biomass are the best non-invasive indicators of marine and coastal ecosystem health, however, the current methods of measuring these are manual and very labor-intensive. By using machine learning and AI, the process of data collection and analysis can be sped up, which will allow policy decisions that affect fish stocks and quotas, environmental impact assessment, and ecological protection to be better informed. The Curtin Institute for Computation has been working in this domain for some time now, with Dr. Marrable having done most of the technical work devising a system to identify, count, and measure fish from underwater imagery. With this funding, he will continue to develop the system and work with the Australian Institute of Marine Science (AIMS) and Curtin’s own Fish Ecology Lab to test and refine the technology.

The use of computer vision technologies in aquaculture has been explored in several studies, including studies on fish species identification, counting, and behavior analysis (Zion,2012). Another study developed an automated procedure for accurately identifying and counting snapper in baited underwater videos for stock assessment (Connolly et al.,2021). Automated fish counting systems represent a transformative technological advancement with far-reaching benefits for both ecology and the fisheries industry. By leveraging innovative technologies, these systems provide accurate, efficient, and cost-effective methods for quantifying fish populations. As our understanding of aquatic ecosystems grows, and the need for sustainable resource management becomes increasingly urgent, automated fish counting systems play a crucial role in promoting ecological conservation and ensuring the long-term viability of the fisheries industry.

2.4. Development and implementation of a fish counter by using an embedded system

The development and implementation of an instrument for the automatic counting of ornamental fish by using an embedded system, is introduced herein. The proposed instrument is tested with two marine species, the Guppies (Poecilia Reticulata) and Mollies (Poecilia Sphenops), under conditions of controlled lighting and specimens whose sizes vary from 0.5 to 2.3 cm. The counting is done by digital image processing obtaining an average accuracy up to 96.64% using different species of fishes and different sizes. The main contributions are the theoretical and experimental study to determine the aquarium background color and the algorithm of the proposed method implemented in a low cost and high-performance embedded system, specifically in a Raspberry Pi 2 executing the free GNU Octave Scientific Programming Language, thus, allowing the counting instrument to be reliable, portable and easily migratory to different operating systems. The obtained results demonstrate that the proposed method is competitive with state-of-the-art ones.

2.5. Ornamental fish counting by non-imaging optical system for real-time applications

Manual counting is done in many ways, one of which is placing many fish on a wet tray mounted above a water tank and pushing small groups of 3–5 fish into an outlet while adding the numbers and memorizing the count. This operation is sometimes combined with an inspection and sorting operation. Due to known manual counting errors, farmers instruct workers to count 3–5% more than the planned counts, in order to avoid marketing deficiencies. A slow water flow flows on the tray and drains through the outlet while carrying the counted fish. A tube connected to an outlet leads the counted fish to a floating basket. The water flow in the tube is shallow and does not fill the tub.

To count the fish sliding through such a tube, one may suggest a counting chamber based on a simple transmitter receiver scheme, in which a narrow optical beam source mounted on one side of the tube is directed to a detector on the other side. Each time the beam is crossed by a passing fish, the signal change is counted. This scheme works well in a homogeneous medium such as a tube filled with water (Mann and Jensen, 1961). However, in partially filled tubes the water fluctuates and reflects the light to random directions, away from the detector, thus, preventing proper functionality of such a simple optical detector.

The goal of the presented work was to develop a simple in-line, low-cost and real-time optical fish-counting system for integration with common ornamental fish farm practices. To meet this challenge, we present a single detector based on optical and signal-processing scheme that relaxes the

influence of water fluctuations on the optical detector's reading by engineering the field of view (FOV) in a way that concentrates a wide light beam. The resulting relaxed signal is post-processed in short frames to allow quick and efficient counting of fish of various sizes.

2.6. SUMMARY

Computer vision technologies have emerged as powerful tools with immense potential to revolutionize the aquaculture industry, addressing the increasing global demand for seafood while promoting sustainability and efficiency. By leveraging image and video processing techniques, computer vision enables machines to interpret and understand visual data, offering numerous applications in fish farming operations. Fish tracking based on computer vision is a complex and challenging task but holds significant value in fishery production and ecological studies. One notable development in the field of automated fish counting is the Automated Fish Detection (AFID) system. Developed by researchers at the Curtin Institute for Computation, AFID autonomously detects the head and tail of fish and uses calibration methods to accurately measure their length. This innovative system offers economic and ecological benefits by providing a non-invasive and efficient approach to quantifying fish populations. It enables policy decisions related to fish stocks, environmental impact assessment, and ecological protection to be better informed, ultimately supporting sustainable resource management. Studies have been conducted to evaluate the effectiveness of computer vision technologies in aquaculture.

These studies have explored fish species identification, counting methods, behavior analysis, and the development of automated procedures for accurate fish identification and population assessment. By streamlining data collection and analysis through machine learning and AI, these technologies offer time and cost savings while improving accuracy and reliability. Computer vision technologies have immense potential in aquaculture, offering valuable insights and automation capabilities to enhance productivity, efficiency, and sustainability in fish farming. From fish behavior monitoring to fish health assessment, farm management, fish tracking, and automated fish counting systems, these technologies play a crucial role in promoting ecological conservation and ensuring the long-term viability of the fisheries industry. Continued research and development in this field are vital to unlock the full potential of computer vision in aquaculture and address the challenges and opportunities of sustainable seafood production.

CHAPTER III

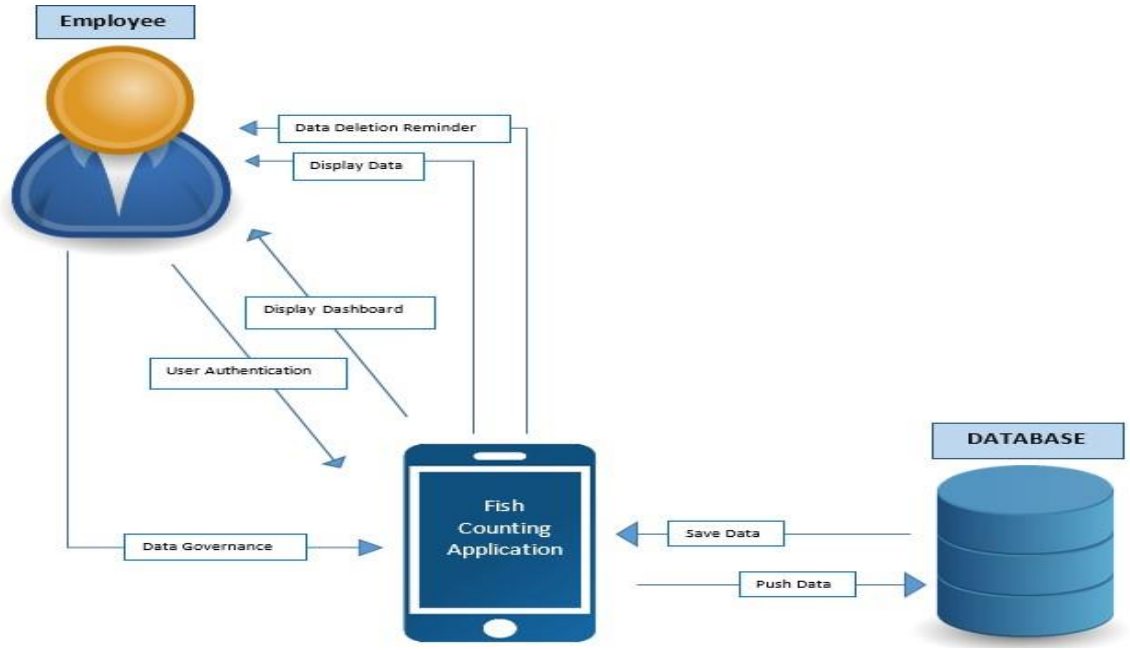
TECHNICAL BACKGROUND

This section of the FinQuant application consists of three main components: conceptual framework, software requirements, and hardware requirements. It provides a comprehensive overview of the FinQuant application's development and ensures that the application meets the needs and requirements of aquarium fish businesses in Zamboanga City.

3.1. CONCEPTUAL FRAMEWORK

The outlined project adheres to the depicted framework, encompassing various technologies and components essential for its realization. Additionally, an in-depth examination of the identified challenges and requirements from preceding chapters is provided, accompanied by a discussion of the implemented solutions aimed at effectively addressing these issues and fulfilling the project's needs.

Figure 1. Conceptual Framework



The developers conducted searches, discussions, and gathered software aligning with the criteria for the proposed system. They also collected pertinent data from related articles, journals, and studies, focusing on fish movement tracking for counting in various countries and exploring articles highlighting positive effects. The system is capable of handling tasks such as automated fish counting, file saving with options for naming and renaming, data deletion, and exporting data to the phone's internal storage. The process phase involves components

addressing data deletion reminders, with comprehensive designs and databases continually undergoing refinement. Progress updates will be reported through weekly reports, with corresponding adjustments made. In the output phase, the research proponents are poised to present the FinQuant for aquarium fish seller system to a panel of judges, who will assess its satisfaction level.

The Technical Intricacies of the Project.

The project participants have collected information on different programs and discussed the technology to be used in the system. The proposed system aims for a simple user interface. Identified programs for this project include Java, OpenCV and the Firebase real-time database, with the potential addition of more technologies later as developers see fit. These technologies will be incorporated into system development if they enhance objective accuracy. Currently, programmers have some experience with Java and Firebase real-time databases, but they plan to explore them further to better meet project goals. Additional details about these systems will be presented later.

Particulars of the Technologies to be used

The technologies the developers are looking into are the following:

Java - a versatile programming language commonly used for building mobile applications due to its platform independence. Android, one of the major mobile operating systems, relies heavily on Java for app development. Using Java enables developers to write code once and run it on various devices, contributing to cross-platform compatibility. Additionally, Java's robust libraries and frameworks simplify the development process, making it easier to create feature-rich and scalable mobile applications.

Open Computer Vision Library (OpenCV) - an open-source computer vision and machine learning software library designed to provide a common infrastructure for computer vision applications. OpenCV is written in C++ and includes interfaces for Java, making it accessible for developers working in Java. It provides tools for image and video processing, making it easier to implement features like motion detection, object tracking, and image analysis.

Firebase real-time database - a cloud-hosted NoSQL database provided by Google's Firebase platform. Its purpose in building mobile applications is to offer a real-time syncing backend for the app's data. It allows to store and synchronization of data in real-time across connected clients, such as mobile devices.

Project Workflow

The intended system operation involves the user expected to register and input the required field before logging in with their email and password, where the email corresponds to the Gmail used for account verification during registration. Within their dashboard, three options are presented: Count, Tank List, and Archive Tank List.

In the "Count" option, the user captures a video of the aquarium, and after 10 seconds, the application provides the result of how many fish were counted. Subsequently, the user has the option to save, cancel, or restart the counting process. If the user chooses to save it, they need to input a file name, and it will be directly saved in the "Tank List" option.

For the "Tank List" option, users can view the list of counted fish. They can sort it by day, from Monday to Sunday, and utilize a search bar for easier data retrieval. Additionally, users can generate a consolidated PDF file, download it, and store it in the phone's internal storage. Users can also rename the file and move it to the "Archive Tank List" for archiving purposes since the Tank list has only 7 days to store data.

In the "Archive Tank List" option, users can access files or data that originated from the tank list and were archived. Unlike the tank list where data is stored for only 7 days, here the files can be stored for a lifetime. Like the tank list option, users can rename and generate PDF files for download to the phone's storage. The unique feature of this option is the ability to delete files or data.

3.2. SOFTWARE REQUIREMENTS

Table 1. Software Requirements

SOFTWARE	PURPOSE
Android Studio	serves as the integrated development environment IDE for Android App creation, streamlining coding, testing, and deployment on Android devices.
Java	enables seamless integration of motion recognition algorithms, facilitates user authentication through the login page, ensures efficient data management with the registration feature**.**
YOLOv5	serves to analyze video frames, detect movement, track fish, and facilitate automated counting and monitoring.
Firebase	handling user authentication through its login and registration features. It enables secure user management, allowing seamless access to the app while ensuring data integrity and synchronization across devices

3.3. HARDWARE REQUIREMENTS

The following is the list of hardware requirements needed by the user to use the application as well as hardware requirements for the development phase.

Table 2. Hardware Requirements

HARDWARE	SPECIFICATION
DEVELOPER	
Laptop / Computer	Processor: AMD Ryzen 3 3200g with Radeon Vega Graphics Memory /RAM: 8GB Hard Disk: 200gb SSD Computer Speed: 3.60 GHz Operating System: Windows 10 Pro
USER	
Phone	Android 8 or Higher

CHAPTER IV

DESIGN AND METHODOLOGY

This section outlines the process of designing the FinQuant application and the methodology used to conduct the research. The Design and Methodology section consists of the following components: Requirements Analysis, Requirements Documentation, and Design Software Systems, Products, and Processes.

4.1. INTRODUCTION

This chapter will go through the application's chosen flow of data and interconnected designs, it also covers the function and full description of the application's components. Specifically, this chapter tackles the application's entity relationship diagram, context diagram, data flow diagram as well as the flowcharts for user processes.

4.2. REQUIREMENTS DOCUMENTATION

Table 3. Comparison Table of Proposed Project and Related System

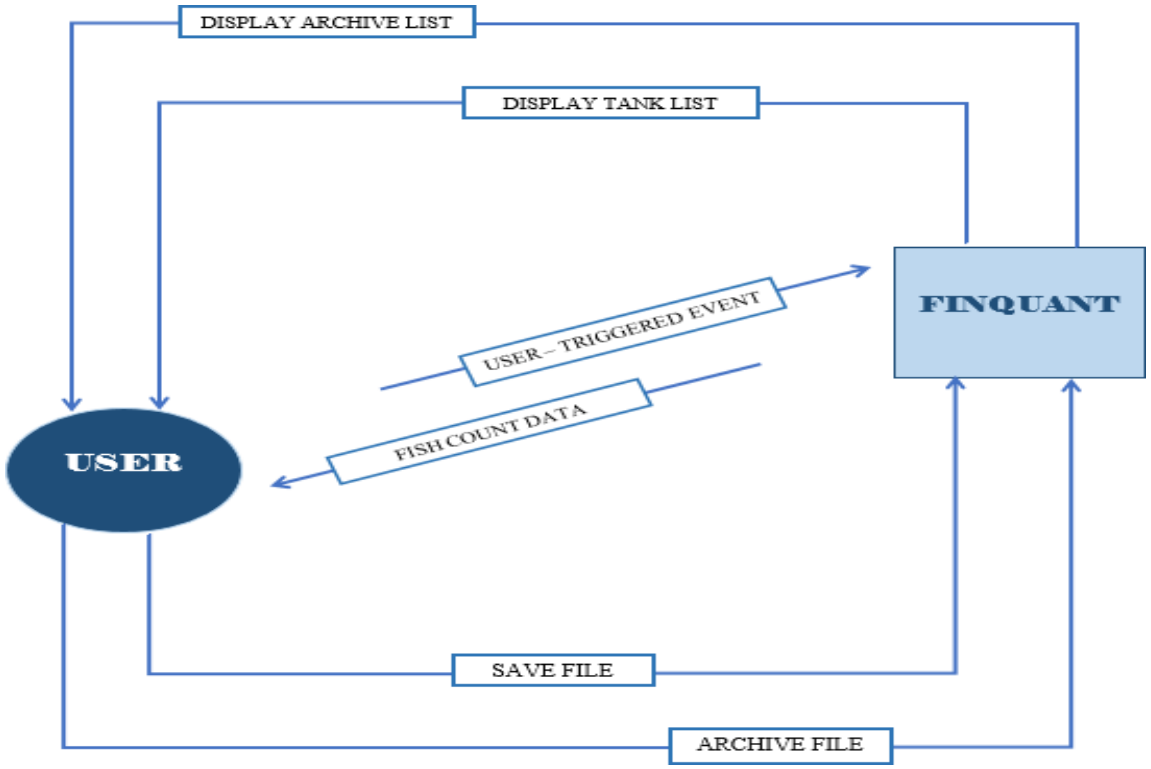
Feature	**FinQuant**	**Embedded System**	**Optical fish-counting system**
Primary function	Motion recognition-based fish counting	Automatic Fish Counting through digital image processing	Optical fish counting system with real-time integration
Platform	Mobile application	Raspberry Pi 2 EMBEDDED SYSTEM	Designed for integration with ornamental fish farm practices.
Technology used	YOLOv5 model for fish detecting and tracking	Digital image processing, GNU Octave	Single detector with optical and signal-processing scheme.
Fish species	Guppie, Goldfish and Koi	Guppies and mollies	Designed for fish of various sizes.
Features	Fish counting, saving, tank	Aquarium background	In-line counting

	management, archive, sorting, PDF generation	color determination, algorithm implementation, portability	system, and resistant to water fluctuations.
Portability	Mobile-based	Portable embedded system on Raspberry pi 2	Not specified
versatility	Mobile-based specific relies on phone cameras.	Versatile, migratory to different OS	Integration with ornamental fish farm practices

4.3. Design Software Systems, Product, Processes

4.3.1. Context Diagram

Figure 2. Context Diagram

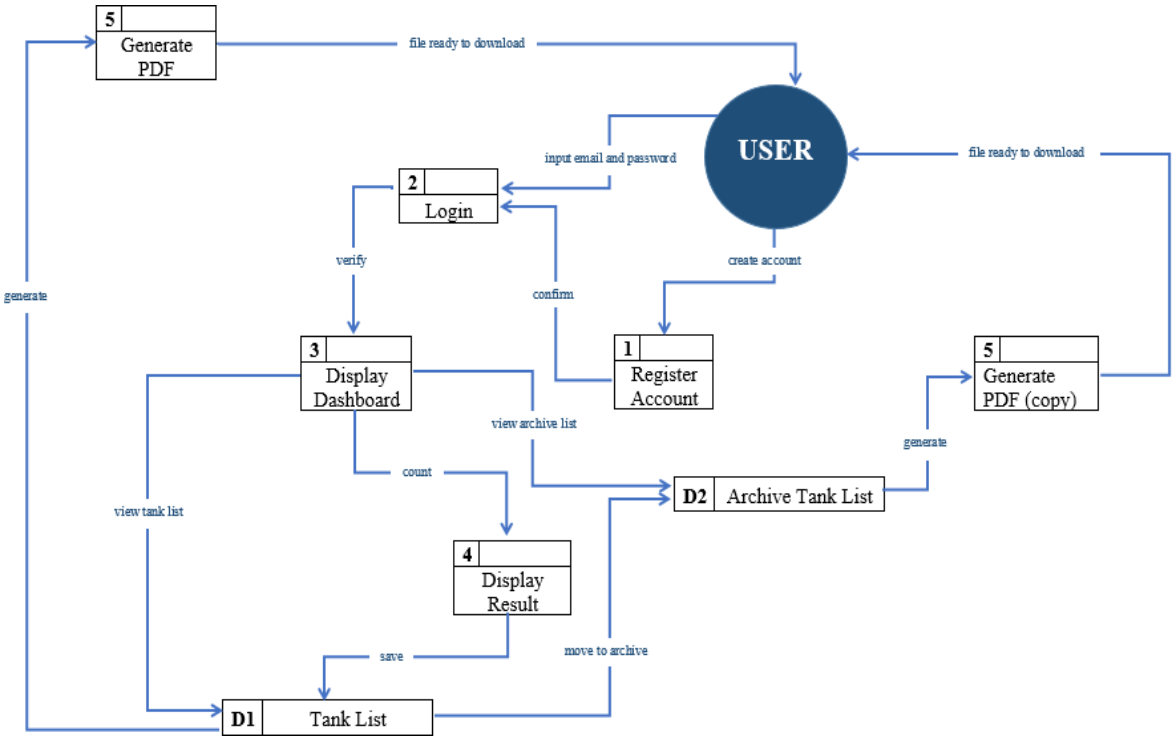


In the figure above, it shows the process once the user triggers an event in the FinQuant application, which is clicking the “Count Fish” button, the application responds by providing the fish count data. This process involves analyzing video data and applying the mentioned image processing techniques to determine the number of fish present.

Additionally, the user can perform several actions within the FinQuant application. They can save the fish count data along with the input of file name, allowing them to store and access it later. The user can also move fish count data from tank list to archive list that is no longer needed, ensuring the application remains organized and efficient.

