POLITEKNIK BANTING SELANGOR

ROBLOX AIRCRAFT MAINTENANCE AEROSKILL

NAME	MATRIC NO.
DANISH IMAN BIN FAIZZA	24DAM22F1035
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DEPARTMENT OF AIRCRAFT MAINTENANCE

SESSION 1 2024/2025

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A REPORT SUBMITTED TO DEPARTMENT OF AIRCRAFT MAINTENANCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR DIPLOMA ENGINEERING IN AIRCRAFT MAINTENANCE

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CERTIFICATION OF PROJECT ORIGINALITY & OWNERSHIP

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"We hereby declare that this report is the result of our own work, except excerpts that we have outlined its sources and this project will be the ownership of polytechnic.

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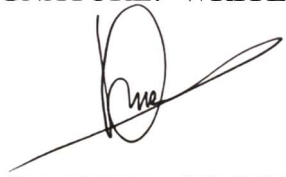

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ABSTRACT

In today's technology-driven world, where engaging and meaningful learning experiences are regarded as highly effective, incorporating technology into education is critical. Roblox Aircraft Maintenance Aeroskill exemplifies this approach by combining education and gaming to create an immersive experience based on aircraft maintenance principles. Although technology-based learning is becoming more popular, gaming's potential to improve aviation education remains largely untapped. This project seeks to address this gap by investigating the impact of Roblox AircraftMaintenance Aeroskill on aviation education, particularly among young people. The game teaches users the fundamentals of aircraft maintenance through an interactive Roblox environment, as well as hands-on experiences in a simulated setting. Initial testing has yielded promising results, with players demonstrating a greater understanding of aircraft systems and maintenance procedures. The game's structure promotes self-directed learning and introduces young people to critical skills, sparking an early interest in aviation maintenance careers. The findings of this project indicate that Roblox Aircraft Maintenance Aeroskill has the potential to improve both traditional and online aviation education by making learning more accessible and enjoyable. Future initiatives are encouraged to investigate similar gaming elements in aviation curricula, fostering collaboration between educators and developers to create engaging educational tools that address a variety of learning needs.

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LIST OF ABBREVIATIONS

IATA	INTERNATIONAL AIR TRANSPORTATION ASSOCIATION
3D	THIRD DIMENSION
PC	PERSONAL COMPIUTER
STEM	SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS
VFD	VIRTUAL FLIGHT DECK
VA	VIRTUAL AIRCRAFT
BITE	BUILT IN TEST EQUIPMENT
IOS	INSTRUCTOR OPERATING STATION
VR	VIRTUAL REALITY
UI	USER INTERFACE
UX	USER EXPERIENCE

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

My name is Danish Iman Bin Faizza, and my matrix number is (24DAM22F1035), me with my fellow group members Mohammad Imran bin Mohammad Hisham (24DAM22F1058) and Danial Iman Bin Shamsul Kamal Arifin (24DAM22F1057). We are students studying for a Diploma in Aircraft Maintenance at Politeknik Banting Selangor. As part of our final year project, we are conducting a survey on the challenges faced by Malaysia's aviation industry due to a shortage of manpower. As we all know, the global aviation industry is still reeling from a staffing problem caused by the pandemic.

Figure 1: Marshalling aircraft

The aviation industry, with its feats of flight and engineering, has always captivated minds young and old. However, despite its allure, there is a notable disparity in the representation of children and students in this dynamic field. This disparity can be attributed to a lack of exposure—many young people simply do not have the opportunity to explore aviation and its various career paths. As a result, potential aviation talents and interests go untapped, limiting the industry's growth and innovation (Florida Flyers Flight Academy, Jan. 15, 2024).

1.2 PROBLEM STATEMENT

Despite the advancements and improvement of technologies in aviation and the potential for getting exciting opportunities and careers, there is still a lack of interest in aviation among children and youngsters, especially under 18 (J. Brownlow Sep.23,2022). This disinterest could be caused by a variety of factors, including the lack of exposure to aviation-related activities, inadequate representation in education curricula, and the high complexity of this field. This issue is concerning as it could lead to a shortage of skilled professionals in the aviation industry in the future. Therefore, it is important to solve this problem and develop strategies to foster an interest in aviation among this demographic.

By fostering an interest in aviation among children under 18, we can ensure a steady rise of passionate, skilled professionals into the aviation industry. Moreover, we can help the young individuals discover the field that offers job opportunities and a chance to contribute to one of the most exciting and dynamic sectors of the modern world.

Many children and students lack exposure to the aviation industry, which has significant consequences. Factors like limited resources in schools and insufficient career guidance contribute to this problem. As a result, young individuals miss out on exploring career opportunities in fields like piloting and aircraft engineering. Research by the International Air Transport Association (IATA) shows that a large percentage of young people globally do not have access to aviation-related education. (IATA future airline industry) This not only limits talent in the industry but also hinders innovation and growth. Addressing this issue requires understanding and overcoming barriers that prevent young people from learning about aviation careers, ensuring a diverse and skilled workforce for the future.

1.3 PROJECT OBJECTIVES

1.3.1 General Project Objectives

The project objectives are:

1. To design an aviation simulation on Roblox to attract the younggeneration.

2. To develop a Roblox simulation focused on aircraft maintenanceto increase student enrollment in related courses.

3. To evaluate Roblox Aeroskill to enhance aviation education efficiency, cost-effectiveness, and innovation.

1.3.2 Specific Individual Project Objectives

1.3.2.1 Product Structure

The specific project objectives are:

- To design a captivating, realistic aircraft maintenance simulation environment for Roblox that gives users the impression that they are actually maintaining an aircraft. Next, include instructional components in the simulation to give players an enjoyable and engaging way to learn about aircraft maintenance principles. We create game mechanics and tasks that captivate players and inspire them to learn about various facets of aviation, including safety procedures, basicmaintenance, aircraft inspection, and maintenance documentation.

- To develop an engaging virtual environment that replicates authentic aircraft maintenance situations. The next step is creating instructional materials that instruct students on aircraft systems, parts, and maintenance techniques. Finally, use gamified components to engage students and make learning fun.

- To evaluate Roblox Aeroskill's efficacy in providing aviation education in contrast to conventional approaches. Then assess how Roblox Aeroskill affects students' interest in and retention of aviation- related knowledge and abilities. Following that, compare the cost- effectiveness of using Roblox Aeroskill with more conventional approaches to aviation education. Finally, pinpoint areas where Roblox Aeroskill can enhance the effectiveness of providing training and educational materials related to aviation.