4.3.2. Data Flow Diagram

Figure 3. Data Flow Diagram



The Figure shows the Data Flow Diagram, where the team breaks down the functionality to generate the fish count data. The user of the application needs to register or create an account, which requires email verification using their personal Gmail account. To log in to FinQuant and access the dashboard, the user needs to input the verified Gmail and password. After logging in, the dashboard is immediately displayed. It includes an option called "Count." When the user clicks on this option, the counting process begins, and FinQuant displays the result. The user can save this result and must provide a file name for easy access. After saving, the user is directed to the tank list, the second option of the app. Here, the user can generate a PDF and move the data to the archive tank list, which is the third option in the app. PDF generation is also possible in the archive tank list.

4.1. REQUIREMENTS ANALYSIS

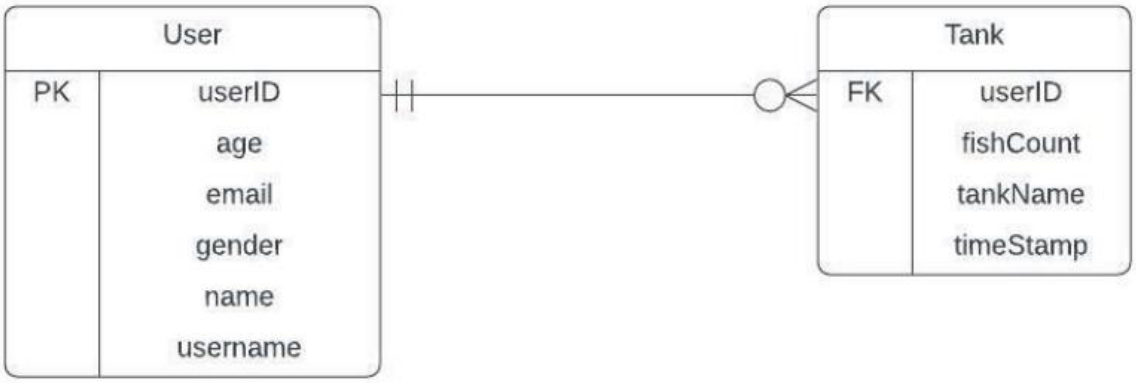


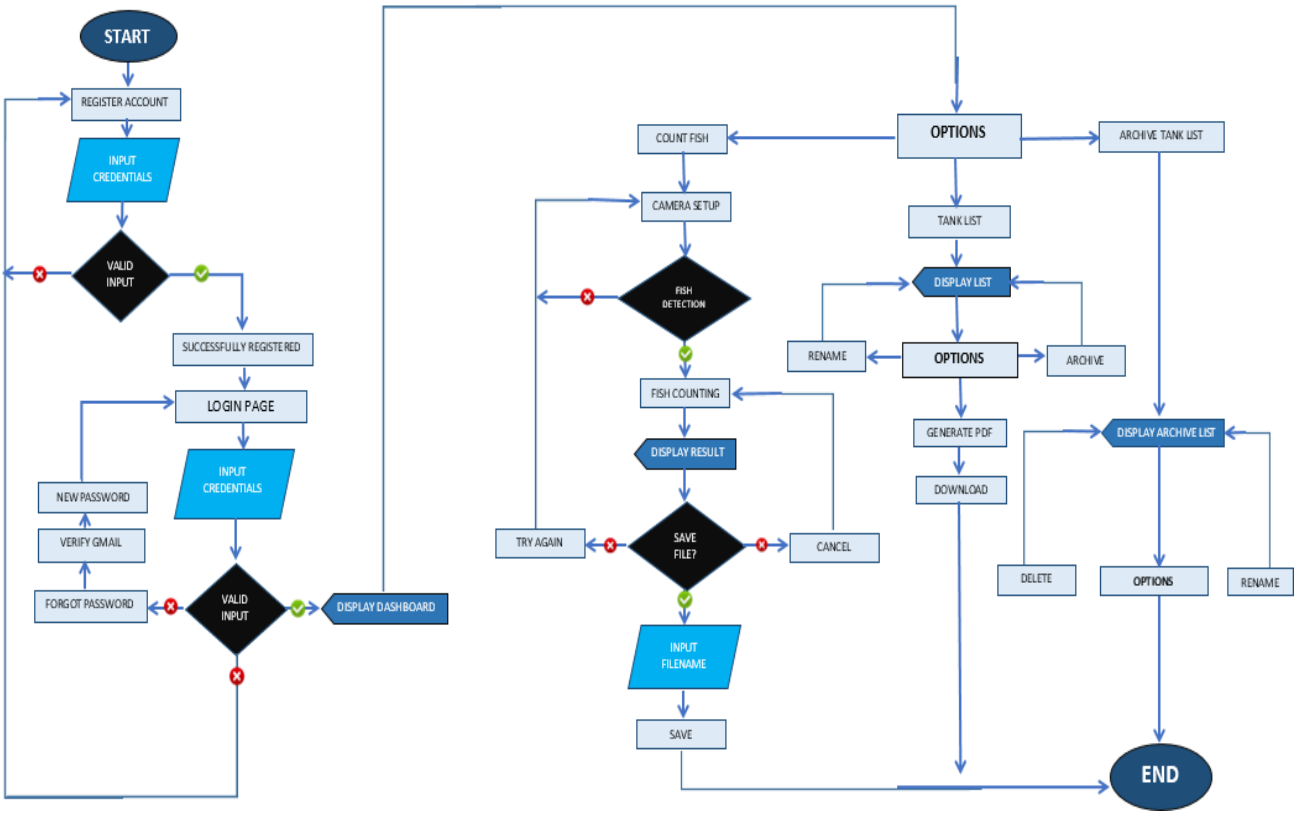
Figure 4. Entity Relationship Diagram

The figure above is the database design of this project. It shows the entities of the study, the User, and Tank. The user can have zero or many Tank but the Tank can only have one and only one user.

4.1.1. Flow Chart

The flowchart highlights the image processing, counting fish, and saving of the fish count data, enabling users to accurately assess and manage their aquarium fish populations.

Figure 5. Flow Chart Diagram



The figure shows how the application will work. The flowchart presented in the research paper outlines the process of fish detection and counting in the FinQuant application. Upon registration, users input their email and Gmail for verification, accessing the user's UI. The UI offers options like Count, Tank List, Archive Tank List, and logout. Opting for Count initiates a 10-second fish counting process with the option to retry and save results with a specified filename. The Tank List displays a weekly sorted list, enabling PDF generation for a day, file archiving, and deletion. FinQuant issues a deletion reminder for files under Tank List after 7 days, promoting timely downloads for future use.

4.2. Sample Input / Output Process

The proposed project follows the illustration below. This section discusses the solutions to address the problems and needs specified in the previous chapters, including the technologies and components used in this project.

Figure 6. Sample Input/ Output Process

INPUT	PROCESS	OUTPUT
Fish Count **Tank List** **Archive Tank List**	**Counting** **File Organization** **Archiving**	**Fish Counted Data** **Tank List Data** **Archived Data**

The input stage of the process involves gathering crucial data for aquatic population management. This includes obtaining the current count of fish in various tanks, referred to as Fish Count, providing insights into the dynamic population within the aquatic environment. Additionally, the Tank Inventory encapsulates the current Tank list, detailing the configuration of active tanks, while the Archived Tank List preserves historical data on tanks that are no longer in service.

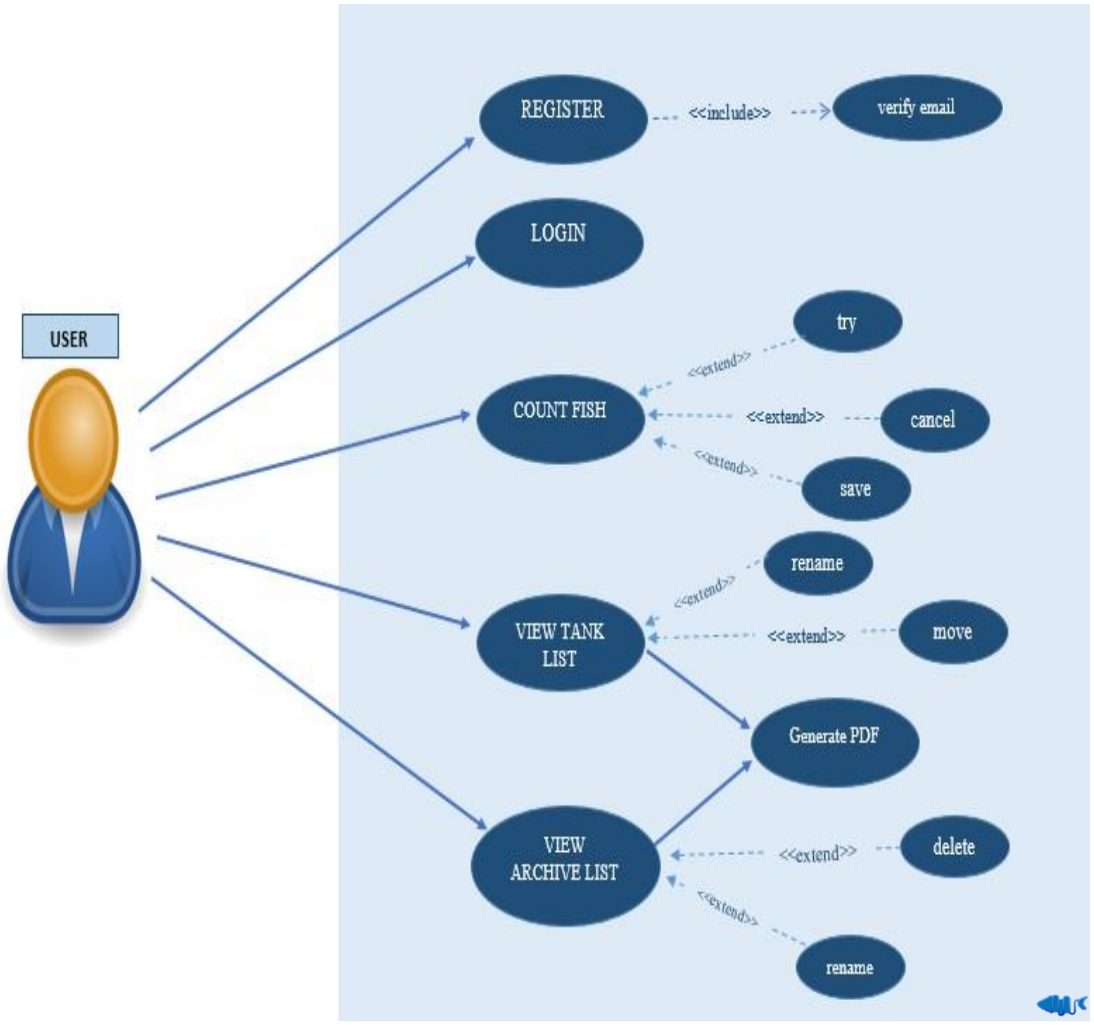
Moving to the process stage, a series of tasks unfold. Enumeration takes place, focusing on counting the present fish population in each tank to understand the current state of the aquatic environment. Following this, Organizational Structuring involves arranging files systematically, ensuring efficient organization of the collected data. Simultaneously, an Archiving Procedure is implemented to systematically archive historical tank data, establishing a comprehensive record for future reference and analysis.

In terms of output, the results are diversified and valuable. The Fish Count Data provides detailed information on the current fish count in each tank, offering a snapshot of the present aquatic population. The Tank Configuration Data furnishes updated details on the active tank configuration, aiding in the management and planning of the aquatic environment. Finally, the Archiving System produces Archived Historical Data, granting access to historical tank information for in-depth analysis or reference purposes, enabling a holistic understanding of the aquatic ecosystem over tim

4.3. Use Cases

The user of FinQuant is the entity that interacts with the application. The user is typically an employee of an aquarium fish business in Zamboanga City who uses the FinQuant application to accurately detect and count fish within aquarium tanks.

Figure 7. Use Cases Diagram



In the previous figure, FinQuant application provides a comprehensive solution for accurately detecting and counting fish within aquarium tanks. The following use case describes the interactions between the user and the various functions of the FinQuant application, including Registration process, by providing necessary details including Gmail. It also shows the other base use case which is the “Login”, “Count Fish” where the user starts the counting process leading to the display of results, it has the extend relationship to cancel, try again and save.

In “View Tank List”, it displays the list of counted fish along their filename it also has the rename and move to archive as an extend relationship of View Tank List. For the “View Archive List”, it will display the archives tank list or the file that was moved from tank list. And it has the rename and delete as its extend relationship. And lastly the “Generate PDF” as the base use case of “View Tank List” and “View Archive List”

4.3.1. Use Case Tables

Table 4. Use Case Tables

No.	Use Case	Description	Actor	Preconditions	Post condition
1	**Register**	User creates an account, requiring email verification with their personal Gmail.	Aquarium Fish Seller	None	User account is successfully created, and email is verified.
2	**Verify Gmail**	Verifies the provided Gmail during the registration process.	Aquarium Fish Seller	User is in the registration process with a provided Gmail.	Gmail is verified successfully.
3	**Log in**	User logs in using the verified Gmail and password.	Aquarium Fish Seller	User has a registered and verified account with FinQuant.	User is logged in, and the dashboard is displayed.
4	**Count**	User initiates the fish counting process and views the result on the FinQuant dashboard.	Aquarium Fish Seller	user is logged in and, on the dashboard,	Fish counting is completed, and the result is displayed. User has the option to save.

5	**Save Count Result**	User saves the counted result with a provided file name for future reference.	Aquarium Fish Seller	User has completed a fish counting process.	Count result is saved with the specified the name.

6	**ViewTank List**	User accesses the tank list option on the dashboard to view the list of counted fish.	Aquarium Fish Seller	User is logged in and on the dashboard.	Tank list is displayed, showing the counted fish.
7	**Generate PDF (Tank)**	User generates a PDF from the tank list for documentation or sharing purposes.	Aquarium Fish Seller	User is viewing the tank list.	PDF is generated from the tank list.
8	**Move to Archive**	User moves a counted file from the tank list to the archive for organization.	Aquarium Fish Seller	User is viewing the tank list.	File is successfully moved to the archive tank list.
9	**View Archive List**	User accesses the archive tank list option on the dashboard to view moved files.	Aquarium Fish Seller	User is logged in and on the dashboard.	Archive tank list is displayed, showing the moved files.
10	**Generate PDF (Archive)**	User generates a PDF from the tank list for documentation or sharing purposes.	Aquarium Fish Seller	User is viewing the archive tank list.	PDF is generated from the archive tank list.

11	**Rename (Tank)**	User renames a file in the tank list for better identification.	Aquarium Fish Seller	User is viewing the tank list.	File in the tank list is successfully renamed.

12	**Rename (Archive)**	User renames a file in the archive tank list for better identification.	Aquarium Fish Seller	User is viewing the archive tank list.	File in the archive tank list is successfully renamed.

4.4.3. System Features

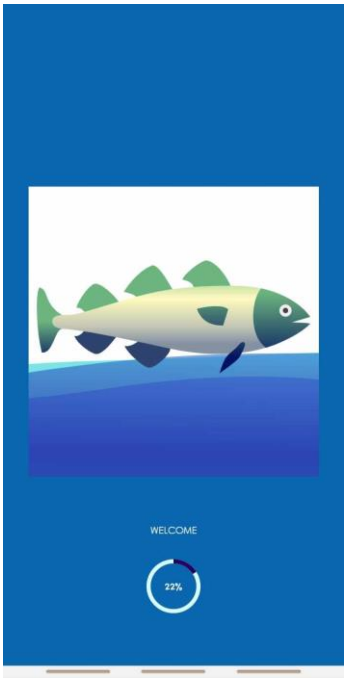
- **Count:** The primary function of the application is to provide accurate and reliable fish counts.
- **Tank List:** The application includes a history feature which called the tank list, it will allow users to view the counted fish sorted by day for a week, providing a record of past fish counts.
- **Archiving / Archive Tank List:** The application can also archive file from the tank list menu. It is for future use and reference.
- **Delete**: The application allows users to delete fish count data that is no longer needed or relevant.
- **Save:** The application allows users to save fish count data for easy organization and reference. In saving process, user must provide or input the file name for them to navigate easily.
- **PDF Generation:** the tank list and the archive tank list can generate pdf for the purpose of storing the data on internal storage of phone.
- **Rename:** The application allows users to rename fish count data for easy identification.

CHAPTER V

DEVELOPMENT AND TESTING

5.1. Description of Prototype

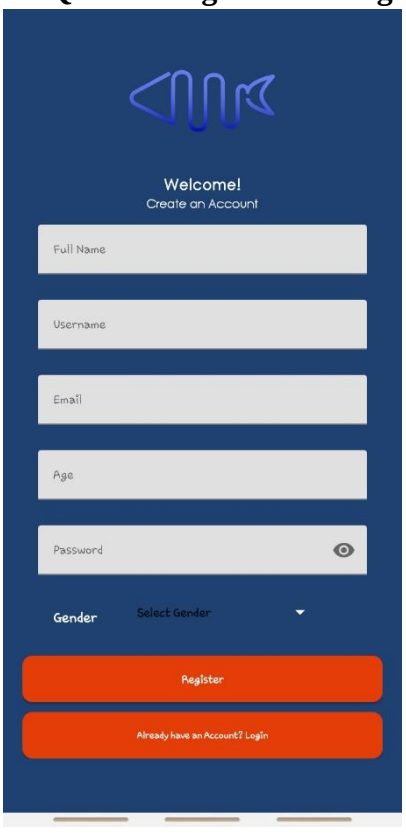
FinQuant's Screen Loading



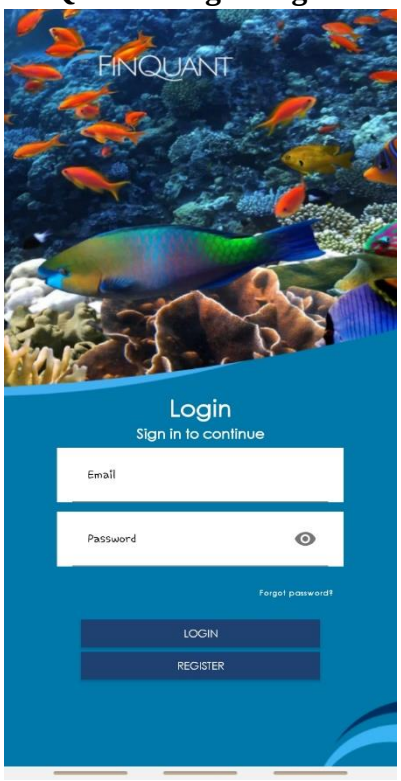
The screen loading for FinQuant, featuring animated graphics of fish and a spinner with a percentage, likely offers an engaging and thematic experience for users. The animated fish graphics add a visual element related to the app's focus on fish counting, creating a cohesive and enjoyable loading process. The spinner with a percentage serves a dual purpose by indicating progress and giving users a sense of how much longer they may need to wait. This combination of animated graphics and a progress indicator not only informs users about the loading status but also aligns with the app's theme, contributing to a more immersive and user-friendly experience during the loading phase

FinQuant's Registration Page

The Registration Page for FinQuant is designed to streamline the account creation process while ensuring security. Users are prompted to input their full name for a personalized account association and a unique username for identification within the app. The requirement for a personal Gmail address enhances account verification and security measures. The creation of a secure password is emphasized to protect user accounts. This holistic approach to registration combines user identification, and security protocols through Gmail verification contributing to a robust and user-friendly onboarding experience in FinQuant.



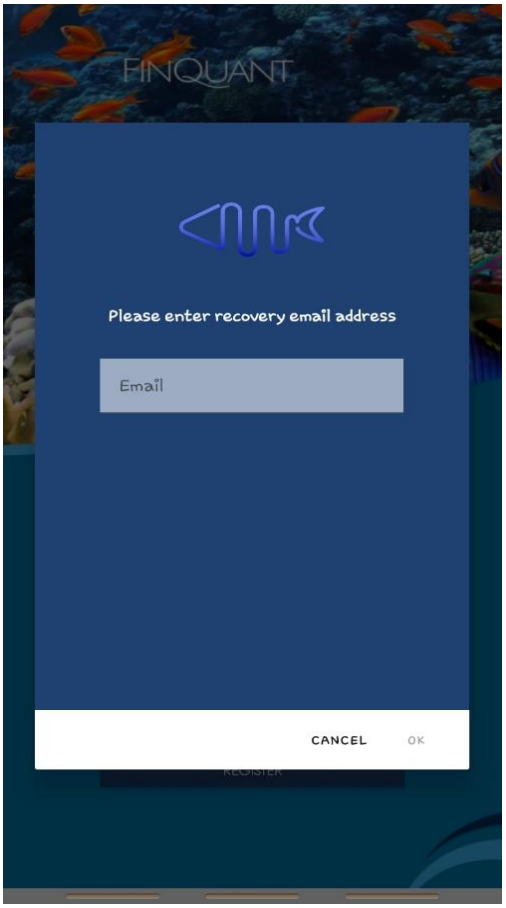
FinQuant's Login Page



The Login Page for FinQuant simplifies user access to the application, requiring them to enter their registered email and password. Users can easily navigate between logging in and registering with dedicated buttons for each action. This dual functionality streamlines the user experience, accommodating both existing users and those new to the app. Additionally, the inclusion of a password recovery feature enhances user convenience. In the event of forgotten passwords, users can initiate the recovery process, involving email verification. The combination of straightforward login inputs, an option to register, and a password recovery feature aims to provide a seamless and user-friendly authentication experience within FinQuant.

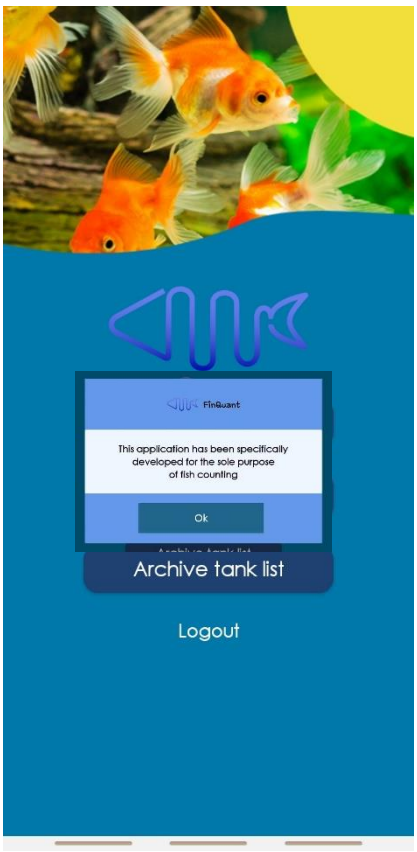
FinQuant's Password Recovery

The Password Recovery feature in FinQuant offers a user-friendly solution for account access in case of forgotten passwords. When users initiate the recovery process, they provide their registered email address. Subsequently, an email verification is sent to the provided email, containing a secure link or code to confirm the user's identity. Once the verification is completed, users can create a new password for their account. This multi-step process ensures the security of the account recovery, requiring users to verify their identity through their associated email before allowing them to reset their password. It adds an extra layer of protection and ensures that only authorized users can regain access to their FinQuant account.



FinQuant's Dashboard Screen / Menu Options

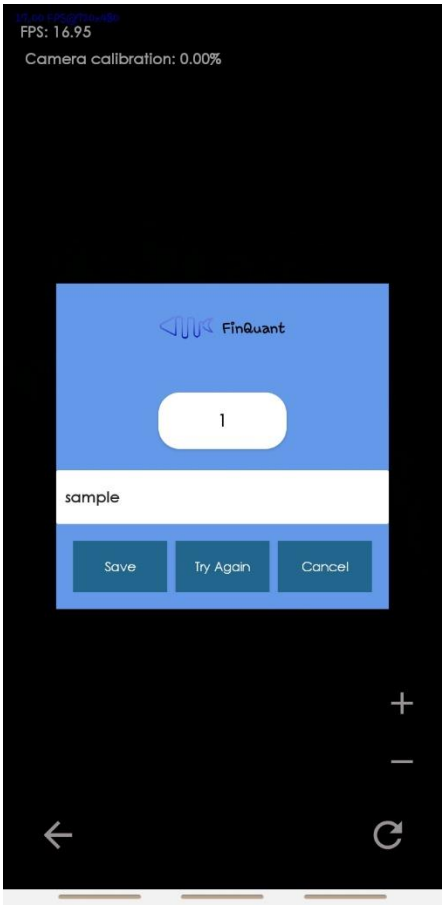
Upon entering FinQuant's Dashboard, users are presented with a warning prompt that underscores the application's exclusive focus on fish counting.



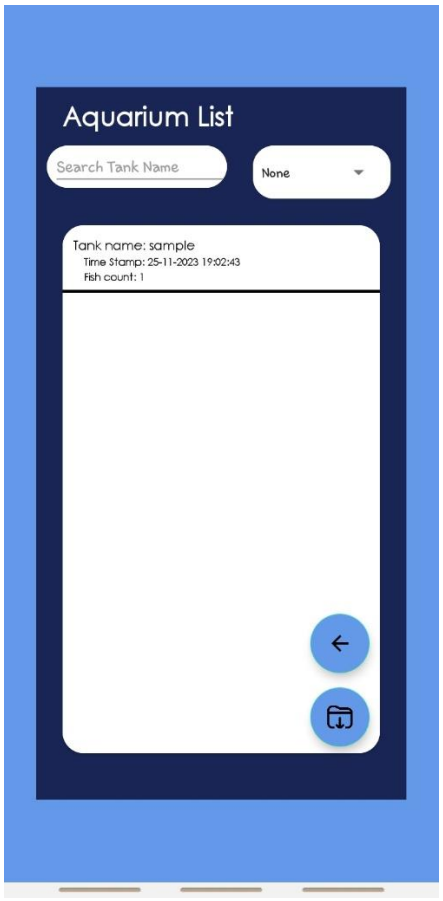
This clear directive ensures users understand the app's primary purpose. Following the warning, users encounter three key menu options. "Count Fish" initiates the fish counting process, utilizing motion recognition capabilities. "Tank List" provides a comprehensive overview of tanks. The "Archive Tank List" offers access to historical tank data, enabling users to review past fish counts and track changes over time. This well-structured dashboard aims to guide users seamlessly through the fish counting process while providing convenient access to tank management and historical data within FinQuant.

MENU 1: “Count Fish”

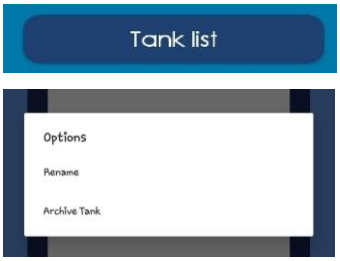
Selecting Menu Option 1, "Count Fish," in FinQuant directs users to the aquarium capture interface, utilizing motion recognition for an accurate counting process. After capturing the aquarium, users are presented with three choices: "Try Again" for reattempting the counting process, "Cancel" to discard changes and return to the main menu, and "Save" to preserve the counted data. When choosing to save, users are prompted to enter a file name, ensuring organized and retrievable records of each fish counting session. This user-centric approach enhances control and organization within the "Count Fish" feature, making the experience seamless and efficient in FinQuant.



MENU 2: “Tank List”

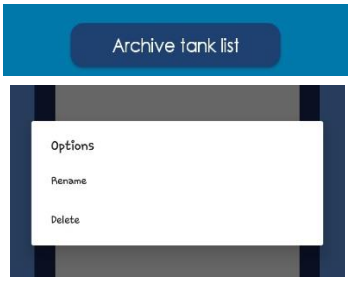


Accessing the "Tank List" menu in FinQuant, users can view a comprehensive list of counted fish, sorted by day for easy reference. The interface includes a convenient search bar, enabling users to quickly locate specific fish counting sessions. Moreover, users have the option to generate a PDF report for each session, facilitating data sharing and documentation. For further organization, the app allows users to rename files and, through a long-press gesture, move them to an archive. This intuitive feature enhances user control, providing a flexible and efficient system for managing, reviewing, and archiving fish counting data within the "Tank List" menu in FinQuant.



MENU 3: “Archive Tank List”

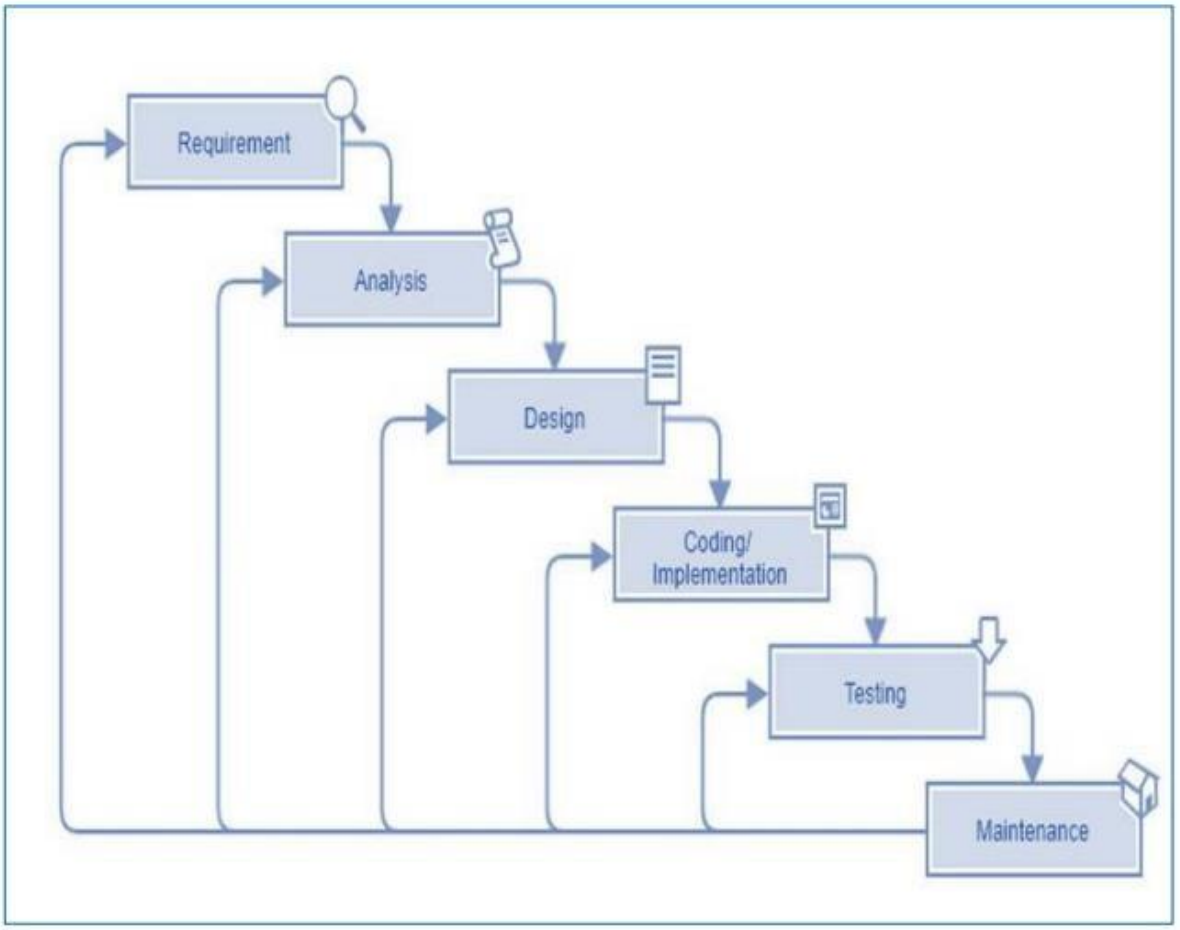
Accessing the "Tank List" menu in FinQuant, users can view a comprehensive list of counted fish, sorted by day for easy reference. The interface includes a convenient search bar, enabling users to quickly locate specific fish counting sessions. Moreover, users have the option to generate a PDF report for each session, facilitating data sharing and documentation. For further organization, the app allows users to rename files and, through a long-press gesture, move them to an archive. This intuitive feature enhances user control, providing a flexible and efficient system for managing, reviewing, and archiving fish counting data within the "Tank List" menu in FinQuant.



5.2. Development

The FinQuant application follows the Waterfall Model, a sequential software development life cycle (SDLC) methodology. The team uses this methodology to ensure that each phase of the development process is completed before moving on to the next phase. The project team is responsible for the development and implementation of the FinQuant as well and the team collaborates throughout the different phases of the Waterfall Model to ensure the successful completion of the project.

Figure 8. Waterfall Methodology



This is the breakdown of each phase of the Waterfall Model for the FinQuant application:

Requirements Gathering and Analysis

During this phase, the specific requirements and needs of the FinQuant application are identified. The project team outlines each requirement in detail to meet the aquarium fish sellers' needs in Zamboanga City. Afterwards, the team begins to analyze each requirement. The goal of this phase is to ensure that the application meets the specific needs of aquarium fish businesses and addresses the challenges they face.

Design

In the Design phase, the architecture and user interface of the FinQuant application are designed based on the outlined requirements. The system components, such as the motion recognition module, and fish counting algorithm component are defined. Wireframes or prototypes are created to visualize the user interface. The goal of this phase is to create a well-designed application that meets the specific needs of aquarium fish businesses.

Implementation

During the Implementation phase, the FinQuant application is developed based on the design specifications. The motion recognition technology is implemented to detect fish movement within aquarium tanks. The fish counting algorithm is integrated to accurately count the number of fish. The user-friendly interface is implemented for easy camera setup, real-time monitoring, and data management. The goal of this phase is to develop a functional application that meets the specific needs of aquarium fish businesses.

Testing

In the Testing phase, various levels of testing are conducted to verify the accuracy and reliability of the fish counting and motion recognition functionalities. Unit testing, application readiness testing, and application function testing are conducted to ensure that the application meets the specific requirements and needs of aquarium fish businesses. Any bugs or issues that arise during testing are identified and fixed. The goal of this phase is to ensure that the FinQuant application is accurate, reliable, and performs as expected.

Maintenance

During the Maintenance phase, the FinQuant application is deployed to aquarium fish sellers in Zamboanga City. Ongoing maintenance and support are provided to address any issues or updates that may arise. Feedback from users is gathered to continuously improve the application and address any identified limitations or areas for enhancement. The goal of this phase is to ensure that the FinQuant application continues to meet the specific needs of aquarium fish businesses and remains a valuable tool for their operations.

By following the Waterfall SDLC model and ensuring comprehensive documentation, the FinQuant application can be developed systematically, ensuring that each phase is completed before moving on to the next, and delivering a well-designed and functional application that meets the specific needs of aquarium fish businesses in Zamboanga City.

5.3. Testing

The Test Plan serves as a comprehensive guide to ensure the conformity of the developed system with its designated requirements and specifications. It encompasses a meticulous outline comprising the project's testing scope, strategy, allocated resources, and timeline. The plan delineates the specific modules or components slated for testing, alongside the techniques, objectives, deliverables, designated personnel, and requisite resources essential for the testing process. This meticulously documented test plan operates as a foundational document for all testing procedures, meticulously detailing each aspect. Consequently, it functions as a pivotal means of communication among team members and involved stakeholders, providing a detailed account of release histories, inclusive of feedback and comments.

TEST STRATEGY

Scope of Testing

● Features to be Tested

These are all the features or modules that need to be tested to ensure that the project meets its requirements.

Table 5. Featured to be Tested

Features	Applicable Role	Description
Motion Recognition Accuracy	Developer	Ensures the accuracy of the motion recognition in counting fish inside the aquarium.
Use Authentication	Users and Developer	Verify that user registration, login, and authentication processes are secure and that authorized users can access the application.
Counting Process	User	Confirm that the fish counting process initiates and stops correctly, providing accurate real-time results for different fish.
Dashboard functionality	Users, Developer	Ensuring users can navigate, view results, and access various functionalities without issues

Save and Naming Files	User	Verify that users can successfully save counted results and provide file names, testing different scenarios for robustness.
Tank List Functionality	User	Including viewing, sorting and filtering counted fish, confirming accurate and updated data display.
PDF Generation	User	Test the generation of PDF from both the tank list and archive tank list.
Archive Management	User	Confirm users can move counted files to the archive tank list and perform such as renaming and deleting files within the archive.

● Features not to be tested

These are the features not to be tested because they are not included in the defined requirements.

Table 6. Features not to be Tested

Features	Description
User Interfaces	Includes static design elements, may not require continuous testing unless there are significant updates or changes to the visual presentation.
Hardware Interfaces	These interface may not need constant testing unless there are changes in the hardware configuration.

Software Interfaces	These interface may not require continuous testing unless there are update that could impact interoperability.
Database Logic	It may not need constant testing unless there are modifications that affect data handling process.

Test Type

In this project, "FinQuant: A Motion Recognition-Based Fish Counting Application," these are the tests to be conducted:

- Alpha Testing
- Beta Testing
- Ad Hoc Testing
- Test cases

Risk and Issues

Managing risks and issues is paramount to ensure the successful and timely delivery of a high-quality product. Potential risk and issues are the following:

Table 7. Testing Plan Risk and Issues

RISK	MITIGATION
Potential delay in delivery due to resource constraints	Implementing resource allocation plan, prioritizing critical task
Unforeseen changes in project requirements	Regular communication with stakeholders to anticipate changes
Incomplete modules arise from a combination of insufficient skills and	The development team will explore tutorials, consult documentation, and encourage collaboration with other team members to facilitate the module development process.

time constraints.	
Team members might not possess the competence or skills needed to conduct these tests.	Team members should consult tutorials, understand documentation, and promptly acquire necessary supplies.

ISSUES	MITIGATION
Critical bug affecting core functionality	Watch tutorials to fixed the bug
Testing environment unavailability	Swift coordination and ensure availability

Test Logic

Testing will be carried out based on the following plans:

Plan A: If external team members can access a laptop or desktop, they will perform the testing. Plan B: If external team members cannot access a device, the project team will enlist outsourced programmers from another group to conduct the testing.

Testing will commence once any of the following conditions is met:

- Finalization of team members designated for testing
- Completion of most software modules, especially the main ones
- Preparation of a test plan
- Completion of the test specification
- Establishment and completion of the test environment

Test Objective

The purpose of preparing this test is to validate the previously specified functional requirements of the FinQuant: A Motion Recognition-Based Fish Counting Application. The project shall focus on testing the main modules of this system for specified users. To verify and validate the accuracy and efficiency of the motion recognition in accurately counting and identifying fish within various environmental conditions. This includes assessing the application's performance in different lighting conditions, and fish quantity and sizes to ensure reliable and precise fish counting capabilities.

Test Criteria

● Test Halt Conditions

Testing will be temporarily halted if 40% of the test cases fail. Resumption will occur once the development team addresses all failed instances in the subsequent iteration.

● Completion Thresholds

The following criteria determine the successful completion of a test phase:

- A 100% run rate is required; otherwise, the failed build test case will undergo iteration.
- An 80% passing rate is necessary for the test phase to be considered successfully completed.

Resource Planning

● System Resource

Table 8. Testing Plan Application Resource

RESOURCES	DESCRIPTION
Android Phone	Device running Android OS version 8.0 or higher, with a minimum of 2 GB RAM and 16 GB ROM
Phone Camera	

Internet Connection	Stable connection with a recommended speed of at least 5 Mbps for smooth operation of the application.

● Human Resource

Table 9. Testing Plan Human Resource

RESOURCES	DESCRIPTION
Test Manager	Plans, coordinates, and oversees testing activities, ensuring quality and adherence to standards.
Tester	Conducts functional, usability, and compatibility testing, focusing on motion recognition and app features.
Quality Assurance Engineer	Ensures overall product quality, develops and implements testing processes, and identifies areas for improvement.

Test Environment

The depicted figure will serve as the designated test environment for this project.

Figure 9. Testing Plan Test Environment

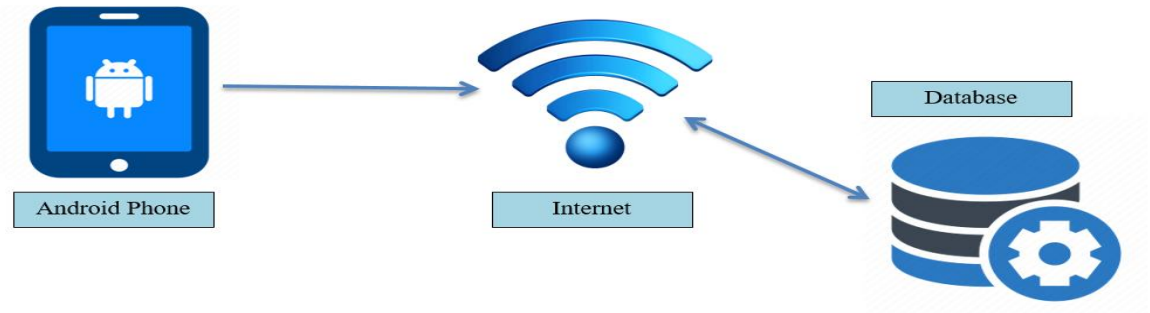


Figure shows the project's test environment, the designated users, as previously specified, will exclusively utilize Android phones, given the native nature of the application. This approach aims to validate the achievement of project objectives. Furthermore, it necessitates both internet connectivity and access to the project's database.