1.3.2.2 Product Mechanisms

- To develop authentic aircraft engine models in Roblox, emphasizing accuracy and realism for player immersion.

- To ensure refined engine performance metrics and functionalities to mirror real-world aircraft systems within the Roblox environment.

- To continuously update and improve engine models based on feedback and advancements in aviation technology, ensuring a dynamic and engaging player experience.

1.3.2.3 Programming/Software

The specific project objectives are:

- To develop programming on Roblox using the programminglanguage Lua.
- To design programming on Roblox game movement and operationaccording to the instructions given.
- To ensure that every movement and fundamentals of the game on Roblox is operating smoothly and accurately.

1.4 PURPOSE OF PRODUCT

The purpose of developing our Roblox-based aircraft maintenance simulation is to capture the interest of young minds and introduce them to the industry of aircraft maintenance in an engaging and interactive way. By leveraging the popularity of gaming platforms to the younger generation, our project seeks to inspire and attract potential future talents to consider careers in the aviation industry. This simulation aims to provide an accessible and immersive learning experience, heavily contributing to addressing the current shortage of skilled professionals in the field by nurturing early interest and learning foundational knowledge.

Roblox is an ideal platform for developing our aircraft maintenance simulation due to its accessibility and widespread popularity among young users. This is because of the millions of active players daily, especially within the target age group, it provides a familiar and engaging environment for introducing complex concepts in a very fun way. Moreover, Roblox offers robust features such as multiplayer functionality, 3D environment customization, and built-in gamification elements. These features enable us to create realistic, collaborative maintenance tasks that mirror the teamwork required in real aircraft maintenance settings. Roblox’s scalability and cost-effectiveness allow our simulation to reach a broader audience without the need for expensive hardware.

1.5 SCOPE OF PROJECT

1.5.1 General project scope

In order to teach students under the age of eighteen the fundamentals of aviation maintenance, our project is among the first to offer a free educational programme on Roblox. Our goal is to encourage young learners to take an interest in aviation education by utilizing Roblox's immersive platform. We enable would-be aviators to investigate aircraft maintenance processes and develop critical abilities for their future aviation endeavors through engaging learning opportunities.

First, children and students under the age of eighteen who are interested in aviation maintenance are the target audience for this project. Our programme is carefully designed to accommodate learners with varying levels of knowledge and experience in the field, catering to a diverse audience that includes both beginners and those who have some prior exposure to aircraft maintenance concepts. Our initiative offers a warm and friendly learning environment where students can explore and engage at their own pace.

With a focus on fundamental maintenance procedures, aircraft inspection, maintenance documentation practices, and critical safety protocols, the programme will cover a wide range of topics related to aviation maintenance. Our content is carefully crafted to captivate young learners, encouraging engagement, and promoting comprehension through immersive and hands-on experiences, all while embracing the special powers of interactive learning.

Taking advantage of Roblox's immersive and user-friendly interface, the project will use it as its main delivery method for educational content. Students will be able to easily access educational resources and participate in interactive games and activities with Roblox's gaming environment. This method uses the natural attraction of gaming to make learning fun and interesting for young students while also improving accessibility and encouraging active engagement.

Lastly, to ensure inclusivity and equal opportunity, the programme will be free and available to all students. We enable everyone to receive aviation maintenance education by removing financial barriers, building a diverse community of students (A.Robertson Jul. 20, 2023).

1.5.2.1 Product structure

The core of the product structure is the use of the gaming platform Roblox as the main means of involving kids and students in the study of aircraft maintenance engineering. Roblox is unique in that it can be used on computers and mobile devices, making it suitable for a larger variety of users. Roblox provides longevity and the capacity to continuously update content, in contrast to traditional educational materials like books, guaranteeing that the learning experience stays dynamic and relevant over time.

Additionally, Roblox's gamified approach to user engagement raises the bar by engrossing players in interactive simulations that mimic the problems and daily tasks that Aircraft Maintenance Engineers encounter. Students can learn practical insights into the field, apply theoretical knowledge in real-world scenarios, and develop critical skills in an enjoyable and engaging way through gaming.

Overall, the product structure maximizes the effectiveness of Aircraft Maintenance Engineering education, making it more relevant, collaborative, and engaging for students and kids by utilizing Roblox's distinctive features, such as its flexibility, online accessibility, and immersive gameplay.

1.5.2.2 Product Mechanisms

Creating a mechanical mechanism for aircraft maintenance within the Roblox engineering framework offers a captivating blend of virtual engineering and simulation. At its core, this project seeks to emulate real-world maintenance scenarios, providing players with an immersive and educational experience. To begin, thorough research into actual aircraft maintenance practices is essential, as it lays the foundation for designing a mechanism that not only functions realistically but also align with safety standards and industry best practices. From there, meticulous attention to detail in Roblox Studio allows for the construction of a virtual representation of the mechanism, ensuring that every component and interaction mirrors its real-world counterpart.

Once implemented, rigorous testing becomes paramount to validate the functionality and usability of the mechanism. Through iterative testing and user feedback, refinements are made to enhance the mechanism's performance and user experience. This iterative approach not only improves the mechanism's effectiveness but also fosters a deeper understanding of the intricacies of aircraft maintenance among players. Moreover, integration within the broader Roblox environment opens up possibilities for immersive gameplay experiences, whether through standalone simulations or as part of larger aviation-themed games.

Beyond development, ongoing maintenance and community engagement are vital aspects of sustaining the project's longevity. Regular updates and support ensure that the mechanism remains functional amidst platform changes and user needs. Furthermore, fostering a community around the project cultivates a space for knowledge sharing, feedback exchange, and collaborative innovation. By embracing these principles, a Roblox-based mechanical mechanism for aircraft maintenance becomes not only a technical achievement but also a vibrant hub for learning and creativity within the Roblox engineering community.

1.5.2.3 SOFTWARE/PROGRAMMING

Coding is the process of transforming computer instructions into a form a computer can understand. Every website or application that we use on the devices operates because programmers write code. All code tells a machine to perform a specific task. Whenever you use the Internet, your device uses a binary code.

For coding, just like people use different languages, such as English and Spanish, so do programs. Roblox uses the coding language Lua. (Roblox corp.,2024)

The programming will be according to the instructions and the operation of the whole game. The game will be mainly focused on the simulation work of line and base maintenance according to the right procedure. We also aimed to maintain the fun of playing the game despite the importance of following the procedure.