Schedule and Estimation

Table 10. Testing Plan Schedule and Estimation

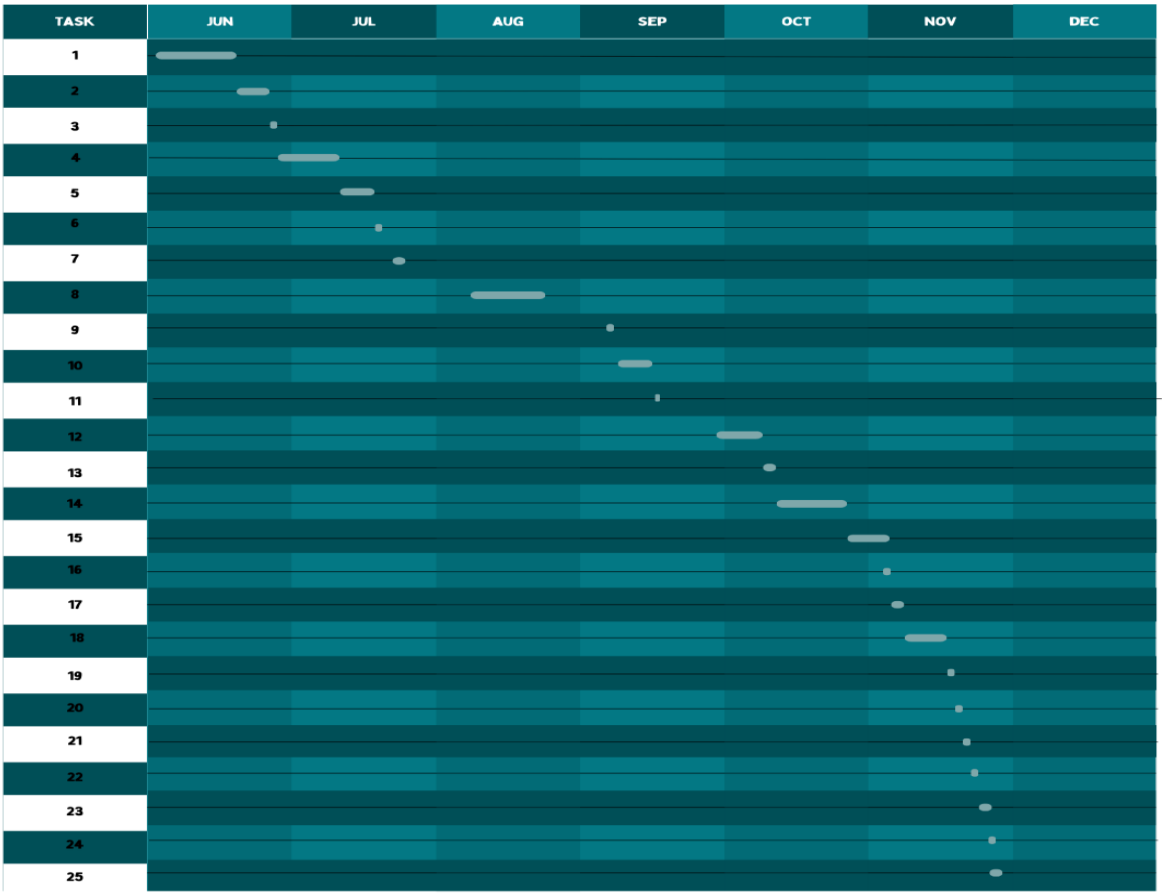
TASK	MEMBERS	ESTIMATE EFFORT
Identify testing resources and tools.	Test Manager	60-man hour
Identifying test conditions.	Test Manager	60-man hour
Creating detailed test cases.	Test Manager	50-man hour
Perform the test cases.	Tester	80-man hour
Create a comprehensive overview of the testing activities.	Quality Assurance Engineer	70-man hour
Test Release.	Tester and Quality Assurance Engineer	60-man hour

● Schedule to complete the task

Figure 10. Gantt Chart

FINQUANT GANTT CHART

TASK ID	TASK DESCRIPTION	TASK DURATION	START DATE	END DATE
1	Capstone Project Title Submissions	15	JUNE 7, 2023	JUNE 21,2023
2	Capstone Chapters 1-4 submission	6	JUNE 21, 2023	JUNE 26, 2023
3	Capstone Title Defense	1	JUNE 27, 2023	JUNE 27, 2023
4	Capstone Project Chapters 1-4 revisions	17	JUNE 28, 2023	JULY 14, 2023
5	Submission of Capstone Project Chapters 1-4 revision	5	JULY 14, 2023	JULY 19, 2023
6	Signing the Rubric for Approved Title	1	JULY 19, 2023	JULY 19, 2023
7	UI Planning	2	JULY 20, 2023	JULY 21, 2023
8	Finalization of the Design GUI	14	AUGUST 12, 2023	AUGUST 25, 2023
9	Capstone Adviser Approval	1	SEPTEMBER 11, 2023	SEPTEMBER 11, 2023
10	Developing the System UI	10	SEPTEMBER 16, 2023	SEPTEMBER 25, 2023
11	Capstone Adviser Consultation	1	SEPTEMBER 27, 2023	SEPTEMBER 27, 2023
12	System Login Module	10	SEPTEMBER 29, 2023	OCTOBER 9, 2023
13	Listing of Fish for training	2	OCTOBER 10, 2023	OCTOBER 12, 2023
14	Manage training for dataset	14	OCTOBER 13, 2023	OCTOBER 27, 2023
15	Tank List and Fish detection module	9	OCTOBER 28, 2023	NOVEMBER 6, 2023
16	Capstone Adviser Consultation	1	NOVEMBER 6, 2023	NOVEMBER 6, 2023
17	Gather additional fish photos	2	NOVEMBER 7, 2023	NOVEMBER 9, 2023
18	Manage additional training for accurate detection	7	NOVEMBER 9, 2023	NOVEMBER 16, 2023
19	Test Planning	1	NOVEMBER 17, 2023	NOVEMBER 17, 2023
20	Integration Testing	1	NOVEMBER 18, 2023	NOVEMBER 18, 2023
21	System Testing	1	NOVEMBER 19, 2023	NOVEMBER 19, 2023
22	Acceptance Testing	1	NOVEMBER 20, 2023	NOVEMBER 20, 2023
23	Rebuilding modules	2	NOVEMBER 21, 2023	NOVEMBER 23, 2023
24	Identify Bugs	1	NOVEMBER 24, 2023	NOVEMBER 24, 2023
25	Implement modification	2	NOVEMBER 24, 2023	NOVEMBER 26, 2023


TASK
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

ALPA Testing

5.4. Test Cases

Project Name :	**REGISTRATION**
Module Name :	Registration Module
Reference Document :	Functional Requirements
Created By :	Renel Joy Ladao
Date of Creation :	Oct. 07, 2023
Date of Review :	Oct. 07, 2023

Test Case ID	Test Scenario	Test Case	Pre – Condition	Test Steps	Test Data	Expected Results	Post - Condition	Actual Results	Status
TC_REGIS_001	Verify Registration	Enter name, Valid email, User name, Age, password and select gender	Needs a name, valid email, and password to register	Enter Full name. Enter Email. Enter Username. Enter Age. Enter Password. Choose gender. “Click Register button”	Full name. Valid Email. Username. Age. Password.	Successful registration	Show the homepage of application	Same with the expected result	Pass

TC_REGIS_001	Verify Registration	Enter full name, Invalid email, User name, Age, gender and password.	Needs full name, valid email, and password to register	Enter Full name. Enter Email. Enter Username. Enter Age. Enter Password. Choose gender. "Click Register button"	Full name. Invalid Email. Username. Age. Password.	Cannot proceed or register "Registration Failed "	Stay on the registration page	Same with the expected result	Pass
TC_REGIS_001	Verify Registration	Click the "Register" button with Blank fields	Needs a name, email, and password to register	Enter Full name. Enter Email. Enter Username. Enter Age. Enter Password. Choose gender. "Click Register button"	Blank Full name. Blank Email. Blank Username. Blank Age. Blank Password.	Cannot proceed to registration "Registration Failed '	Stay on Registration page	Same with the expected result	Pass

TC_REGIS_001	Verify Registration	Enter a valid name, Blank email, User name, Age, gender and password.	Needs a valid name, email, and valid password to register	Enter name. Enter Email. Enter Username. Enter Age. Enter Password. Choose gender. "Click Register button"	Full name. Blank Email. Valid Username. Valid Age. Valid Password.	Cannot proceed to registration and will show a tool tip that says "Please fill all the field, including selecting a gender "	Stay on Registration page	Same with the expected result	Pass
TC_REGIS_001	Verify Registration	Enter name, Enter email, Enter password, User name, Blank Age, gender and password.	Need a valid name, Valid email, And enter password.	Enter name. Enter Email. Enter Username. Blank Age. Enter Password. Choose gender. Click "Register" button	Full name, Valid Email, Valid username, Blank age, Select gender, Valid password	After clicking the "Register" button an alert message will pop up "please fill in all the fields "	remain on the registration page.	Same as the expected result	Pass

TC_REGIS_001	Verify Registration	Enter name, Enter email, Enter password, User name, Enter Age, gender and password.	Need a valid name, Valid email, And enter password.	Enter name. Enter Email. Enter Username. Blank Age. Enter Password. Didn't select gender. Click "Register" button	Full name, Valid Email, Valid username, Valid age, Didn't select gender, Valid password	After clicking the "Register" button an alert message will pop up "Registration Failed"	remain on the registration page.	Same as the expected result	Pass
TC_REGIS_001	Verify Registration	Enter name, Enter email, Blank password, User name, Age, gender and password.	Need a valid name, Valid email, And blank password.	Enter name. Enter Email. Enter Username. Enter Age. Blank Password. Choose gender. Click "Register" button	Full name, Valid Email, Valid username, Valid age, Select gender, Blank password	After clicking the "Register" button an alert message will pop up "please fill in all the fields "	remain on the registration page.	Same as the expected result	Pass

TC_REGIS_001	Verify Registration	Enter name, enter already used email, User name, Age, gender and password.	Needs a valid name, new existing email, and valid password to register	Enter name. Enter Email. Enter Username. Enter Age. Enter Password. Choose gender. Click "Register" button	Full name. Already registered email. Username. Age. Password	After registering and clicking the register button, a message alert will pop up "Registration Failed."	Remain on the registration page.	Same as the expected result.	Pass
TC_REGIS_001	Verify Registration	Sends verification action link in the email	Needs to accept the verification link sent to the email	Enter full name Enter email Enter password Click "Register" button	Valid full name Valid email Valid password	After registering and clicking the email received, the user will be able to log in already.	After clicking the email received, you can now log in as a user on the log in page.	The registered user will be able to log in	Pass

Project Name :	**LOGIN**
Module Name :	**Login Module**
Reference Document :	**Functional Requirements**
Created By :	**Renel Joy Ladao**
Date of Creation :	**Oct 10, 2023**
Date of Review :	**Oct 10, 2023**

Test Case ID	Test Scenario	Test Case	Pre – Condition	Test Steps	Test Data	Expected Results	Post -Condition	Actual Results	Status
TC_LOGIN_001	Verify the login	Enter valid email and password	Needs a valid email and password	Enter email	Valid email	Successfully login directed to the dashboard menu	Show a prompt “” and must click “OK”, then the application dashboard shows three menus.	Same with the expected result	Pass
				Enter password	Valid password				
				Click the “Login” button					
TC_LOGIN_001	Verify the login	Enter valid email and invalid password	Needs a valid email and password	Enter email	Valid email	Alert message “Login Failed, Please Check Your Credentials”	Stay on log in page	Same with the expected result	Pass
				Enter password	Invalid password				
				Click the “Login” button					
TC_LOGIN_001	Verify the login	Enter invalid email and valid password	Needs a valid email and password	Enter email	Invalid email	Alert message “Login Failed, Please Check Your Credentials”	Stay on login page	Same with the expected result	Pass
				Enter password	Valid password				
				Click the “Login” button					

TC_LOGIN_001	Verify the login	Enter invalid email and invalid password	Needs a valid email and password	Enter email Enter password Click the “Login” button	Invalid email Invalid password	Alert message “Login Failed, Please Check Your Credentials”	Stay on login page	Same with the expected result	Pass
TC_LOGIN_001	Verify the login	Enter blank email and valid password	Needs email and password	Enter email Enter password Click “Login” button	Blank email field Valid password	Alert Message “Please Enter Email”	Stay on login page	Same with the expected result	Pass
TC_LOGIN_001	Verify the login	Enter valid email and blank password	Needs email and password	Enter email Enter password Click “Login” button	Valid email Blank password field	Alert Message “Please Enter Password”			
TC_LOGIN_001	Verify the login	Enter blank	Needs email and password	Enter email	Blank email field	Alert Message “Please Enter	Stay on login page	Same with the	Pass

		email and blank password		Enter password Click "Login" button	Blank password field	Email" and "Please Enter Password"		expected result	
TC_LOGIN_001	Verify forgot password	Enter a valid email and invalid password	Needs a registered email to reset the password	Click "Forgot Password" Enter the registered email Click "OK" button Go to Gmail account and click the reset link Reset password and click "Save"	Existing email account	A message prompt a message "Password reset sent to "existing email""	Stay on login page	Same with the expected result	Pass
TC_LOGIN_001	Verify forgot password	Enter email without "@"	Needs a registered email to reset the password	Click "Forgot Password" Enter the registered email Click "OK" button	An email without an "@"	A toast notification will show with a message of "Failed to send password reset email"	Back to login page	Same with the expected result	Pass

TC_LOGIN_001	verify that users will receive a link in their mail for resetting their password	Enter a valid email	Needs a registered email account to reset the password	Click “Forgot Password” Enter the registered email Click “OK” button Go to Gmail account and click the reset link Reset password and click “Save”	Valid email	Toast notification with a message “Password reset sent to “existing email””	The link for resetting the password is sent via their email	Same with the expected result	Pass
TC_LOGIN_001	Verify If the password is masked	Enter password	Needs a valid password to proceed	Enter the Password	Entered Password	Password is in a form of asterisks when entered	A masked password	Same with the expected result	

Project Name	**:**			**Motion Recognition**					
Module Name	**:**			**Motion Recognition Module**					
Reference Document	**:**			**Functional Requirements**					
Created By	**:**			**Renel Joy Ladao**					
Date of Creation	**:**			**December 1,2023**					
Date of Review	**:**			**December 1, 2023**					
Test Case ID	**Test Scenario**	**Test Case**	**Pre –Condition**	**Test Steps**	**Test Data**	**Expected Results**	**Post - Condition**	**Actual Results**	**Status**
TC_MR_001	Verify accuracy of motion recognition in fish counting.	Count fish in a tank	The fish tank is properly set up with fish	Select "Count Fish" Alert message "Are you sure you want to count Fish" Select "Confirm" Refrain from moving the device to ensure precise counts.	Introduce a specific number of fish in a tank.	The app accurately counts the number of fish in a tank	Verify that the fish counting app provides an accurate count of fish	Pending	Pending
TC_MR_001	Saving the count fish data	Saving fish count with name	The fish tank is properly set up with fish	Select "Count Fish" Alert message "Are you sure you want to count Fish" Select "Confirm"	Counted fish in a tank	Toast notification "Fish count save successfully in tank name:"	Verify that fish count data is stored securely	Same as expected result.	Pass

				Refrain from moving the device to ensure precise counts. Enter Tank Name, Click “Save”					
TC_MR_001	Saving the count fish data	Saving fish count without name	The fish tank is properly set up with fish	Select “Count Fish” Alert message “Are you sure you want to count Fish” Select “Confirm” Refrain from moving the device to ensure precise counts. Blank Tank Name, Click “Save”	Counted fish in a tank	Toast notification “Tank name is required:”	Stay in saving process	Same as expected result.	Pass
TC_MR_001	Evaluating the “Try Again” button in fish	Retrying fish counting	Previously unsuccessful fish counting attempt	Select “Count Fish” Alert message “Are you sure you want to count Fish”	Unsuccessful counting attempt	Fish counting application allows user to retry the	The app restarts the fish counting process.	Same as expected result.	Pass

	counting process			Select “Confirm” Refrain from moving the device to ensure precise counts., Click “Try Again”		counting process			

Project Name :				**Tank List Management**					
Module Name :				**Tank List Module**					
Reference Document :				**Functional Requirements**					
Created By :				**Renel Joy Ladao**					
Date of Creation :				**November 20, 2023**					
Date of Review :				**November 20, 2023**					
Test Case ID	**Test Scenario**	**Test Case**	**Pre – Condition**	**Test Steps**	**Test Data**	**Expected Results**	**Post - Condition**	**Actual Results**	**Status**
TC_TANK_001	Renaming the data in tank list	Attempt to rename	At least one tank data is present in the list	Identify the tank data that needs renaming Long press the data Select “Rename” Click “Rename”	New tank name	Loading indicator “Renaming tank” and stay on tank list result page	The tank list data is renamed	Same with the expected result	

TC_TANK_001	Renaming the data in tank list	Attempt to rename but accidentaly tap the “Rename”	At least one tank data is present in the list	Identify the tank data that needs renaming Long press the data Select “Rename” Click “Rename”		Alert message “New Tank Name is Required”	The tank list data is renamed	Same with the expected result	
TC_TANK_001	Move to archive	Attempt to move the tank list data to Archive Tank List	At least one tank data is present in the tank list	Identify a tank data that needs to archive Long press the tank data Tap the “Move to Archive”	Move to Archive	“Tank Archive is success : (Tank Name)”	The tank data is moved to Archive Tank List	Same with the expected result	
TC_TANK_001	Search tank name	Attempt to search the tank name	At least one tank data is present din tank list and are setup with distinct names	Tap the search bar Enter the query using the typing device (real-time or instant search)	Fish tank name	Display the search results with the specified fish tank name	The search results show information related to the specified fish tank name	Same with the expected result	

TC_TANK_001	Sort tank list	Sort by “ Monday”	Fish counting data is available on the day of “ Monday ”	Select the “Sort” Tap “ Monday ”	“ Monday ” Fish entries	Display fish entries the day of “ Monday ”	Fish entries shows under “ Monday ”	Same with the expected result	
TC_TANK_001	Sort tank list	Sort by “ Tuesday ”	Fish counting data is available on the day of “ Tuesday ”	Select the “Sort” Tap “ Tuesday ”	“ Tuesday ” Fish entries	Display fish entries the day of “ Tuesday ”	Fish entries shows under “ Tuesday ”	Same with the expected result	
TC_TANK_001	Sort tank list	Sort by “ Wednesday ”	Fish counting data is available on the day	Select the “Sort”	“ Wednesday ” Fish entries	Display fish entries the day of “ Wednesday ”	Fish entries shows under “ Wednesday ”	Same with the expected result	

			of “ Wednesday ”	Tap “ Wednesday ”					
TC_TANK_001	Sort tank list	Sort by “ Thursday ”	Fish counting data is available on the day of “ Thursday ”	Select the “Sort” Tap “ Thursday ”	“ Thursday ” Fish entries	Display fish entries the day of “ Thursday ”	Fish entries shows under “ Thursday ”	Same with the expected result	
TC_TANK_001	Sort tank list	Sort by “ Friday ”	Fish counting data is available on the day of “ Friday ”	Select the “Sort” Tap “ Friday ”	“ Friday ” Fish entries	Display fish entries the day of “ Friday ”	Fish entries shows under “ Friday ”	Same with the expected result	
TC_TANK_001	Sort tank list	Sort by “ Saturday ”	Fish counting data is	Select the “Sort”	“ Saturday ” Fish entries	Display fish entries the	Fish entries shows	Same with the expected result	

			available on the day of “ Saturday ”	Tap “ Saturday “		day of “ Saturday ”	under “ Saturday ”		
TC_TANK_001	Sort tank list	Sort by “ Sunday ”	Fish counting data is available on the day of “ Sunday ”	Select the “Sort” Tap “ Sunday “	“ Sunday ” Fish entries	Display fish entries the day of “ Sunday ”	Fish entries shows under “ Sunday ”	Same with the expected result	
TC_TANK_001	Sort tank list	Sort by “ None ”	All fish counting data is available	Select the “Sort” Option Tap the “None”	Various tanks with different data exist in the tank list in descending order	Display all fish entries in descending order	All fish entries will display in descending order	Same with the expected result	

TC_TANK_001	Sort tank list	Sorting by day	fish counted data is available for various day of the week	Select the “Sort” Tap the specified day	Available days: Monday Tuesday Thursday Friday Saturday Sunday None	Display fish entries based on the selected day	Fish entries shows according to the selected day	Same with the expected result	
TC_TANK_001	PDF Generation	Generate PDF for tank list data	Multiple tanks with diverse data are present in the tank list	Select the icon of PDF generation	Various tanks with different data exist in the tank list	A toast notification “PDF generated and uploaded successfully ”	Stay on aquarium list	Same with the expected result	

Project Name :				**Archive List management**					
Module Name :				**Archive list module**					
Reference Document :				**Functional Requirements**					
Created By :				**Renel Joy Ladao**					
Date of Creation :				**November 20, 2023**					
Date of Review :				**November 20, 2023**					
Test Case ID	**Test Scenario**	**Test Case**	**Pre –Condition**	**Test Steps**	**Test Data**	**Expected Results**	**Post - Condition**	**Actual Results**	**Status**
TC_ARCH_001	Renaming the data in archive list	Attempt to rename	At least one tank data is present in the archive list	Identify the tank data that needs renaming Long press the data Select “Rename” Click “Rename”	New tank name in archive list	Loading indicator “Renaming tank” and stay on aquarium list result page	The tank name is renamed in archive list	Same with the expected result	Pass
TC_ARCH_001	Renaming the data in tank list	Attempt to rename but accidentally tap the “Rename”	At least one tank data is present in the archive list	Identify the tank data that needs renaming Long press the data Select “Rename” Click “Rename”	Blank name	Alert message “New Tank Name is Required”	Stay in aquarium list	Same with the expected result	Pass
TC_ARCH_001	Delete file	Attempt to delete the tank name	Select the file that that in the archive list that needs to be deleted.	Identify the tank data that’s need to be deleted, Long press the data, Select the “Delete” alert	File to be Deleted	A message will say “tank delete success”	Stay on Archive list	Same with the expected result	Pass

				message “Are you sure want to delete this file” Click “Delete” button					
TC_ARCH_001	Search tank name in Archive	Attempt to search the tank name	At least one tank data is present din archive list and are setup with distinct names	Tap the search bar Enter the query using the typing device (real-time or instant search)	tank name	Display the search results with the specified fish tank name	The search results show information related to the specified fish tank name in Archive list	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Monday"	Fish tank name data is saved on the day of “ Monday ”	Select "Sort" Tap "Monday"	“ Monday ” Archive entries	Display archive tank name entries the day of “ Monday ”	Archive tank name entries shows under “ Monday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Tuesday"	Fish tank name data is saved on the day of “ Tuesday ”	Select "Sort" Tap "Tuesday"	“ Tuesday ” Archive entries	Display archive tank name entries the day of “ Tuesday ”	Archive tank name entries shows under “ Tuesday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Wednesday"	Fish tank name data is saved on the day of “ Wednesday ”	Select "Sort" Tap "Wednesday"	“ Wednesday ” Archive entries	Display archive tank name entries the day of “ Wednesday ”	Archive tank name entries shows under “ Wednesday ”	Same with the expected result	Pass

TC_ARCH_001	Sort Archive list	Sort by "Thursday"	Fish tank name data is saved on the day of “ Thursday ”	Select "Sort" Tap "Thursday"	“ Thursday ” Archive entries	Display archive tank name entries the day of “ Thursday ”	Archive tank name entries shows under “ Thursday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Friday"	Fish tank name data is saved on the day of “ Friday ”	Select "Sort" Tap "Friday"	“ Friday ” Archive entries	Display archive tank name entries the day of “ Friday ”	Archive tank name entries shows under “ Friday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Saturday"	Fish tank name data is saved on the day of “ Saturday ”	Select "Sort" Tap "Saturday"	“ Saturday ” Archive entries	Display archive tank name entries the day of “ Saturday ”	Archive tank name entries shows under “ Saturday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "Sunday"	Fish tank name data is saved on the day of “ Sunday ”	Select "Sort" Tap "Sunday"	“ Sunday ” Archive entries	Display archive tank name entries the day of “ Sunday ”	Archive tank name entries shows under “ Sunday ”	Same with the expected result	Pass
TC_ARCH_001	Sort Archive list	Sort by "None"	All saved data is available	Select "Sort" Tap "none"	Various tanks with different data exist in the archive list in descending order	Display all archive tank name entries in descending order	All archive tank name entries will display in descending order	Same with the expected result	Pass

TC_ARCH_001	Sort Archive list	Sorting by day	All saved data is available for various day of the week	Select "Sort" Tap type a specific day	Available days: Monday Tuesday Thursday Friday Saturday Sunday None	Display archive tank name entries based on the selected day	Archive tank name entries shows according to the selected day	Same with the expected result	Pass
TC_ARCH_001	PDF Generation	Generate PDF for tank list data	Multiple tanks with diverse data are present in the archive list	Select the icon of PDF generation	Various tanks with different data exist in the archive list	A toast notification "PDF generated and uploaded successfully"	Stay on aquarium list	Same with the expected result	Pass

5.5. Implementation Plan

This plan will be the bridge to guide the developers in implementing the new application. Many activities that are specified above were already detailed. In utilizing this strategy, communication with the client was to properly integrate the application in the targeted environment. The developer of this application will also oversee the application. It is to ensure the comprehension of the tea under implementation strategies and also the potential dangers to the entire project. This is the valuable part of creating the application as it allows for effective collaboration, understanding of implementation strategies, and mitigation of potential risks throughout the project. By involving the client in the planning and design process, the project team can gain better insights into the client's requirements and specific goals (Rukshan & Mangala, 2010).

This involvement will lead to a more successful implementation of the new application, as it ensures that the client's needs and goals are properly understood and considered throughout the development process.

5.5.1. Purpose

Through utilizing this plan, the developer will have a guide in implementing the application efficiently. Since this plan or strategy was already detailed in terms of general strategy, tactics, and procedures. The FinQuant will be utilized as an efficient way and effortless approach for aquarium fish sellers of Zamboanga City in the process of fish counting. Furthermore, the application utilizes internet connectivity in order to access the application features.

5.5.2. System Overview

This plan will serve as a direction for us to create the application successfully. This plan offers the project outline in order to ensure that every single step is executed, and resources are properly allocated. Through this plan, the development of this application will have a clear and achievable plan in place. In addition, it will help the developer to set better goals, plan the project effectively, and make important decisions to achieve a successful application.

5.5.2.1. System Description

FinQuant supports user registration with email verification, where the new user is allowed to create an account in order to access the full application. Afterward, user can now log in with their existing account. Users can eventually see the menus which was the main is to count fish. User can also save the counted

fish data and rename it with their preference.

In line with the menus, the user can also view the tank list, sort it, rename, move to archive, and also can be filtered through the search bar. Sorting is through Day which consists of seven days.

The application also supports archiving where the user can move the tank list data from the tank list to the archive tank list menu, it can be renamed, deleted, sorted by day, and filtered. Aside from that, FinQuant can also generate PDFs to export the file to phone internal storage. In addition, the application requires internet connectivity, and it uses Firebase real-time database.

In general, the application was built to make the fish counting process in aquarium fish sellers an effortless approach, as well as to care for the health of fish.

5.5.2.2. Assumptions and Constraints

In terms of implementation with this proposed application, the following list below are the software which support the production as well as the different platforms such as: phone, and internet connectivity. The proposed application will support only android phones.

Hardware Constraints

The following table list is the minimum hardware requirements for the native application to function effectively.

Table 11. Hardware Constraints

Specifications	Must Possess
Operating System	Android
Version	8 or higher
Phone Camera	
RAM	2 GB or higher
ROM	16GB or higher
Internet Connection	Stable connection with a recommended speed of at least 5 Mbps for smooth operation of the application.

5.5.2.3. System Organization

The application acquires data such as the user authentication, count fish, tank list, and archive tank list. The fish seller, or their staff will be the one who will be in charge of executing the functionality efficiently. The process phase entails several steps. Count fish, tank list, archive tank list, and the following features of each menu are what the application components deal with.

Hardware

The following listed below are the valuable components in order to implement the project successfully:

- Android phone
- Charger of phone
- Tripod

Software

To ensure the success of the application the following are the list of necessary applications or software which are listed below:

- Android Studio
- YOLOv5
- Java
- Roboflow
- Google Colab
- Firebase

5.5.3. Glossary

Throughout the documentation, there are terms that was frequently used. The following terms may not be exact with the meaning in dictionary yet these terms possess meaning in line with the application.

Table 12. Glossary

TERM	DESCRIPTION
Aquarium Fish seller	It focus on the person or a business man or woman that sells fish and have a supplier where they can get fish. They are the main user for this application.

Native Application	It defines that this proposed application can only be executed on android phone. It will not support other than the Android phones with at least version 8 and higher.
Zamboanga City	one of the many cities in the Zamboanga Peninsula, found within the island of Mindanao.
FinQuant	This is the proposed project of the team, it is a motion recognition-based fish-counting application. It is called FinQuant, from the root word Fin which means the fins of the fish, and Quant for numbers.
User	The user that the team frequently mentioned was the aquarium fish seller.

5.6. Management Overview

This portion presents the synopsis of the strategies and steps that will be addressed in the following components for the purpose of assisting the implementation plan. Utilizing this plan will now ensure the success of the implementation of the application. This plan encompasses the general strategy, tactics, and procedures.

5.6.1. Description of Implementation

FinQuant application tailored for aquarium fish sellers, will undergo a strategic implementation. Accessible on Android phones with internet connectivity, our phased approach ensures a seamless deployment. We'll introduce the application first to small businesses especially in inventory management, minimizing disruption in the aquarium selling environment. This method allows for swift issue resolution and ensures a smooth integration tailored to the needs of busy aquarium professionals.

5.6.2. Points-of-Contact

ROLE	NAME	CONTACT
Project Manager / Quality Assurance Engineer	Renel Joy Ladao	0916 – 975 - 4667
UI / UX Design / Analyst	Cherry Lou Arat	0912-439 - 9707
Programmer / Test Manager	Criston Jade Enolpe	0998 – 953 - 9863

Table 13. Points-of-Contact

5.6.3. Major Task

TASK	RESOURCES	KEY PERSON
Oversee the coordination and strategic planning of the comprehensive implementation process.	Laptop and Internet Connection	Project Manager
Documentation about the execution will be generated as required.	Laptop and Internet Connection	Team
Offer any technical assistance.	Laptop and Internet Connection	Team
Modules along with other objectives must be accomplished prior to implementation.	Laptop and Internet Connection	Team
Members of the implementation team have been designated.	Laptop and Internet Connection	Team

Table 14. Major Task

5.6.4. Implementation Schedule

The following are the task that is necessary for the pre-implementation and implementation phase. The timeline schedule for the needed task to accomplish the application is listed in the table below.

Table 14. Implementation Schedule

TASK ID	TASK DESCRIPTION	TASK DURATION	START DATE	END DATE
1	Capstone Project Title Submissions	15	June 7, 2023	June 21 ,2023
2	Capstone Chapters 1-4 submission	6	June 21, 2023	June 26, 2023
3	Capstone Title Defense	1	June 27, 2023	June 27, 2023
4	Capstone Project Chapters 1-4 revisions	17	June 28, 2023	July 14, 2023
5	Submission of Capstone Project Chapters 1-4 revision	5	July 14, 2023	July 19, 2023
6	Signing the Rubric for Approved Title	1	July 19, 2023	July 19, 2023
7	UI Planning	2	July 20, 2023	July 21, 2023
8	Finalization of the Design GUI	14	august 12, 2023	august 25, 2023
9	Capstone Adviser Approval	1	September 11, 2023	September 11, 2023
10	Developing the System UI	10	September 16, 2023	September 25, 2023
11	Capstone Adviser Consultation	1	September 27, 2023	September 27, 2023
12	System Login Module	10	September 29, 2023	October 9, 2023
13	Listing of Fish for training	2	October 10, 2023	October 12, 2023
14	Manage training for dataset	14	October 13, 2023	October 27, 2023
15	Tank List and Fish detection module	9	October 28, 2023	November 6, 2023
16	Capstone Adviser Consultation	1	November 6, 2023	November 6, 2023
17	Gather additional fish photos	2	November 7, 2023	November 9, 2023
18	Manage additional training for accurate detection	7	November 9, 2023	November 16, 2023
19	Test Planning	1	November 17, 2023	November 17, 2023
20	Integration Testing	1	November 18, 2023	November 18, 2023
21	System Testing	1	November 19, 2023	November 19, 2023
22	Acceptance Testing	1	November 20, 2023	November 20, 2023
23	Rebuilding modules	2	November 21, 2023	November 23, 2023
24	Identify Bugs	1	November 24, 2023	November 24, 2023
25	Implement modification	2	November 24, 2023	November 26, 2023

5.6.5. Security and Privacy

This component of the implementation plan will include the of application features during implementation.

5.6.5.1. System Security Features

User authentication – The project management software will have user authentication using an email and password. They can only utilize an email that exists since this is where the application sends the verification for the account that the user wants to create. It will also come with a password recovery setting which will be sent to their email should they forget their password.

5.6.5.2. Security Set-Up During Implementation

The project would be an online application; hence, no LAN servers or workstations with preloaded data on hard disk drives will be installed. Because Firebase, being a secure cloud service provider, ensures the safety of the data in the online application and protects it from potential data breaches.

5.7. Implementation Support

This section gives all the necessary details that may help the implementation and overall completion of the proposed application.

5.7.1. Hardware, Software, Facilities, and Materials

The following are the hardware, software, facilities, and materials needed for this project's successful implementation.

5.7.1.1. Hardware

The various equipment that is valuable to the implementation of this project are the following:

- Cellular
- Charger for Cellular
- Tripod

5.7.1.2. Software

The following is a list of applications or software that the project proponents consider essential to completing the project:

- Firebase
- Android Studio
- Open CV
- Java

5.7.1.3. Facilities

The development team would work together in the school, in their individual residences, and via various social media platforms. Thus, they won't need special access to any facilities or work environments in order to develop the application.

5.7.1.4. Materials

Below are the following materials to be used for the implementation plan:

- Cellular
- Charger for Cellular
- Tripod

5.7.2. Documentation

These components of implementation plan will possess for further documentation needed to support the project's expected outcomes.

5.7.3. Personnel

ROLE	NAME
Project Manager / Quality Assurance Engineer	Renel Joy Ladao
UI / UX Design / Analyst	Cherry Lou Arat
Programmer / Test Manager	Criston Jade Enolpe

5.7.3.1. Staffing Requirements

The project proponents consist of three members but will be partaking or sharing four roles;

- The project manager is the member responsible for monitoring and leading the project team and oversees the day-to-day operations of the project.

- The developers are responsible for determining the essential coding tasks, developing the components that will interact with other parts, such as data connections, installing required apps, and testing the software system that will be developed.

- The UI/UX Designer is the proponent who gathers and evaluates the user requirements. This person is in charge of employing process flows, sitemaps, and storyboards to illustrate design concepts. the general design of the tabs, widgets, and menus of the graphical user interface.

- The Tester is the team member responsible for assessing software requirements and compiling a list of test scenarios that will be executed throughout the project. The tester is additionally responsible for performing the following responsibilities: conducting usability tests on the software, evaluating the test outcomes, distinguishing the various errors or defects encountered throughout the testing process, and determining the overall usability rating of the system. Furthermore, this responsibility encompasses the generation of reports detailing all aspects of software testing and communicating the results to the design team.

5.7.3.2. Training of Implementation Staff

The project proponents working on this project must have the following knowledge, qualifications, and experience on the following:

- Proficiency in multitasking is an indispensable skill to have as this project develops. It enables the team to compensate for the shortcomings or inexperience of one member.

- The ability to adapt to various duties is advantageous in this project. This also falls under the category of situations in which they must effectively manage their time in order to contribute to the work despite their hectic schedule.

- Possess outstanding communication skills. The requirement may be modified in order to allow sufficient levels of communication. The team would benefit from knowing how to comprehend both written and spoken communication, including that which is captured on video conversations conducted via Google Meet and social media platforms like Messenger.

- Possesses a comprehensive understanding of various software development methodologies, platforms, and environments

- Possess knowledge of how to utilize testing instruments.

CHAPTER VI

RESULTS AND DISCUSSION

This section focuses on presenting and analyzing the results obtained from the proposed project. It will discuss the application as well as the testing conducted.

6.1. INTRODUCTION

The research developed an application for counting fish. The application automates fish counting through phone cameras. The proposed project is called the "FinQuant: A motion recognition-based for fish counting application. It automates the counting process for fish in order to streamline the inventory management in aquarium fish seller.

The application specifically designed for the aquarium fish seller, but it can also be utilized by individuals outside their field, such as those who kept pet fish in aquarium or enthusiasts involved in fish breeding. As there no specific role specifications in this application, the data for each user varies due to user authentication, where the account is linked to the email provided during registration

The FinQuant allows user authentication in order to personalize the data, it also have the real-time fish counting process to track the numbers. This process has also the capacity to zoom in and out for more productivity.

The application also caters the Tank List Management as well as the Archiving process. User may use the search bar for easy navigation and sort every data in tank list and archive tank list. The sorting process is by day which also arranged in descending order this is to have ample time for the user to review the previous data before the recent. In addition, user have also the ability to rename specified the data. The unique ability of the result page under tank list function is the capability of moving the data to archive tank list. While Archive tank list uniqueness id the capability to delete the data. Both Tank List and Archive tank list has the ability to generate PDF in order to acquire the history for future use and reference as well.

6.2. SUMMARY of FINDINGS

TEST RESULT						
Executed	Passed					**42**
	Failed					**0**
	Total Test Executed					**42**
Module	**Description**	**% TCs Executed**	**% TCs Passed**	**TCs Pending**	**Priority**	**Remarks**
Registration	Create an account for new user	100%	100%	0	High	Pass
Log in	Sign into existing account	100%	100%	0	High	Pass
Scanning		100%	100%	0	High	Pass
Tank list	Rename, Sort, Move to Archive, Search, and PDF generation	100%	100%	0	High	Pass
Archive list	Rename, Sort, Delete, Search, and PDF generation	100%	100%	0	High	Pass

On December 12 ,2023, beta testing was conducted in *HF BIOAQUATICS with Ma'am Ivy Dimple De Guzman and DEXTER WORLD PET SHOP with Sir Arjin Fernandez* . They evaluated the application by answering the evaluation form, which can be in Appendix D. They rated each usability functionalities of the modules from 1-to 5. One being the lowest and five being the highest in the ratings. The results yielded a five on four modules and one module got four. However, one concern is that some of the Application users may not be able to have access to technologies. Below is the evaluation form:

HF BIOAQUATICS (USER 1)			
Tester Name: Ivy Dimple De Guzman			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5
Motion Recognition	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5
Tank list	Rename, Sort, Move to Archive, Search ,and PDF	pass	5

	generation		
	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF generation	pass	5
	Does the application allows the renaming of	pass	5

	file?		
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	It helps to lessen the errors of miscounting, the automation is brilliant. It will also prevent the time consuming counting of fish.		
Did you find the activities difficult?	No, because it has a simple user interface which is very understandable		
Which of the app's feature do you find the most useful?	The counting of fish as well as the tank management.		

Which of the app's feature do you find the least useful?	None
Did the application help solve your problem?	Yes, especially in counting and keeping records.
How easy was this application to use?	It is easy because it has the simple user interface.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	Maybe the registration form field of age and gender as well as the full name and username.

DEXTER WORLD PET SHOP (USER 2)			
Tester Name: Arjin Fernandez			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5
Motion Recognition	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5
Tank list	Rename, Sort, Move	pass	5

	to Archive, Search ,and PDF generation		
	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF generation	pass	5
	Does the	pass	5

	application allows the renaming of file?		
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	The counting process is fast, it will now prevent from miscount. It also help us to do some work since it is not already a time consuming process		
Did you find the activities difficult?	No, because the researcher explain it properly that make us understand the process as well as their application is simple and easy to understands.		
Which of the app's feature do you find	The features that is very useful is the counting because we know how difficult to count manually especially when it's a koi.		

the most useful?	
Which of the app's feature do you find the least useful?	None, every feature is relevant in terms of business like selling ornamental fish.
Did the application help solve your problem?	Yes, in counting fish particularly because its easy and fast.
How easy was this application to use?	Its easy because buttons are easy to navigate.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	The age and gender.

CHAPTER VII
CONCLUSIONS AND RECCOMENDATIONS

7.1. Conclusion

The development of the FINQUANT: A Motion Recognition-Based Fish Counting Application is to help aquarium fish seller to count easily. The researchers conducted alpha testing with 10 sampled users and generated a test case for each application module which could be found under the testing plan test cases part of this documentation. After the alpha testing the researchers also conducted beta testing within the Zamboanga City. The beta testing on December 12 of the year 2023. Together with the HF Pet Shop and DEXTER WORLD pet shop.