1.6 PROJECT IMPACT

The Roblox Aircraft Maintenance Mastery will help young children to spark interest on aviation maintenance. It will expose them to the maintenance section of the aircraft industry since it's the most unpopular career that is embarked on by many people. The game will show the basics of line and base maintenance and the procedures to ensure safety every time during work. This will be achieved by 3D modelling and designing the game and programming it uses the programming language called Lua.

Roblox is one of the most fun and engaging games that are free to play. Roblox also offers us the chance to play on a variety of servers around the globe so that the players can have a connection between different people of different backgrounds. It is also flexible and portable since the game is available on PC and mobile phones.

This game will also increase the availability of aircraft maintenance simulation on Roblox since many developers do not develop an aircraft maintenance themed gameplay. Most of the gameplay available is fighter jet games, pilot games and many more (Haskins, April 9).

CHAPTER 2

LITERATURE REVIEW

2.1 GENERAL LITERATURE REVIEW

2.1.1 Roblox's Potential as a Teaching Tool for Fundamental Aircraft Maintenance

In recent years, there has been a noticeable increase in interest in the implementation of gaming platforms into educational environments. The well-known online gaming platform Roblox provides a special setting for engaging in interactive learning. The purpose of this literature review is to investigate Roblox's potential as a tool for instructing people under the age of eighteen in the fundamentals of aircraft maintenance. It also looks into the relationship between exposure to aviation-related content via gaming platforms and the interest in studying aircraft maintenance more later on.

2.1.2 Educational Potential of Roblox

A flexible platform for building and exploring a vast array of virtual environments is offered by Roblox. We can create engaging educational games and simulations that are suited to particular learning objectives thanks to its user- friendly interface. Research has indicated that the utilization of games in education can significantly improve student motivation, engagement, and retention of knowledge in a variety of subject areas. We can replicate actual aircraft maintenance situations by utilizing Roblox's interactive features, giving students practical experience in a secure and convenient virtual setting. (Gee.J.P.2003).

2.1.3 Engagement and Immersion

Roblox has many educational benefits, one of which is its capacity to draw students in with immersive gaming. The platform's interactive features promote active engagement and the growth of problem-solving abilities. We can develop engaging stories and learning objectives that encourage students to investigate difficult subjects like aircraft maintenance by gamifying the learning process. This immersive method encourages experiential learning, enabling students to apply abstract concepts to real-world situations and develop a deeper comprehension of the material (Shaffer, D.W. 2006).

2.1.4 Accessibility and Inclusivity

A broad range of users, including people and students from various socioeconomic backgrounds and geographical locations, can access Roblox. Students can access educational content without the need for specialized software or expensive equipment thanks to its low entry barrier. Additionally, the platform facilitates collaborative learning; this inclusive methodology encourages social interaction and peer-to-peer knowledge sharing, which improves participants' overall learning experience (Aquire, K. 2006).

2.1.5 Impact on Career Aspirations

The exposure of students to aviation-related topics through gaming platforms such as Roblox can have a substantial impact on their career goals. According to research, children who are exposed to STEM (science, technology, engineering, and mathematics) subjects early on are more likely to go on to pursue related careers later on. We can encourage young learners to think about careers in aviation maintenance and related industries by presenting fundamental aircraft maintenance concepts in an interesting and approachable way. On the other hand, students may perceive a lack of interest or awareness as a result of not being exposed to these subjects in traditional educational settings, which could impede their pursuit of careers in aviation.

To sum up, Roblox has a great deal of potential as a teaching tool for teaching people under the age of eighteen the fundamentals of aircraft maintenance. Its immersive and interactive features make it a powerful tool for holding students' attention and encouraging a deeper comprehension of difficult subjects. We can develop interesting learning opportunities that encourage students to pursue further education in aviation maintenance and related fields by utilising Roblox's accessibility and inclusivity. To completely comprehend the long-term effects of gaming platforms on educational outcomes and career aspirations, more research is necessary (Means, B. & Neisler,J. 2010).

2.2 SPECIFIC LITERATURE REVIEW

2.2.1 Roblox Educational Game

Preflight inspections, in a virtual environment, players would explore a 3D model of an aircraft, spotting and reporting any problems or damage. changing out parts, Within the Roblox environment, practice using the proper tools to simulate tasks like changing a tire or refueling. procedure for maintenance, show players scenarios where instruments break down and they must use virtual tools and manuals to diagnose and fix the issue.

Presents a cutting-edge method for teaching aircraft maintenance using virtual reality technology. Players are fully submerged in the atmosphere of an aircraft hangar or workshop, complete with realistic sights and sounds, thanks to the realistic environments created. Players work on various aircraft models' maintenance tasks in these virtual environments, learning the unique procedures for each model. Workshops, equipped with virtual tools and equipment, facilitate hands-on interaction, allowing players to understand the purposes and functions of various tools. This idea provides a dynamic and captivating learning environment that improves retention of information and comprehension of aircraft maintenance procedures.

Lastly, we provide all the tools needed to incorporate Roblox simulations into our platform. Detailed lesson plans with specific goals in line with academic standards are included in these resources. We also offer detailed guidelines for integrating Roblox simulations into the curriculum in an easy-to-follow manner. These resources use captivating and immersive virtual experiences to enhance student learning.

2.2.2 Student Resources

We included a range of resources and tools offered to students to improve their Roblox learning experience. Usually, this entails giving students access to the Roblox platform via personal accounts or licenses, allowing them to interact with learning materials and play educational games inside the Roblox environment.

Also, educational resources like tutorials and guides that provide detailed explanations and step-by-step guidance are provided to students to help them effectively navigate the Roblox environment and finish tasks or activities that have been assigned. Additionally, students can collaborate with peers on group projects and assignments by using the communication features available tothem within the Roblox environment.

With the use of these tools, students can communicate, exchange ideas, and cooperate to achieve shared objectives, which promotes cooperation and teamwork. All in all, these educational materials aim to empower students by raising their level of engagement and promoting group projects within the Roblox virtual world.

2.2.3 Software / Programming

Roblox is a game that has its own programming system in Roblox creator. The programming language used in Roblox is called Lua. In order to code on Roblox, the first thing to do is to create a script. Scripts are commonly created in ServerScriptService, a special folder made just for holding scripts (Roblox Corp., 2024).

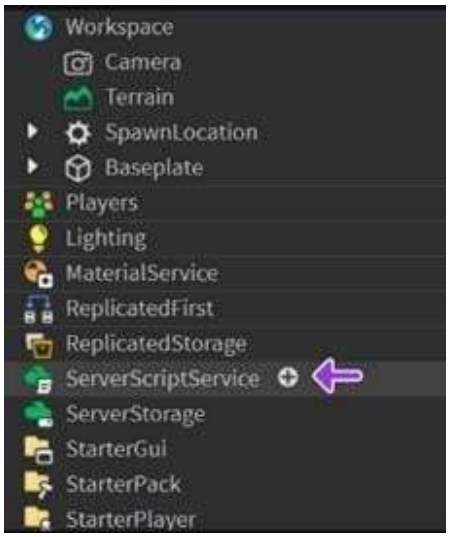


Figure 2: ServerScriptService

```
Default code

print("Hello world!")
```

Figure 3: Example of script

In Roblox Studio, a script refers to a piece of code written in the Lua programming language that controls various aspects of a game or experience. Scripts are essential components of Roblox games, as they enable developersto add interactivity, functionality, and logic to their creations.

Scripts in Roblox Studio can perform a wide range of tasks for our objectives, including controlling the character in our game to move freely and explore the Aircraft maintenance simulation, creating game mechanics so that the mechanics and the operation of the game is functioning based on the game's goals and implementing special effects to create a visual and audio effects, such as particle systems, lighting effects, sound effects and dynamic environments.

2.3 REVIEW OF RECENT RESEARCH/RELATED PRODUCTS

2.3.1 Recent Market Products

2.3.1.1 Product A

DANISH IMAN

No	Patented product	Patent Summary
1.	**Airline Technician on Steam**  *Figure 4: Airline Technician*  *Figure 5:Airline Technician*	**Game name**: AirlineTechnician **Inventor**: CAMO Games **Published date**: To beannounced. **Description**: Airline Technician is a game about the important job of Airport Line Technicians. Their responsibilities include coordinating ramp operations and aircraft movement via radio, fueling,towing aircraft, operating ground support equipment, reporting malfunctions and keeping the airport operational (Airline technician 2024).

Table 1: Recent market product

2.3.1.2 PRODUCT B

DANIAL IMAN

No.	Patented Product	Patent summary
1.	**Plane Mechanic Airplane Games4+ Engine Repair Garage Workshop**  *Figure 6: Plane mechanic*	**Game name:** Plane Mechanic Airplane Games 4+ Engine repairGarage Workshop **Inventor**: Techving **Description:** Work in airplane repair center for fixing army helicopters, war jets and passenger planes. Do detailed repair jobs with ingenuity of an ultimate repairman in modern airplane mechanic workshop. Become an expert aeronautical engineer andfind out all the problems in flying machines. Enjoy distinctive and unseen gameplay in plane mechanic simulator game.

Table 2: Recent market product 2

2.3.1.3 PRODUCT C

MOHAMMAD IMRAN

No.	Patented Product	Patent summary
1.	L3HARRIS Virtual Maintenance Trainer  *Figure 7: L3HARRIS*	**Game name**: VirtualMaintenance Trainer **Developer**: L3HARRIS **Description**: This game is avirtual aircraft maintenance simulation that includes Systems operations (normaland abnormal), 25 standard maintenance tasks, Aircraft simulated using Boeing simulator data package and many more. Features of the VMT include:Instructor operating station (IOS) - Launch training scenarios - Monitor and control studentprogress - Setup aircraft environmentVirtual flight deck (VFD) - Simulated cockpit - Layouts organized withpanels to teach specific aircraft systems - Active schematicsVirtual aircraft (VA) - Aircraft walk-around andaccess to compartments component identification - Front panel BITE - Installation and removal of components integrated with IOS and VFD

Table 3: Recent market product 3

2.4 COMPARISON BETWEEN RECENT RESEARCH AND CURRENTPROJECT

2.4.1 Product A vs Our productDANISH IMAN

Product	Airline Technician on Steam	Roblox Aircraft Maintenance Mastery
Purpose	Airline Technician on Steam simulates the role of an aircraft maintenance engineer, allowing players to diagnose and repair various aircraft issues. Thegame aims to provide an educational and engaging experience for aviation enthusiasts and aspiring mechanics by featuring realistic scenarios and technical challenges. (Airline Technician 2024)	The goal of Roblox Aircraft Maintenance Mastery is to provide a fun and educational experience in which children and school leavers can explore the exciting world of aircraft maintenance. Players take on the role of a technician, learning to diagnose and repair a variety of aircraft issues in a user-friendly and engaging environment.The game promotes curiosity, problem-solving, and teamwork, making it an excellent platform for youngstudents to explore their interests in aviation and engineering in a safe and interactive environment.
Target	Aviation enthusiast, Aspiring Technicians and Professionals in the Aviation Industry	Students, School-leaver, and STEM learners
Platform	Steam	Roblox
Features	Detailed Graphics and Physics: High-quality visuals and realistic physics improve the immersive experience.	Comprehensive Maintenance Tasks, Training and Tutorials, Free to Play and Realistic Scenarios
Genre	Aircraft Maintenance	Aircraft Maintenance

Table 4: Comparison product and our product

2.4.2 Product B vs Our product

DANIAL IMAN

Product	**Plane Mechanic AirplaneGames 4+ Engine Repair Garage Workshop**	**Roblox Aircraft Maintenance Mastery**
Purpose	to help students gain exposure to the work of airplane technicians, butthis game is more aboutexposure to helicopters,war jets and passenger planes.	to help students better understand the job environment as aircraft technician. besides that, can attract the attention of young people with feature on this game
Target	Young children and teenagers	Secondary school and teenagers
Platform	Techving	Roblox
Features	Specific aircraft and focus on some training on aircraft	Simple and worldwide on airport
Genre	Aircraft Maintenance	Aircraft Maintenance

Table 5: Comparison product b with our product

2.4.3 Product C vs Our Product

MOHAMMAD IMRAN

Product	**L3HARRIS Virtual Maintenance Trainer**	**Roblox Aircraft Maintenance Mastery**
Purpose	It helps reduce training costs and increase operational efficiency by teaching any number of aircraft malfunctions on demand.	To increase the number of young generations that areinterested and chosen a career path of aircraft maintenance.
Target	Maintenance Technician	Young children and teenagers
Platform	L3Harris Technologies	Roblox
Features	Specific and certificate focused training	Simple and fun
Genre	Aircraft Maintenance	Aircraft Maintenance

Table 6: Comparison product c with our product

CHAPTER 3

RESEARCH METHODOLOGY

3.1 PROJECT BRIEFING AND RISK ASSESSMENT

To accomplish our game successfully, we have conducted training and a consultant for our project from an individual company, TRDNT 3D Game Development to support the development of our project according to our planned mechanism and structure.