The development of the FINQUANT: A Motion Recognition-Based Fish Counting Application is to help aquarium fish seller to count easily. The researchers conducted alpha testing with 10 sampled users and generated a test case for each application module which could be found under the testing plan test cases part of this documentation. After the alpha testing the researchers also conducted beta testing within the Zamboanga City. The beta testing on December 1 of the year 2023. Together with HF Pet shop and DEXTER WORLD Pet shop, the tester concluded that the following notions were satisfied in terms of its objectives:

- The user may create an account on the registration page, they will use an existing email account for them to verify the created account.
- Users may log in after the registration and can run through the application's features. Anywhere, everywhere users can access the application as well as the data they had as long as they know the account they used or created.
- User may count fish through their phone camera, and save it for future reference. user will have file management where they can keep the records of the counted fish as well as PDF Generation.

7.2. Recommendations

The FINQUANT: A Motion Recognition-Based Fish Counting Application is designed exclusively for Aquarium Fish Seller. The application will simplify inventory management for sellers by easily counting the fish using motion detection. Furthermore, the application's ability to save files allows fish sellers to keep organized and accessible records of their fish stock.

These are the following recommendations for future researchers:

To future researchers, FinQuant, as a motion recognition-based fish counting application, holds great potential for further enhancement and refinement. I hope that the application continues to evolve for improved functionality and even greater accuracy in fish counting. It would be beneficial if future developments could include the ability to detect and identify different fish species within an aquarium setting. This expansion in features could significantly contribute to a more comprehensive understanding of aquatic environments and better serve the needs of researchers and enthusiasts alike.

REFERENCES

i. The Use of Computer Vision Technologies in Aquaculture – a Review, Computers and Electronics in Agriculture. (2012). Boaz Zion. Retrieved December 10, 2023, from https://www.sciencedirect.com/science/article/abs/pii/S0168169912001950

ii. Costa, C., Loy, A., Cataudella, S., Davis, D., & Scardi, M. (2006). Extracting fish size using dual underwater cameras. Aquacultural Engineering, 35(0144–8609), 218–227. https://doi.org/10.1016/j.aquaeng

iii. Yang, Ling & Liu, Yeqi & Yu, Huihui & Fang, Xiaomin & Song, Lihua & Li, Daoliang & Chen, Yingyi. (2020). Computer Vision Models in Intelligent Aquaculture with Emphasis on Fish Detection and Behavior Analysis: A Review. Archives of Computational Methods in Engineering. 28. 1-32. 10.1007/s11831-020-09486-2.

iv. Miyazono, Tsubasa & Saitoh, Takeshi. (2018). Fish Species Recognition Based on CNN Using Annotated Image. 10.1007/978-981-10-6451-7_19.

v. Conte, F. S. (2004). Stress and the welfare of cultured fish. Applied Animal Behaviour Science, 86(0168–1591), 205–223.

vi. Deep, B & Dash, Ratnakar. (2019). Underwater Fish Species Recognition Using Deep Learning Techniques. 665-669. 10.1109/SPIN.2019.8711657.

vii. Zion, B., Shklyar, A., & Karplus, I. (1999). Sorting fish by computer vision. Computers and Electronics in Agriculture, 23(0168–1699), 175–187. https://doi.org/10.1016/S0168-1699(99)00030-7

viii. Automated Fish Counting System to Benefit Ecology, Fisheries Industry. (2021, September 29). Curtin University. Retrieved December 11, 2023, from https://www.curtin.edu.au/news/media-release/automated-fish-counting-system-to-benefit-ecology-fisheries-industry/

ix. Hernandez-Ontiveros, J. M., Inzunza-Gonzalez, E. I.-G., Guerero, E. E., Bonilla, O. R., Prieto, S. O., Valdez, J. R., & Cuautle, E. (2018). Development and implementation of a fish counter by using an embedded system. Computers and Electronics in Agriculture, 145(0168–1699), 53–62. https://doi.org/10.1016/j.compag

x. Fan. (2013). Automate fry counting using computer vision and multi-class least squares support vector machine. Aquaculture, 380–383(0044–8486), 91–98. https://doi.org/10.1016/j.aquaculture.2012.10.016

xi. Klapp, Iftach & Arad, Or & Rosenfeld, Lavi & Barki, Assaf & Shaked, Ben & Zion, Boaz. (2018). Ornamental fish counting by non-imaging optical system for real-time applications. Computers and Electronics in Agriculture. 153. 126-133. 10.1016/j.compag.2018.08.007.

APPENDIX A

Greetings! In partial fulfilment with requirements in IT 140 (Capstone Project and Research 1), the team would like to interview for our project titled "FinQuant: A Motion Recognition-Based Fish Counting Application" to know about the prospect's overall business process. All of the answers will be kept strictly confidential. Thank you.

USER 1	
Name of pet shop	HF BIOAQUATICS
When did your pet shop start?	No comment
How many branches does your pet shop have?	No comment
What is your name, and position in the pet shop?	Ivy Dimple De Guzman – In Charge
What process do you use for counting fish?	Manual counting
Have you ever faced challenges in terms of counting fish?	Yes
Which species of fish is difficult to count?	Mollies
After you finish counting, how do you keep the record list?	Write on a record book
How do you organize files of the lists of counted fish for easy access?	By using the record book, with specific date
How do you keep the old files of the counted fish for future reference?	If the record book is full, we'll just keep it in an envelope with date range.
USER 2	
Name of pet shop	DEXTER WORLD PET SHOP
When did your pet shop start?	
How many branches does your pet shop have?	2
What is your name, and position in the pet shop?	Arjin Fernandez – In Charge

What process do you use for counting fish?	Manual counting
Have you ever faced challenges in terms of counting fish?	Yes
Which species of fish is difficult to count?	Koi
After you finish counting, how do you keep the record list?	Writing in a record book.
How do you organize files of the lists of counted fish for easy access?	By indicating the date in each list.
How do you keep the old files of the counted fish for future reference?	Keeping it in a box or cabinet with specific date range.

APPENDIX B

Appendix B

```
package com.finquant.Yolov5;

import android.app.ActivityManager;
import android.content.Context;
import android.content.Intent;
import android.content.pm.ConfigurationInfo;
import android.graphics.Bitmap;
import android.graphics.BitmapFactory;
import android.graphics.Canvas;
import android.graphics.Color;
import android.graphics.Matrix;
import android.graphics.Paint;
import android.graphics.RectF;
import android.os.Bundle;
import android.os.Handler;
import android.os.Looper;
import android.util.Log;
import android.widget.Button;
import android.widget.ImageView;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;


import com.finquant.Utils.Dialog_utils;
import com.finquant.Yolov5.customview.OverlayView;
import com.finquant.Yolov5.env.ImageUtils;
import com.finquant.Yolov5.env.Logger;
import com.finquant.Yolov5.env.Utils;
import com.finquant.Yolov5.tflite.Classifier;
import com.finquant.Yolov5.tflite.YoloV5Classifier;
import com.finquant.Yolov5.tracking.MultiBoxTracker;
import com.m.motion_2.R;

import java.io.IOException;
import java.util.LinkedList;
import java.util.List;

public class MainActivity extends AppCompatActivity {

    public static final float MINIMUM_CONFIDENCE_TF_OD_API = 0.3f;
    int count = 0; // Initialize the counter outside the loop.

    private Button btnTryAgain, btnSave;

    private static final Logger LOGGER = new Logger();
```

```
    public static final int TF_OD_API_INPUT_SIZE = 640;

    private static final boolean TF_OD_API_IS_QUANTIZED = false;

    private static final String TF_OD_API_MODEL_FILE = "best-fp16.tflite";

    private static final String TF_OD_API_LABELS_FILE = "file:///android_asset/fish.txt";

    // Minimum detection confidence to track a detection.
    private static final boolean MAINTAIN_ASPECT = true;
    private Integer sensorOrientation = 90;

    private Classifier detector;

    private Matrix frameToCropTransform;
    private Matrix cropToFrameTransform;
    private MultiBoxTracker tracker;
    private OverlayView trackingOverlay;

    protected int previewWidth = 0;
    protected int previewHeight = 0;

    private Bitmap sourceBitmap;
    private Bitmap cropBitmap;

    private Button cameraButton, detectButton;
    private ImageView imageView;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);

        cameraButton = findViewById(R.id.cameraButton);
        detectButton = findViewById(R.id.detectButton);
        imageView = findViewById(R.id.imageView);
        btnTryAgain = findViewById(R.id.btnTryAgain);
        btnSave = findViewById(R.id.btnSave);
        btnTryAgain.setOnClickListener(v -> {
            Intent intent = new Intent(MainActivity.this, DetectorActivity.class);
            startActivity(intent);
            finish();
        });

        cameraButton.setOnClickListener(v -> startActivity(new Intent(MainActivity.this,
DetectorActivity.class)));

        Intent intent = getIntent();
        if (intent != null) {
```

```
        Log.d("MainActivity", "intent != null");

        String path = intent.getStringExtra("path");
        Log.d("MainActivity", "path: " + path);

        if (path != null) {
            sourceBitmap = BitmapFactory.decodeFile(path);
            if (sourceBitmap != null) {
                cropBitmap = Utils.processBitmap(sourceBitmap,
TF_OD_API_INPUT_SIZE);
                if (cropBitmap != null) {
                    imageView.setImageBitmap(cropBitmap);
                } else {
                    // Handle the error, show message to the user or log
                    Log.e("MainActivity", "Failed to process the bitmap.");
                }
            } else {
                // Handle the error, show message to the user or log
                Log.e("MainActivity", "Failed to load bitmap from assets.");
            }
        }
    }


    // detectButton.performClick();


//      detectButton.setOnClickListener(v -> {
//          Handler handler1 = new Handler();
//
//          new Thread(() -> {
//                                          final List<Classifier.Recognition> results =
detector.recognizeImage(cropBitmap);
//              handler1.post(new Runnable() {
//                  @Override
//                  public void run() {
//                      handleResult(cropBitmap, results);
//                  }
//              });
//          }).start();
//
//      });



    btnSave.setOnClickListener(v -> {
        Dialog_utils.showFishCountDialog(count, MainActivity.this);
    });
```

```
        initBox();


        ActivityManager activityManager = (ActivityManager) getSystemService(Context.ACTIVITY_SERVICE);
        ConfigurationInfo configurationInfo = activityManager.getDeviceConfigurationInfo();

        System.err.println(Double.parseDouble(configurationInfo.getGlEsVersion()));
        System.err.println(configurationInfo.reqGlEsVersion >= 0x30000);
        System.err.println(String.format("%X", configurationInfo.reqGlEsVersion));

        final List<Classifier.Recognition> results = detector.recognizeImage(cropBitmap);
        handleResult(cropBitmap, results);

    }


    private void initBox() {
        previewHeight = TF_OD_API_INPUT_SIZE;
        previewWidth = TF_OD_API_INPUT_SIZE;
        frameToCropTransform =
                ImageUtils.getTransformationMatrix(
                        previewWidth, previewHeight,
                        TF_OD_API_INPUT_SIZE, TF_OD_API_INPUT_SIZE,
                        sensorOrientation, MAINTAIN_ASPECT);

        cropToFrameTransform = new Matrix();
        frameToCropTransform.invert(cropToFrameTransform);

        tracker = new MultiBoxTracker(this);
        trackingOverlay = findViewById(R.id.tracking_overlay);
        trackingOverlay.addCallback(
                canvas -> tracker.draw(canvas));

        tracker.setFrameConfiguration(TF_OD_API_INPUT_SIZE, TF_OD_API_INPUT_SIZE, sensorOrientation);

        try {
            detector =
                    YoloV5Classifier.create(
                            getAssets(),
                            TF_OD_API_MODEL_FILE,
                            TF_OD_API_LABELS_FILE,
                            TF_OD_API_IS_QUANTIZED,
                            TF_OD_API_INPUT_SIZE);
```

```
//          Handler handler = new Handler();
//
//          new Thread(() -> {
//                                                  final List<Classifier.Recognition> results =
detector.recognizeImage(cropBitmap);
//              handler.postDelayed(new Runnable() {
//                  @Override
//                  public void run() {
//                      handleResult(cropBitmap, results);
//                  }
//              }, 1000);
//          }).start();

      } catch (final IOException e) {
         e.printStackTrace();
         LOGGER.e(e, "Exception initializing classifier!");
         Toast toast =
               Toast.makeText(
                     getApplicationContext(), "Classifier could not be initialized",
Toast.LENGTH_SHORT);
         toast.show();
         finish();
      }
   }

   private void handleResult(Bitmap bitmap, List<Classifier.Recognition> results) {
      final Canvas canvas = new Canvas(bitmap);
      final Paint paint = new Paint();
      paint.setColor(Color.RED);
      paint.setStyle(Paint.Style.STROKE);
      paint.setStrokeWidth(2.0f);

      final List<Classifier.Recognition> mappedRecognitions =
            new LinkedList<Classifier.Recognition>();


      for (final Classifier.Recognition result : results) {
         final RectF location = result.getLocation();
         if (location != null && result.getConfidence() >=
MINIMUM_CONFIDENCE_TF_OD_API) {
            canvas.drawRect(location, paint);
            cropToFrameTransform.mapRect(location);

            result.setLocation(location);
            mappedRecognitions.add(result);
            count++; // Increment the count for each detection.

         }
      }
```

```
        Log.d("TAG", "Count: " + count);



//        tracker.trackResults(f, new Random().nextInt());
//        trackingOverlay.postInvalidate();
        //imageView.setImageBitmap(bitmap);
    }

    @Override
    protected void onStart() {
        super.onStart();


    }
}
```

// OVERRIDE

```
private void handleResult(Bitmap bitmap, List<Classifier.Recognition> results) {
        final Canvas canvas = new Canvas(bitmap);
        final Paint paint = new Paint();
        paint.setColor(Color.RED);
        paint.setStyle(Paint.Style.STROKE);
        paint.setStrokeWidth(2.0f);

        final List<Classifier.Recognition> mappedRecognitions =
                new LinkedList<Classifier.Recognition>();


        for (final Classifier.Recognition result : results) {
            final RectF location = result.getLocation();
            if (location != null && result.getConfidence() >=
MINIMUM_CONFIDENCE_TF_OD_API) {
                canvas.drawRect(location, paint);
                cropToFrameTransform.mapRect(location);

                result.setLocation(location);
                mappedRecognitions.add(result);
                count++; // Increment the count for each detection.

            }
        }

        Log.d("TAG", "Count: " + count);



//        tracker.trackResults(f, new Random().nextInt());
//        trackingOverlay.postInvalidate();
        //imageView.setImageBitmap(bitmap);
```

APPENDIX C

Appendix C

TESTING

The Capstone Project proponents created 25 sample users. Every 5 users will have different phone brand which is the Samsung, Oppo, Redmi, Infinix, and Honor. The proponents will execute the testing into 5 different phone brands to clarify the usability of the proposed mobile application on various devices. This approach of conducting the testing on different phone brands allows the researchers to assess the compatibility and performance of their mobile application across a wider range of devices, ensuring a more comprehensive evaluation of the application's usability.

NOT PA SUREE

PHONE BRAND	FULL NAME	USERNAME
Samsung	Manelyn Ibarbia	manelyn
	Ritchel Ann Gulo	ann
Techno	Aivy May Cabasag	may
	Mycah Dongallo	myc
Redmi	John David Gamier	david
	Nikka Angela Delos Reyes	nikk
Infinix	Christelgene Arat	Gene27
	Julius Decimo	Jul29
Honor	Cyrene Kate Pasiolan	Cyy99
	Clifford King Pasiolan	Ford45

The following table contains the test result summary of the various test cases done to the different modules within the system.

TEST REPORT						
EXECUTED	Passed					42
	Failed					0
	(Total) Tests Executed (Passed + Failed)					42
Pending						0
In Progress						0
Blocked						0
Completed						100%
Functions	Description	% TCs Executed	% TCs Passed	TCs Pending	Priority	Remarks
New Account	Create a new account for the user	100%	100%	0	High	Pass
Verify Registration	Enter a valid name, Invalid email, Username, Age, gender and password.	100%	100%	0	Normal	Pass
Verify Registration	Click the "Register" button with Blank fields	100%	100%	0	Normal	Pass
Verify Registration	Enter a valid name, Blank email, User name, Age, gender and password.	100%	100%	0	Normal	Pass
verify registration	sends verification link in the	100%	100%	0	High	Pass

	email					
Verify the login	Enter valid email and password	100%	100%	0	High	Pass
Verify the login	Enter valid email and invalid password	100%	100%	0	Normal	Pass
Verify the login	Enter invalid email and valid password	100%	100%	0	Normal	Pass
Verify the login	Enter invalid email and invalid password	100%	100%	0	Normal	Pass
Verify the login	Enter blank email and valid password	100%	100%	0	Normal	Pass
Verify the login	Enter valid email and blank password	100%	100%	0	Normal	Pass
Verify the login	Enter blank email and blank password	100%	100%	0	Normal	Pass
Verify forgot password	Enter a valid email and invalid password	100%	100%	0	Normal	Pass
Verify forgot password	Enter email without “@”	100%	100%	0	Normal	Pass
verify that users will receive a link in their mail	Enter a valid email	100%	100%	0	High	Pass

for resetting their password						
Verify If the password is masked	Enter password	100%	100%	0	High	Pass
Verify accuracy of motion recognition in fish counting.	Count fish in a tank	100%	100%	0	High	Pass
Saving the count fish data	Saving fish count with name	100%	100%	0	Normal	Pass
Saving the count fish data	Saving fish count without name	100%	100%	0	Normal	Pass
Evaluating the “Try Again” button in fish counting process	Retrying fish counting	100%	100%	0	High	Pass
Search tank name	Attempt to search the tank name	100%	100%	0	Normal	Pass
Sort tank list	Sort by “ Monday”	100%	100%	0	High	Pass
Sort tank list	Sort by “ Tuesday ”	100%	100%	0	High	Pass
Sort tank list	Sort by “ Wednesday ”	100%	100%	0	High	Pass
Sort tank list	Sort by “Thursday”	100%	100%	0	High	Pass
Sort tank list	Sort by “Friday”	100%	100%	0	High	Pass
Sort tank list	Sort by “Saturday”	100%	100%	0	High	Pass
Sort tank list	Sort by “Sunday”	100%	100%	0	High	Pass
Sort tank list	Sort by “None”	100%	100%	0	High	Pass
Sort tank list	Sorting by day	100%	100%	0	High	Pass
PDF Generation	Generate PDF for tank list data	100%	100%	0	High	Pass

Renaming the data in archive list	Attempt to rename	100%	100%	0	Normal	Pass
Renaming the data in tank list	Attempt to rename but accidentally tap the “Rename”	100%	100%	0	Normal	Pass
Search tank name in Archive	Attempt to search the tank name	100%	100%	0	Normsl	Pass
Sort Archive list	Sort by "Monday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Tuesday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Wednesday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Thursday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Friday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Saturday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "Sunday"	100%	100%	0	High	Pass
Sort Archive list	Sort by "None"	100%	100%	0	High	Pass
Sort Archive list	Sorting by day	100%	100%	0	High	Pass
PDF Generation	Generate PDF for tank list data	100%	100%	0	High	Pass

The following table contains the test result summary of the various modules within the application.

TEST REPORT		
EXECUTED	Passed	42
	Failed	0
	(Total) Tests Executed (Passed + Failed)	42
Pending		0

In Progress						0
Blocked						0
Completed						42
Module	**Description**	**% TCs Executed**	**% TCs Passed**	**TCs Pending**	**Priority**	**Remarks**
Registration	Create an account for new user	100%	100%	0	High	Pass
Log in	Sign into existing account	100%	100%	0	High	Pass
Motion Recognition	Save, Try Again	100%	100%	0	High	Pass
Tank list	Rename, Sort, Move to Archive, Search ,and PDF generation	100%	100%	0	High	Pass
Archive list	Rename, Sort, Delete, Search ,and PDF generation	100%	100%	0	High	Pass

BETA TESTING RESULT

HF BIOAQUATICS (USER 1)			
Tester Name: My Dimple De Guzman			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5
Motion Recognition	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5
Tank list	Rename, Sort, Move to Archive, Search ,and	pass	5

	PDF generation		
	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF generation	pass	5
	Does the application allows the	pass	5

	renaming of file?		
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	It helps to lessen the errors of miscounting, the automation is brilliant. It will also prevent the time consuming counting of fish.		
Did you find the activities difficult?	No, because it has a simple user interface which is very understandable		
Which of the app's feature do you find the most useful?	The counting of fish as well as the tank management.		

Which of the app's feature do you find the least useful?	None
Did the application help solve your problem?	Yes, especially in counting and keeping records.
How easy was this application to use?	It is easy because it has the simple user interface.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	Maybe the registration form field of age and gender as well as the full name and username.