To expedite our partnership, we have multiple online meetings. This helps us for discussions, exploring a variety of game designs, structures and being able to programme the specific tasks that we aimed to be added in this game.

Besides that, we also chose blenders to enhance and design the required components of aircraft parts, maintenance buildings and others. Blender is a powerful, open-source 3D modeling and animation software that can significantly enhance the quality and realism of the designs for our product. Its versatility and wide range of tools make it an ideal choice for creating detailed, accurate, and visually appealing 3D models of aircraft components, parts and maintenance environments.

3.2 DESIGN ENGINEERING TOOLS

3.2.1 Design Requirement Analysis

The project's goal is to develop an interactive aircraft maintenance simulation using Roblox for children, students, and teenagers under the age of 18. The goal is to teach aircraft maintenance and safety procedures, to pique interest in aviation careers, and to provide a fun and engaging learning experience appropriate for all age groups. The simulation will feature an intuitive interface, step-by-step tutorials, mini-games, customizable avatars, and progress tracking. The educational content will range from basic to advanced topics, such as safety protocols and tool usage.

The simulation must run smoothly on a variety of devices, support multiple users at once, and provide strong data protection. It should be user-friendly for all skill levels and include comprehensive help resources. The technical requirements include Roblox Studio development. The content will be age-appropriate, with simplified explanations for each age group. Gamification elements, interactive activities, and story-based missions will keep users interested.

Finally, the simulation will follow legal and ethical guidelines, such as content moderation and inclusive design practices, to ensure accessibility for all users. This design aims to create an educational tool that piques young learners' interest in aviation and provides them with fundamental aircraft maintenance knowledge.

3.3 Questionnaire Survey

Figure 8: One of our questions from the survey

Our objective is to achieve clear learning objectives and accurate representation of aviation concepts to be embedded in our Roblox game. We targeted to prevent any false or less engaging experience so that the players will gain more passion on the field. Our aim is to prevent unrealistic gameplay that can affect the real experience of being an aircraft maintenance engineer. It is important to have clear learning objectives in order that the young minds can easily catch what they are trying to learn while at the same time playing the game.

The survey was done using a Google Form. The inquiry was about gathering information about students at Politeknik Banting and numerous teens' familiarity of the Roblox site. The survey contains the following sample questions:

- How frequently do you participate in aviation-related activities on gaming platforms?
- How do you think aviation education on gaming platforms stacks up against other online platforms or resources for learning about aviation?
- Which aspect of aviation education do you find the most interesting on gaming platform?

The survey was given out to Politeknik Banting students, instructors, and Licensed Aircraft Engineers (LAE).

3.4 Pareto Diagram

The pareto diagram visually represents the positive influence more on flight simulation. Nowadays, many people don't know anything about aviation other than pilots. We want to apply in the community for exposure how to work on base maintenance and line maintenance in the aviation field. By giving early exposure to the younger generation, we will be able to increase manpower in the aviation field.

ASPECTS	FREQUENCY	PERCENTAGE	CUMMULATIVE %	MARKER %
Base Maintenance (Hangar)	36	45.00%	45.00%	80%
Line Maintenance (TaxiWay)	18	22.50%	67.50%	80%
Flight Simulation	14	17.50%	85.00%	80%
Airport Operation	12	15.00%	100.00%	80%
TOTAL	80			

Figure 9: Pareto List

Figure 10: Pareto diagram

3.5 Design Concept Generation

3.5.1 Morphological Matrix

The Morphological Matrix offers a structured approach to idea generation by offering a variety of dimensions and their possible combinations. It guarantees in-depth coverage of all pertinent subjects and facilitates selecting the best options for an engaging and successful Roblox aviation education experience. Within each dimension, there are various options or characteristics to choose from. Morphological matrices are used in various environments, including engineering design, product development, strategic planning, and creative problem solving. They are especially useful when dealing with complex problems involving multiple interacting parameters.

3.5.2 Proposed Concept 1

3.5.2.1 Idea by Danish Iman

FUNCTION	IDEA 1
GAME MODE	Application  *Figure 11: Application on aircraft maintenance*
VENUE	High Flexibility
THEMES	Last long
IN-GAME ENVIRONMENT	No limit
INSTRUCTION/PROCEDURE	Moderate Engagement

Table 7: First proposed concept

3.5.2.2 Proposed Design Concept 2

Idea by Danial Iman

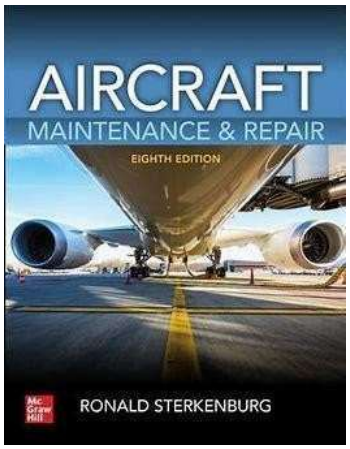
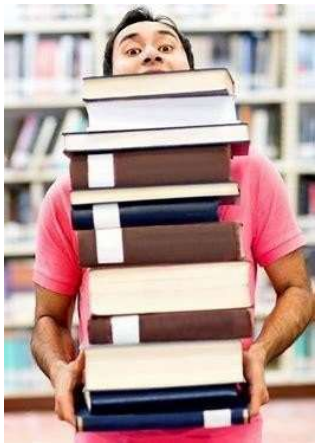
FUNCTION	IDEA 2
METHOD OF STUDY	BOOK  *Figure 12: Book about aircraft maintenance*
FLEXIBILITY	LESS FLEXIBLE  *Figure 13: Flexiblity on many books*
LONGEVITY	DOES NOT LASTLONG
LIMIT OF USER/ATTEMPT CAPACITY	DIFFICULT TO BE USED BY MANY
ENGAGEMENT WITH USER	LOW ENGAGEMENT

Table 8: Second proposed concept

3.5.2.3 Proposed Design Concept 3

Idea by Mohammad Imran

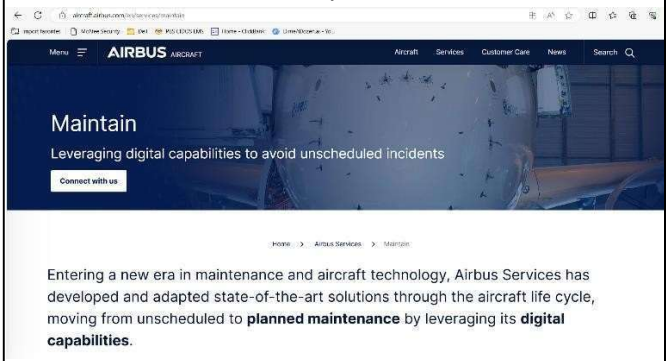
FUNCTION	IDEA 3
METHOD OF STUDY	Website/Internet  *Figure 14: Website aircraft maintenance*
FLEXIBILITY	High Flexibility  *Figure 15: Using website anywhere*
LONGEVITY	Last Long
LIMIT OF USER/ATTEMPT	No limit
ENGAGEMENT WITH USER	Moderate engagement