DEXTER WORLD PET SHOP (USER 2)			
Tester Name: Arjin Fernandez			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5

	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
Motion Recognition	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5
	Rename, Sort, Move to Archive, Search ,and PDF generation	pass	5
Tank list	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5

	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF generation	pass	5
	Does the application allows the renaming of file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5

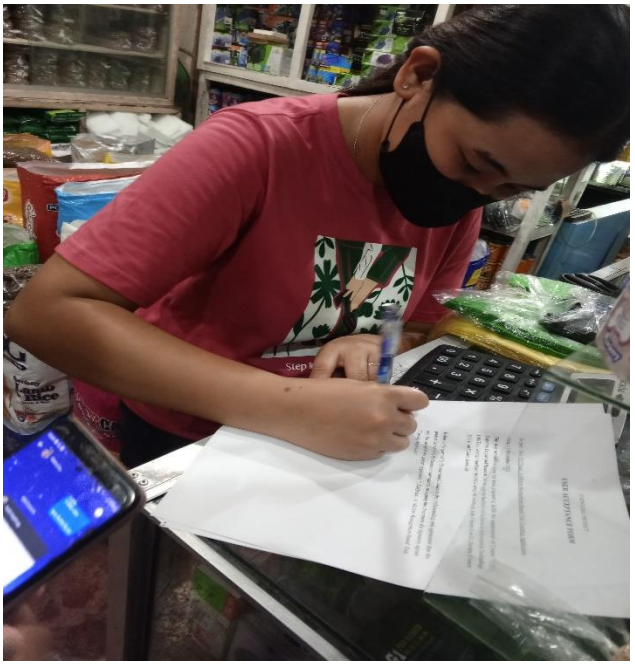
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	The counting process is fast, it will now prevent from miscount. It also help us to do some work since it is not already a time consuming process		
Did you find the activities difficult?	No, because the researcher explain it properly that make us understand the process as well as their application is simple and easy to understands.		
Which of the app's feature do you find the most useful?	The features that is very useful is the counting because we know how difficult to count manually especially when it's a koi.		
Which of the app's feature do you find the least useful?	None, every feature is relevant in terms of business like selling ornamental fish.		
Did the application help solve your problem?	Yes, in counting fish particularly because its easy and fast.		

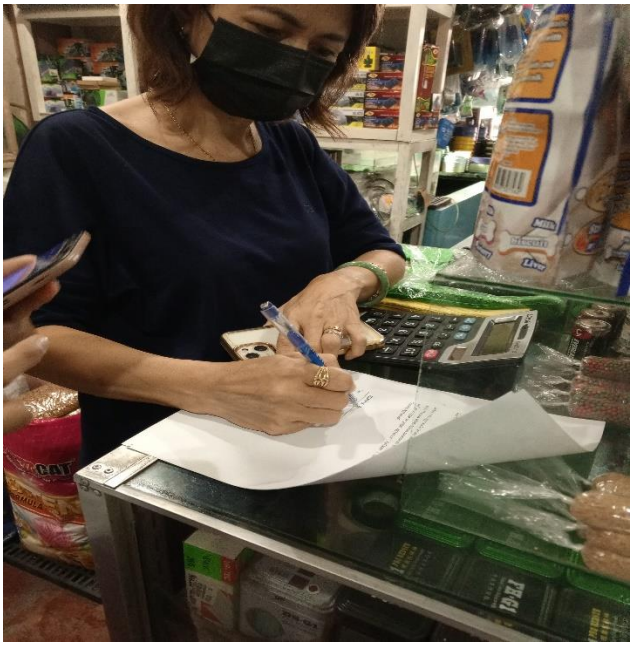
How easy was this application to use?	Its easy because buttons are easy to navigate.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	The age and gender.

Photo and Video Documentation

- **Consultation Meetings**

USER 2 (HF BIOAQUATICS)





USER 2 (DEXTER WORLD PET SHOP)

APPENDIX D

Appendix D

EVALUATION FORM

HF BIOAQUATICS (USER 1)			
Tester Name: My Dimple De Guzman			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5
Motion Recognition	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5

Tank list	Rename, Sort, Move to Archive, Search ,and PDF generation	pass	5
	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF	pass	5

	generation		
	Does the application allows the renaming of file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	It helps to lessen the errors of miscounting, the automation is brilliant. It will also prevent the time consuming counting of fish.		
Did you find the activities difficult?	No, because it has a simple user interface which is very understandable		

Which of the app's feature do you find the most useful?	The counting of fish as well as the tank management.
Which of the app's feature do you find the least useful?	None
Did the application help solve your problem?	Yes, especially in counting and keeping records.
How easy was this application to use?	It is easy because it has the simple user interface.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	Maybe the registration form field of age and gender as well as the full name and username.

DEXTER WORLD PET SHOP (USER 2)			
Tester Name: Arjin Fernandez			
Module	**Description & Function**	**Pass/Fail**	**Usability (1-5)**
Registration	Create an account for a new user.	Pass	5
Log in	Sign into existing account.	Pass	5
Motion Recognition	Fish Counting, Save, Try Again	Pass	4
	Does the application count the fish?	pass	4
	Does the application save the counted fish?	pass	5
	Does the application restart the counting process?	pass	5
Tank list	Rename, Sort, Move	pass	5

	to Archive, Search ,and PDF generation		
	Does the application allows renaming the file?	pass	5
	Does the application sort the file by day?	pass	5
	Does the application allow the moving of file to archive?	pass	5
	Does the application can search specific file?	pass	5
	Does the application generate PDF?	pass	5
Archive Tank List	Rename, Sort, Delete, Search ,and PDF generation	pass	5
	Does the	pass	5

	application allows the renaming of file?		
	Does the application sort the file by day?	pass	5
	Does the application allow to delete file?	pass	5
	Does the application search a specific file?	pass	5
	Does the application generate PDF?	pass	5
How will this App help improve the counting of ornamental fish?	The counting process is fast, it will now prevent from miscount. It also help us to do some work since it is not already a time consuming process		
Did you find the activities difficult?	No, because the researcher explain it properly that make us understand the process as well as their application is simple and easy to understands.		
Which of the app's feature do you find	The features that is very useful is the counting because we know how difficult to count manually especially when it's a koi.		

the most useful?	
Which of the app's feature do you find the least useful?	None, every feature is relevant in terms of business like selling ornamental fish.
Did the application help solve your problem?	Yes, in counting fish particularly because its easy and fast.
How easy was this application to use?	Its easy because buttons are easy to navigate.
Which parts felt unnecessarily complicated?	None
Which parts did you feel were irrelevant?	The age and gender.

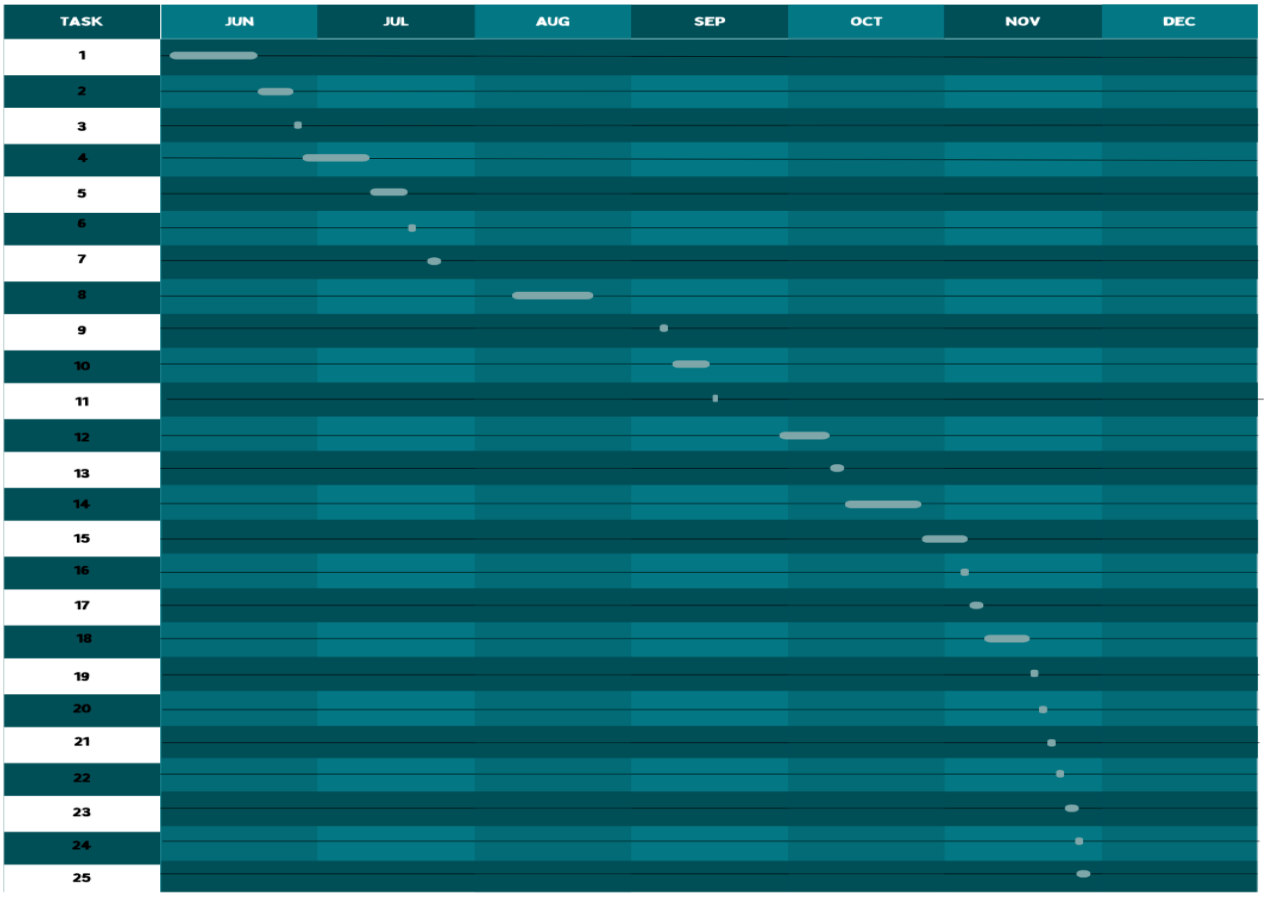
APPENDIX E

Appendix E

GANTT CHART

FINQUANT GANTT CHART

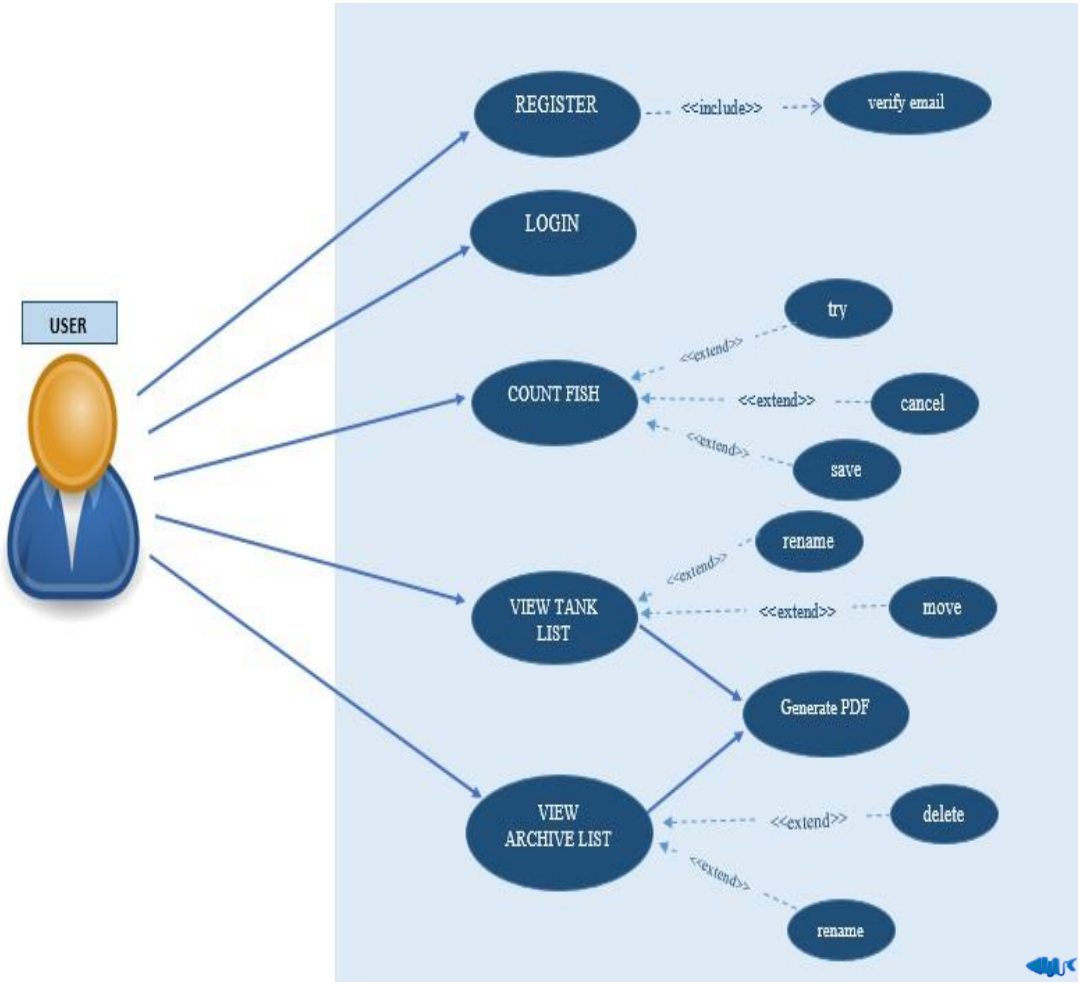
TASK ID	TASK DESCRIPTION	TASK DURATION	START DATE	END DATE
1	Capstone Project Title Submissions	15	JUNE 7, 2023	JUNE 21 ,2023
2	Capstone Chapters 1-4 submission	6	JUNE 21, 2023	JUNE 26, 2023
3	Capstone Title Defense	1	JUNE 27, 2023	JUNE 27, 2023
4	Capstone Project Chapters 1-4 revisions	17	JUNE 28, 2023	JULY 14, 2023
5	Submission of Capstone Project Chapters 1-4 revision	5	JULY 14, 2023	JULY 19, 2023
6	Signing the Rubric for Approved Title	1	JULY 19, 2023	JULY 19, 2023
7	UI Planning	2	JULY 20, 2023	JULY 21, 2023
8	Finalization of the Design GUI	14	AUGUST 12, 2023	AUGUST 25, 2023
9	Capstone Adviser Approval	1	SEPTEMBER 11, 2023	SEPTEMBER 11, 2023
10	Developing the System UI	10	SEPTEMBER 16, 2023	SEPTEMBER 25, 2023
11	Capstone Adviser Consultation	1	SEPTEMBER 27, 2023	SEPTEMBER 27, 2023
12	System Login Module	10	SEPTEMBER 29, 2023	OCTOBER 9, 2023
13	Listing of Fish for training	2	OCTOBER 10, 2023	OCTOBER 12, 2023
14	Manage training for dataset	14	OCTOBER 13, 2023	OCTOBER 27, 2023
15	Tank List and Fish detection module	9	OCTOBER 28, 2023	NOVEMBER 6, 2023
16	Capstone Adviser Consultation	1	NOVEMBER 6, 2023	NOVEMBER 6, 2023
17	Gather additional fish photos	2	NOVEMBER 7, 2023	NOVEMBER 9, 2023
18	Manage additional training for accurate detection	7	NOVEMBER 9, 2023	NOVEMBER 16, 2023
19	Test Planning	1	NOVEMBER 17, 2023	NOVEMBER 17, 2023
20	Integration Testing	1	NOVEMBER 18, 2023	NOVEMBER 18, 2023
21	System Testing	1	NOVEMBER 19, 2023	NOVEMBER 19, 2023
22	Acceptance Testing	1	NOVEMBER 20, 2023	NOVEMBER 20, 2023
23	Rebuilding modules	2	NOVEMBER 21, 2023	NOVEMBER 23, 2023
24	Identify Bugs	1	NOVEMBER 24, 2023	NOVEMBER 24, 2023
25	Implement modification	2	NOVEMBER 24, 2023	NOVEMBER 26, 2023


TASK
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

APPENDIX F

Appendix F

USE CASES



In the previous figure, FinQuant application provides a comprehensive solution for accurately detecting and counting fish within aquarium tanks. The following use case describes the interactions between the user and the various functions of the FinQuant application, including: Registration process, by providing necessary details including Gmail. It also shows the other base use case which is the “Login”, “Count Fish” where the user starts the counting process leading to the display of results, it has the extend relationship to cancel, try again and save.

In “View Tank List”, it displays the list of counted fish along their filename it also has the rename and move to archive as an extend relationship of View Tank List. For the “View Archive List”, it will display the archives tank list or the file that was moved from tank list. And it has the rename and delete as its extend relationship. And lastly the “Generate PDF” as the base use case of “View Tank List” and “View Archive List”

No.	Use Case	Description	Actor	Preconditions	Post condition
1	**Register**	User creates an account, requiring email verification with their personal Gmail.	Aquarium Fish Seller	None	User account is successfully created, and email is verified.
2	**Verify Gmail**	Verifies the provided Gmail during the registration process.	Aquarium Fish Seller	User is in the registration process with a provided Gmail.	Gmail is verified successfully.
3	**Log in**	User logs in using the verified Gmail and password.	Aquarium Fish Seller	User has a registered and verified account with FinQuant.	User is logged in, and the dashboard is displayed.
4	**Count**	User initiates the fish counting process and views the result on the FinQuant dashboard.	Aquarium Fish Seller	user is logged in and on the dashboard	Fish counting is completed, and the result is displayed. User has the option to save.

5	**Save Count Result**	User saves the counted result with a provided file name for future reference.	Aquarium Fish Seller	User has completed a fish counting process.	Count result is saved with the specified the name.
6	**ViewTank List**	User accesses the tank list option on the dashboard to view the list of counted fish.	Aquarium Fish Seller	User is logged in and on the dashboard.	Tank list is displayed, showing the counted fish.
7	**Generate PDF (Tank)**	User generates a PDF from the tank list for documentation or sharing purposes.	Aquarium Fish Seller	User is viewing the tank list.	PDF is generated from the tank list.
8	**Move to Archive**	User moves a counted file from the tank list to the archive for organization.	Aquarium Fish Seller	User is viewing the tank list.	File is successfully moved to the archive tank list.
9	**View Archive List**	User accesses the archive tank list option on the dashboard to view moved files.	Aquarium Fish Seller	User is logged in and on the dashboard.	Archive tank list is displayed, showing the moved files.
10	**Generate PDF (Archive)**	User generates a PDF from the tank list for documentation or sharing purposes.	Aquarium Fish Seller	User is viewing the archive tank list.	PDF is generated from the archive tank list.

11	**Rename (Tank)**	User renames a file in the tank list for better identification.	Aquarium Fish Seller	User is viewing the tank list.	File in the tank list is successfully renamed.

APPENDIX G

Appendix G

CAPSTONE PROJECT

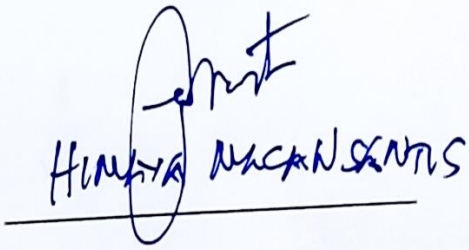
USER ACCEPTANCE FORM

Project Title: FinQuant: A Motion Recognition-Based Fish Counting Application

Date: 12 December 2023

This user acceptance form has been prepared to fulfill the requirement of Course IT 141, Capstone Project and Research 2 of the course Bachelor of Science in Information Technology (BSIT) at Western Mindanao State University by students Arat, Cherry Lou O., Enolpe, Criston Jade B. and Ladao, Renel Joy.

Below is the approval by the user which indicates the understanding and agreement that the project has met with the business requirements. In signing this document, the signatory agrees and has accepted the project application " FinQuant: A Motion Recognition-Based Fish Counting Application".