Table 9: Third proposed concept

3.5.2.4 Proposed Design Concept 4

Idea by Danish Iman

Function	IDEA 4
METHOD OF STUDY	Games (Roblox)  *Figure 16: Flight displayin roblox*
FLEXIBILITY	High Flexibility  *Figure 17: Playing roblox anywhere*
LONGETIVITY	Last Long
LIMIT OF USER/ATTEMPT	No limit
ENGAGEMENT WITH USER	High Engagement

Table 10: Fourth proposed Concept

3.6 Evaluation & Selection of Conceptual Design

3.6.1 Pugh Matrix

PUGH MATRIX: PROJECT ROBLOX AIRCRAFT MAINTENANCE MASTERYCONCEPT GENERATION USING PUGH MATRIX (CONCEPT 2 AS DATUM)

CRITERION	FACTOR	CONCEPT 1	CONCEPT 2	CONCEPT 3	CONCEPT 4
GAME MODE	0.2	2	D	2	1
PLACES	0.1	2	A	2	2
THEME	0.2	1	T	1	1
EXPLAINATION	0.3	1	U	1	1
ENVIROMENTAL	0.2	3		1	3
TOTAL SCORE	1.0	1.7	M	1.3	1.5
RANKING		1		3	2

Table 11: Pugh matrix

LEGEND :3(+),2(=),1(-)

PUGH MATRIX: PROJECT ROBLOX AIRCRAFT MAINTENANCE MASTERYCONCEPT GENERATION USING PUGH MATRIX (PROJECT AVIATION ROBLOX CONCEPT 4 AS DATUM)

Criterion	Factor	Concept 1	Concept 2	Concept 3	Aircraft Maintenance Mastery	Concept 4
ENGAGING	0.1	2	1	2	D	3
PLACES	0.2	3	2	3	A	3
THEMES	0.2	2	1	2	T	3
EXPLAINATION	0.3	3	3	3	U	3
ENVIRONMENT	0.3	3	1	3	M	3
TOTAL SCORE	1.0	2	1.9	3	-	3.3
RANKING	-	2	3	2	-	1

Table 12: Pugh matrix 2

LEGEND :3(+),2(=),1(-)

3.6.2 Conceptual Design of the Proposed Product

The conceptual design phase sets the foundation for the development of the Roblox aviation education product. It is important to consult with educators, aviation experts, and potential users throughout the design process to ensure the product meets their needs and aligns with educational goals.

3.7 Product Sketches for Interface Layout

3.7.1 General Interface Layout

We will always ensure our game is simple, effective and reaches the specified target. The first Interface that the players will see is our logo of the game and the loading screen. When the players have already entered the game, they will meet the choices of picking line maintenance or base maintenance based on their likings. This will expose more of the players to the real-life day-to-day life of an aircraft maintenance engineer.

Figure 18: Loading interface layout

Figure 19: Area of the apron on line maintenance section

Figure 20: Place where the player respawns

Roblox is a game where we can make any type of interface based on our requirements, creativity and the goal of the game. There will be instructions and procedures that the players can refer to during the game's maintenance work. We also will ensure that every button and control of the game is simple to operate without losing the real-life engagement of the game. Other than that, we also planned to put many large aircraft and other ground vehicles on the workspace.

3.7.2 Specific Interface Layout

Figure 21: Example of the Line maintenance area

The game will consist of line maintenance and base maintenance. The players can choose if they want line or base maintenance when they spawned on the office and each of the section have different servers. Line maintenance consistsof usual tasks such as change of tire, pushback and refueling. Base maintenance will take place on the hangar and consists of tasks like jacking and replacing the windshield. There will be procedures and safety precautions that can be referred to in order to help the players to perform the task and have real- life experience in the aircraft maintenance field.

3.7.2.1 Product Structure

Roblox Studio is a free development platform from Roblox Corporation that allows users to create and share their own games and experiences within the Roblox community. It includes various tools and features intended to make the game development process easier for both new and experienced developers.

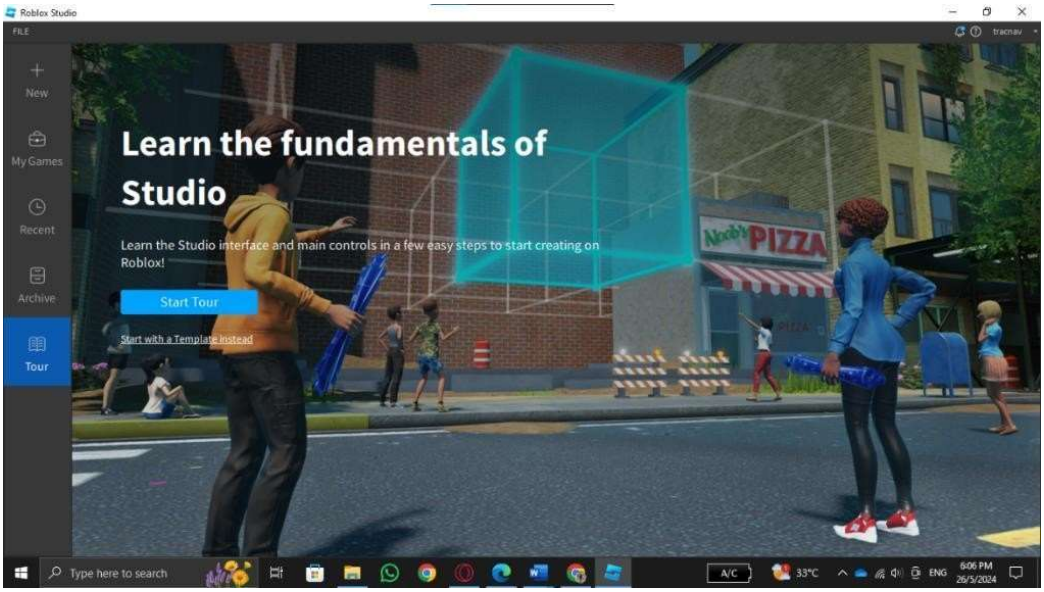


Figure 22: Homepage of the Roblox studio

A "Baseplate" is one of Roblox Studio's default templates for new projects. It serves as a basic starting point for developing games and experiences. The baseplate is essentially a large, flat, rectangular platform made of a basic terrain material, such as grass or a grid- patterned surface.