User

(Signature over printed name)

(USER 2)

CAPSTONE PROJECT

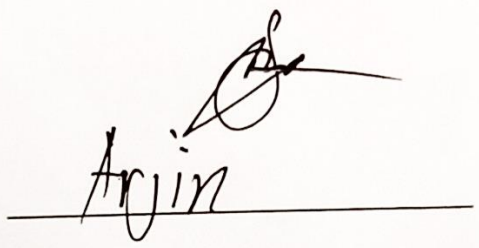
USER ACCEPTANCE FORM

Project Title: FinQuant: A Motion Recognition-Based Fish Counting Application

Date: 12 December 2023

This user acceptance form has been prepared to fulfill the requirement of Course IT 141, Capstone Project and Research 2 of the course Bachelor of Science in Information Technology (BSIT) at Western Mindanao State University by students Arat, Cherry Lou O., Enolpe, Criston Jade B. and Ladao, Renel Joy.

Below is the approval by the user which indicates the understanding and agreement that the project has met with the business requirements. In signing this document, the signatory agrees and has accepted the project application " FinQuant: A Motion Recognition-Based Fish Counting Application".



User

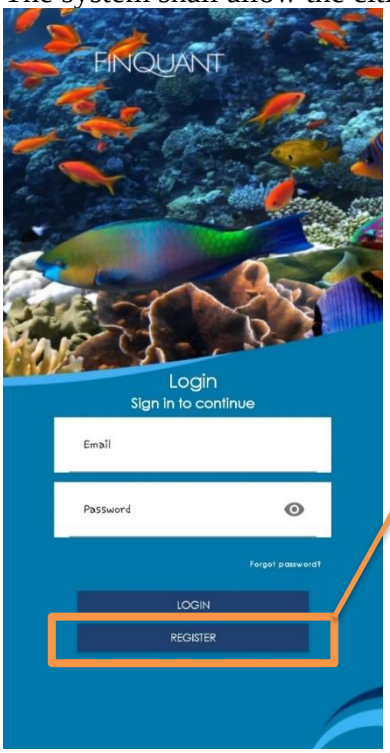
(Signature over printed name)

APPENDIX H

Appendix H

USER GUIDE

A. The system shall allow the citizen users to create an account.

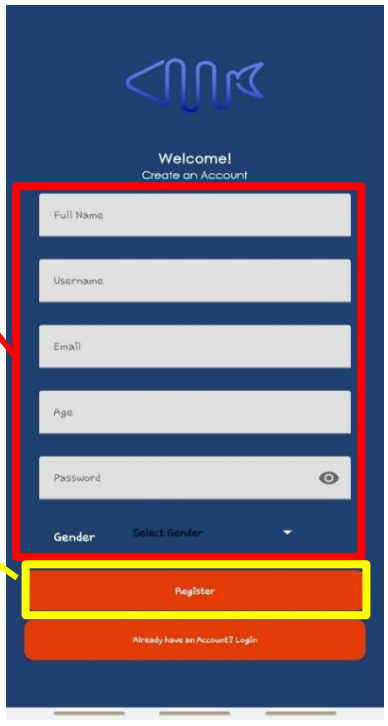


The user will see a screen with the login form. For this process let's focus on the register. Click the "Register" in the navigation bar to create an account.

This is the registration form. It must be filled with the required information; thus user must input the necessary data in order to proceed in creating the account.

NOTE: Email must be existing for verification afterwards.

After filling the required field, click the "Register" button to create an account. Else, the other button may click if already had an account.



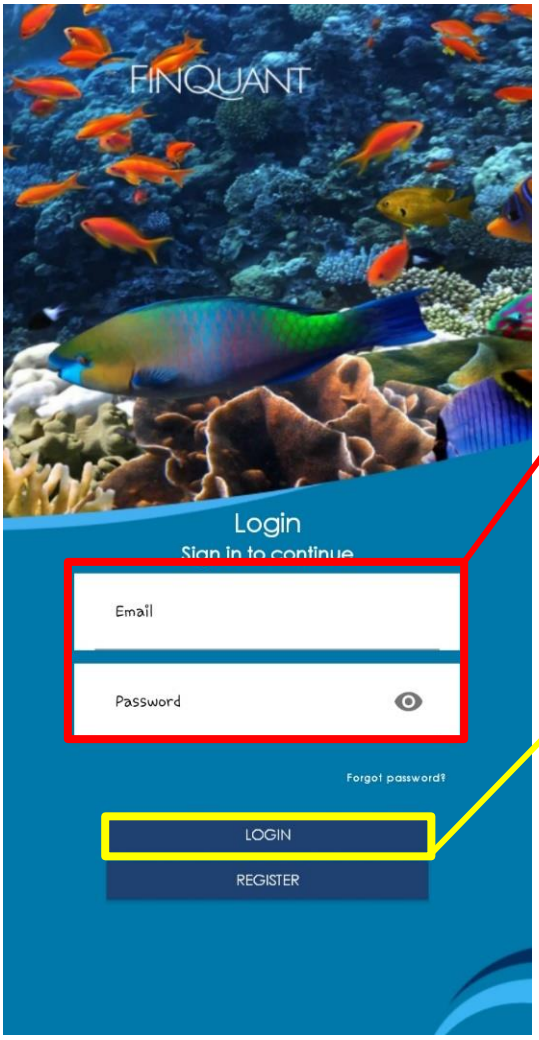
After clicking the register button, it will redirect to the login form, with following 3 toast notification.

1st notification: “Registration successful. Verification email sent.

2nd notification: “Verification email sent to (registered email)

3rd notification: “Please verify your email before logging in (registered email)

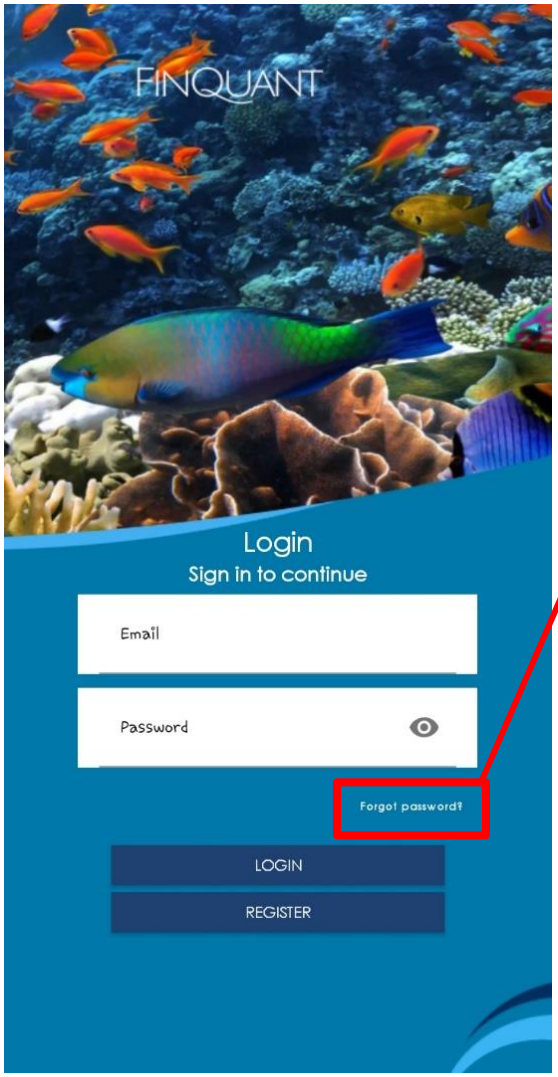
B. The system shall allow all users to log in.



In Login Form, input field are the email and password, this is accessible after verifying the account created, hence verification must be done first before logging in.

After filling the required field, click the “LOGIN” button to proceed on the application menu dashboard.

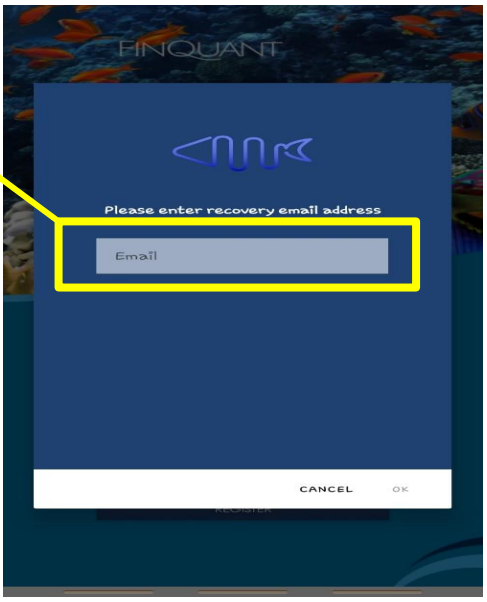
C. The system shall allow users to recover their accounts.



This feature maybe used in case user forgot their current password. Just click the "Forgot password" to open new page where to process the recovering of account.

Just input the registered email, so that the application will send a link for password reset. After entering the registered email, just click "OK" and a link will be sent to your email. Click the link and input the new password.

NOTE: The input field must not leave blank, else the "OK" option is not clickable.

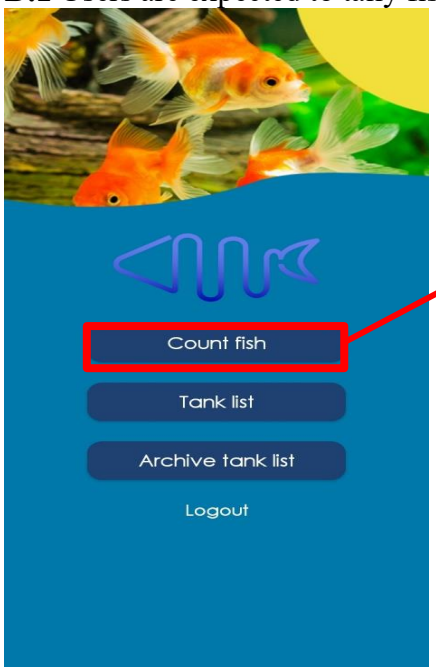


D. The user should be able to access the dashboard menu within the application.

After logging in, the dashboard menu will display.

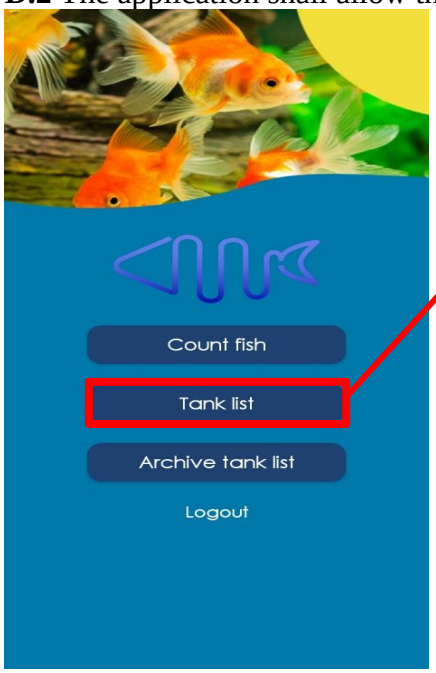
User may click this button if they want to go back in the Login Form.

D.1 Users are expected to tally fish using the "Count fish" menu

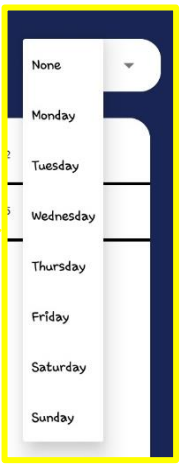


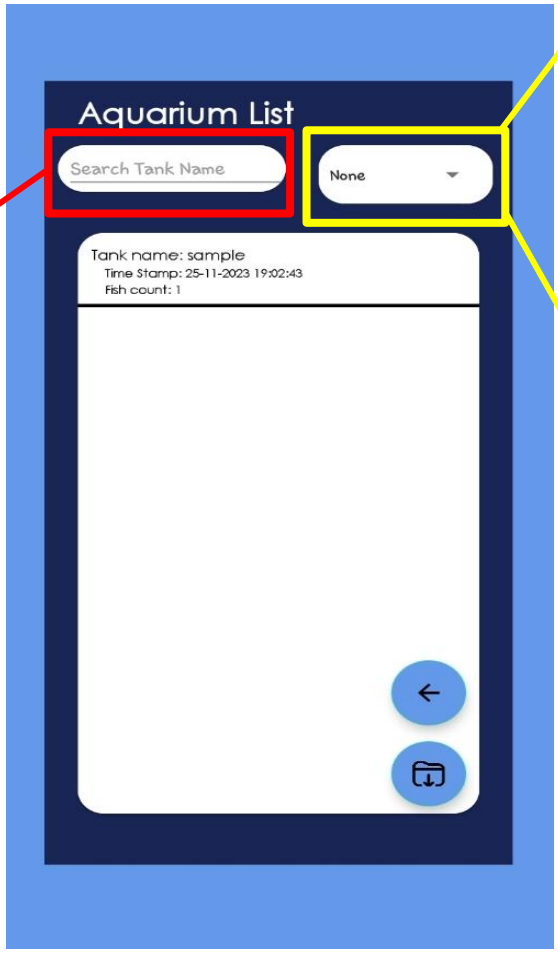
Lets focus for the first mebu option; the "Count fish". Setup the phone camera, then access the "Count fish" menu to start the counting process. Along the process, refrain from moving the device to ensure precise counts.

D.2 The application shall allow the management of tank list.



For the second option named “Tank list”, selecting this option will navigate to a page displaying a list of counted fish along with their corresponding named, presented in descending order.





Upon selecting the “Tank list” menu, the tank list page will be shown. Use this search bar by entering the data’s name to perform a search.

Click and it will trigger a dropdown containing choices of days and an option for none. It will sort data base on the choices that made.

CHERRY LOU O. ARAT

Calle Veronica, Malagutay, Zamboanga City, Philippines,7000
(+63) 912 - 439 – 9707 | aratcherrylou@gmail.com

PERSONAL INFORMATION

Birthday	:	January 05, 2002	Citizenship	:	Filipino
Birthplace	:	Putik, Z.C.	Civil Status	:	Single
Age	:	21	Ethnicity	:	Cebuano
Sex	:	Female	Religion	:	Roman Catholic

EDUCATION

College Level

2020 - present
Bachelor of Science in Information Technology
Western Mindanao State University - Main Campus
Normal Road Baliwasan, Zamboanga City

Secondary Level

2018 - 2020
Senior High School
TVL – Information and Communication Technology
Computer Technologies Institute Inc.
Baliwasan Chico Road, Zamboanga City

2014 - 2018
Junior High School
Zamboanga National High School WEST
RT Lim Boulevard, Zamboanga City

Primary Level

2009 - 2014
Elementary
Malagutay Elementary School
Malagutay, Zamboanga City

2007 - 2009
Early Childhood Education
Kalinaw Day Care
San Jose Road, Zamboanga City

WORKING SKILLS AND EXPERTISE

Work Experience:

2019 – 2020 (320 Hours)
DXMR Zamboanga
Work Immersion
Baliwasan Chico Road, Zamboanga City

Tools and Technologies:

Programming Languages Proficiency				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice application)	Advanced (Applied theory, project development)	Expert (Recognized authority)
C++, SQL, JavaScript, PHP	Python, VB.net	HTML, CSS, Bootstrap		

Applications/Tools/Platforms				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice)	Advanced (Applied theory)	Expert (Recognized authority)
Figma, AutoCad, 3Ds Max Design, MySQL	Visual Studio Code, Visual Studio, MS Access	Photoshop, Canva	MS Word, MS powerpoint, MS Excel	

ACHIEVEMENTS

Certificates

June 10, 2023
KABATAANG DIGITAL: Career Opportunities in ICT
DICT Region IX

January 18, 2020
Digital Arts
COMTECH, Zamboanga City

February 17, 2018
Programming: Basic and Advance Webpage Development
STI College, Zamboanga

August 06, 2016
Student Assistant in Information Technology Crash Course Program
Southern City Colleges, Zamboanga City

June 25, 2016
Information Technology Crash Course
Southern City Colleges, Zamboanga City

CHARACTER REFERENCES

Cyril-J S Balboa, T1/ LPT

Senior High Research Adviser
Cjsbalboa@gmail.com

Boyet Saranillo Fernandez, LPT

Senior High Teacher
boyet.fernandez@deped.gov.ph

RENEL JOY A. LADAO

Calle Pilar, Zone 8, Ayala, Zamboanga City, Philippines,7000
(+63) 916 - 975 – 4667 | reneljoyladao268@gmail.com

PERSONAL INFORMATION

Birthday	:	November 28, 2000	Citizenship	:	Filipino
Birthplace	:	Zamboanga City	Civil Status	:	Single
Age	:	23	Ethnicity	:	Cebuano
Sex	:	Female	Religion	:	Roman Catholic

EDUCATION

College Level

2019 - present
Bachelor of Science in Information Technology
Western Mindanao State University - Main Campus
Normal Road Baliwasan, Zamboanga City

Secondary Level

2017 - 2019
Senior High School
TVL – Electrical Installation and Maintenance
Ayala National High School
Zone 6, Ayala, Zamboanga City

2012 - 2017
Junior High School
Ayala National High School
Zone 6, Ayala, Zamboanga City

Primary Level

2008 - 2012
Elementary
Ayala Central School
Zone 6, Ayala, Zamboanga City

WORKING SKILLS AND EXPERTISE

Work Experience:

10 days
Mega Fishing Corporation
Work Immersion
Zone 3, Cawit, Zamboanga City

Tools and Technologies:

Programming Languages Proficiency				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice application)	Advanced (Applied theory, project development)	Expert (Recognized authority)
C++, JavaScript, SQL, Python	HTML			

Applications/Tools/Platforms				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice)	Advanced (Applied theory)	Expert (Recognized authority)
Illustrator, MySQL, Visual studio,	NetBeans, Photoshop,	Canva, MS excel, MS Powerpoint	MS Word,	

ACHIEVEMENTS

Certificates

June 9, 2022
Introduction to UI/UX Design
Webinar

May 24, 2022
Cisco Labs Crash Course
Internet Crash Course

May 23, 2022
Configuration Juniper SRX Router using J-Web
Internet Crash Course

December 2018
National Certificate 2 in Electrical Installation and Maintenance
Ayala National High School

February 28 - March 15, 2015
Student Assistant in Information Technology Crash Course Program
Southern City Colleges, Zamboanga City

March 2015
Information Technology Crash Course
Southern City Colleges, Zamboanga City

CHARACTER REFERENCES

Catherine Hari

Reseller(MSE, Natasha, Boardwalk)

CRISTON JADE B. ENOLPE

Block 3 Lot 4, Teachers Village Cabaluay, Zamboanga City
Philippines, 7000
(+63) 936 - 187 – 7020 | cristonjade@gmail.com

PERSONAL INFORMATION

Birthday	:	November 13, 1998	Citizenship	:	Filipino
Birthplace	:	Zamboanga City	Civil Status	:	Single
Age	:	25	Ethnicity	:	Zamboangueño
Sex	:	Male	Religion	:	Roman Catholic

EDUCATION

College Level

2020 - present
Bachelor of Science in Information Technology
Western Mindanao State University - Main Campus
Software Engineering Project: **WMSU Satellite Socio-Economic Research and Data Analytics Center**
Normal Road Baliwasan, Zamboanga City

Secondary Level

2018 - 2020
Senior High School
TVL – Information and Communication Technology
STI Colleges Zamboanga City
Governor Lim Avenue, Zamboanga City

2011 - 2017
Junior High School
Manicahan National Highschool
Manicahan, Zamboanga City

Primary Level

2009 - 2011
Elementary
Manicahan Poblacion Elementary School
Manicahan, Zamboanga City

2005 - 2009
Canelar Elementary School
Triplet Road, Zamboanga City

WORKING SKILLS AND EXPERTISE

Work Experience:

60 Hours
Zamboanga State College of Marine Sciences and Technology (Faculty Office)
Work Immersion
Brgy. Rio Hondo, Zamboanga City

Tools and Technologies:

Programming Languages Proficiency				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice application)	Advanced (Applied theory, project development)	Expert (Recognized authority)
C++, C#	JavaScript	Python, Bootstrap, CSS, HTML5, ReactJS	PHP, SQL	

Applications/Tools/Platforms				
Fundamental Awareness (Basic Knowledge)	Novice (Limited experience)	Intermediate (Practice)	Advanced (Applied theory)	Expert (Recognized authority)
Photoshop, Illustrator	GitHub	Visual Studio	MS Word, MS PowerPoint, MySQL, Visual Studio Code	

ACHIEVEMENTS

Certificates

June 9, 2022

INTRODUCTION TO UI/UX DESIGN
CONTROL NO.: R9BST-2022-W022-0778
DICT Region IX

CHARACTER REFERENCES

Ms. Ceed Jennelle Lorenzo

Capstone Adviser, (CCS)
Western Mindanao State University
Normal Road Baliwasan, Zamboanga City

Dr. Roderick Go

Dean, College of Computing Studies(CSS)
Western Mindanao State University
Normal Road Baliwasan, Zamboanga City