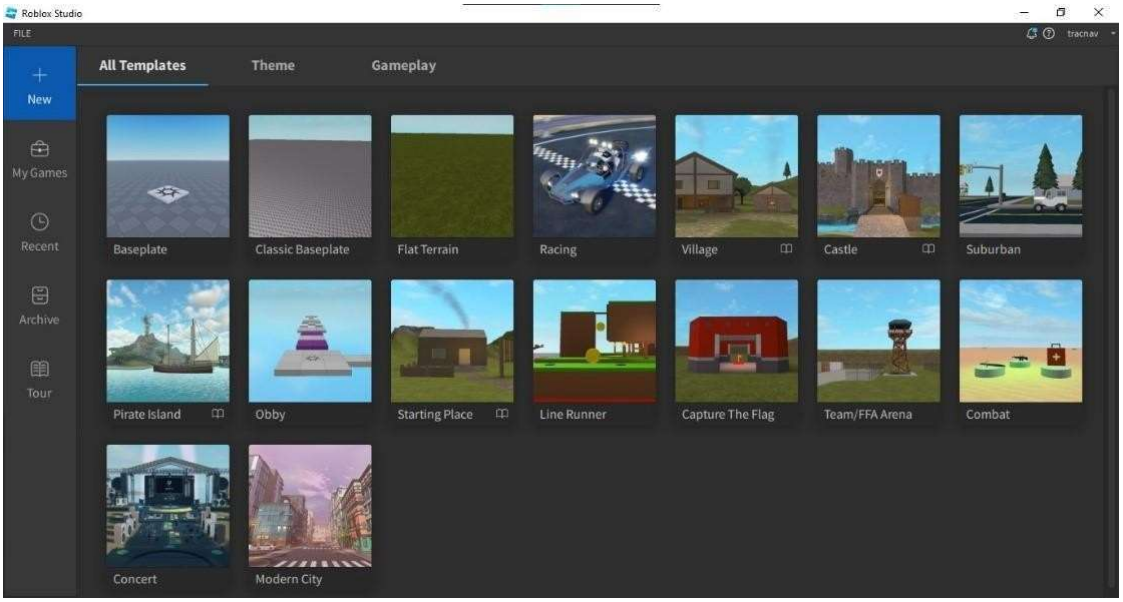


Figure 23: Templates of Roblox

The Starting Point is where baseplate provides a simple, pre-made environment that enables developers to begin building and experimenting right away without having to create a foundation from scratch. The baseplate can be moved, scaled, and rotated within the game world, providing a versatile foundation for constructing various structures and features.

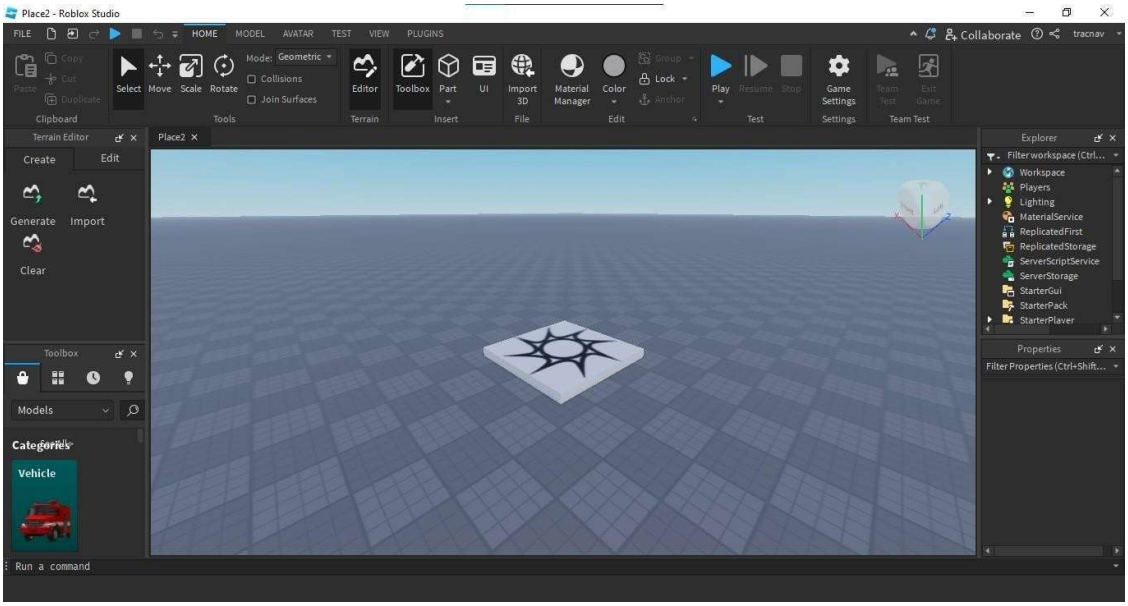


Figure 24: Respawn area

Roblox Studio's baseplate offers a starting point for creating games and experiences, with extensive customization options to meet your unique needs and creative vision. After creating a scene using a template and placing all objects on the field, we can test them.

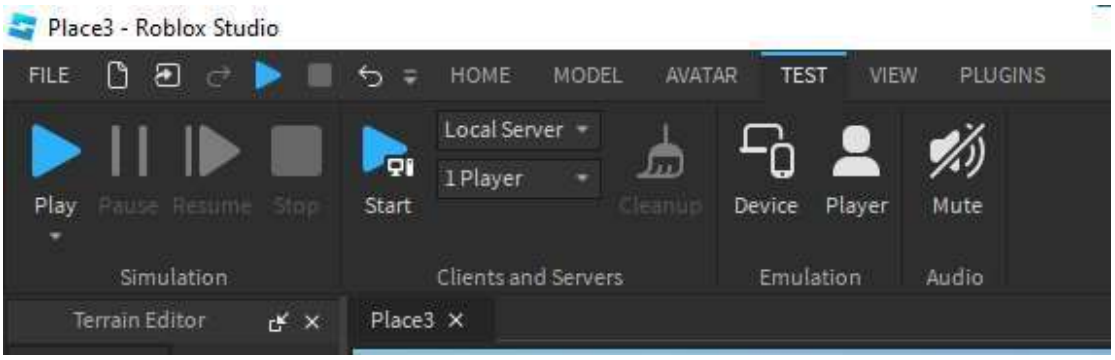


Figure 25: Test mode

.

Finally, the basic game idea and character are already done, so we can play and learn about aircraft maintenance simulations.

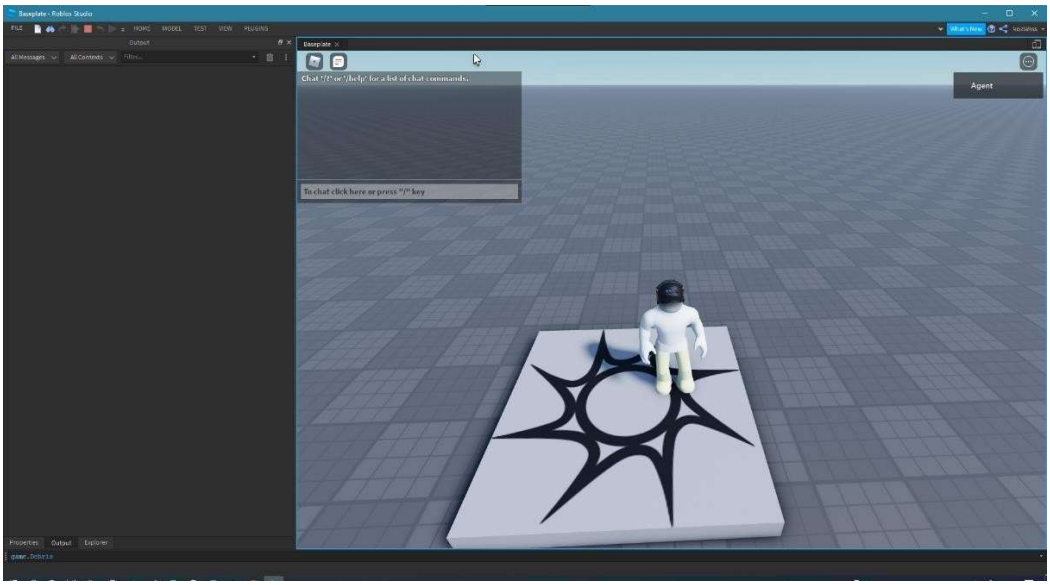


Figure 26: Roblox character on the respawn site

3.8 PROJECT FLOW CHART

3.8.1 Overall Project Flow Chart

AEM Flow Chart

Figure 27: AEM flow chart from start to finish

AEP Flow Chart

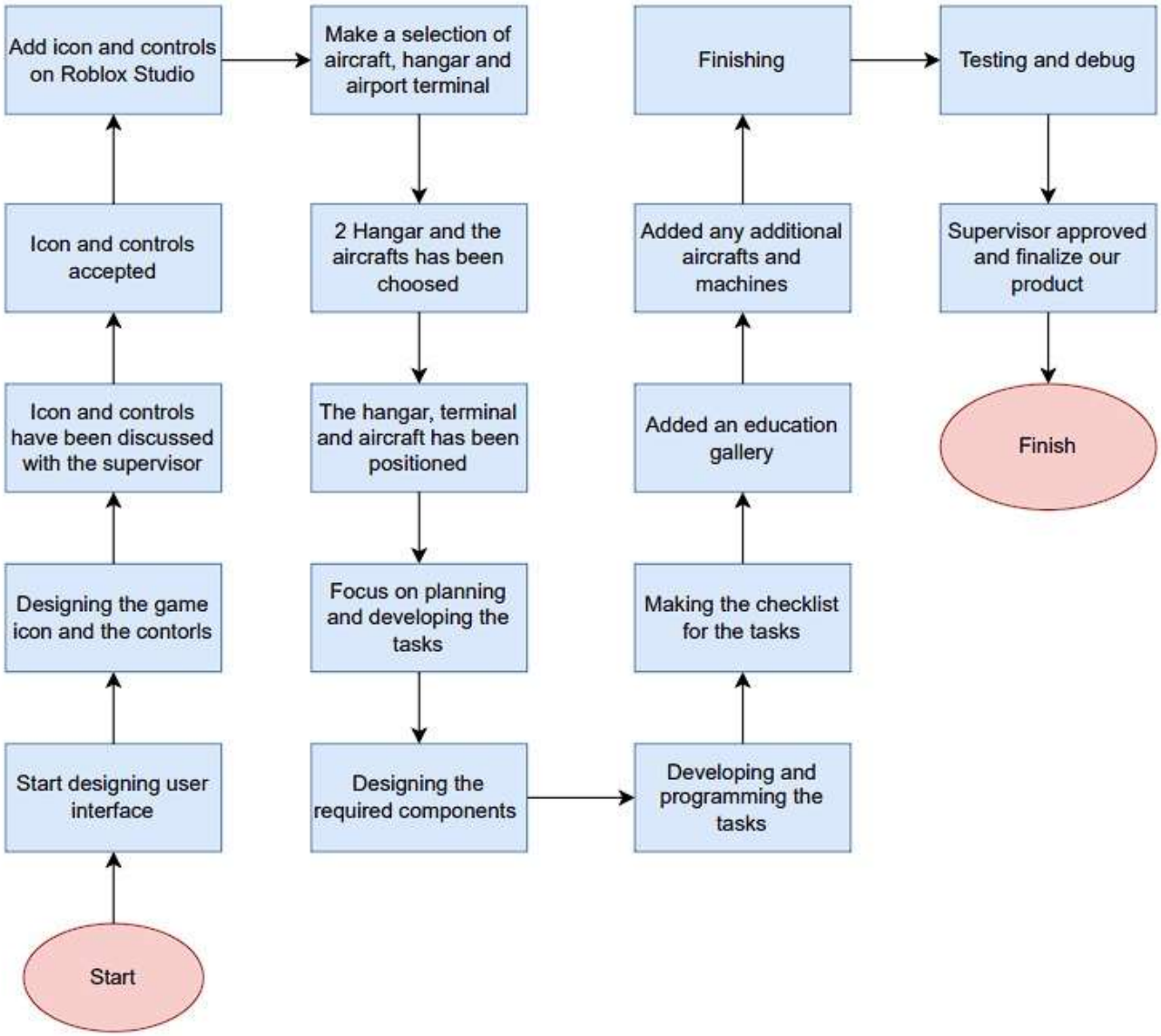


Figure 28: AEP flow chart from start to finish

3.9 Specific Project Design Flow

3.9.1 Product Mechanism

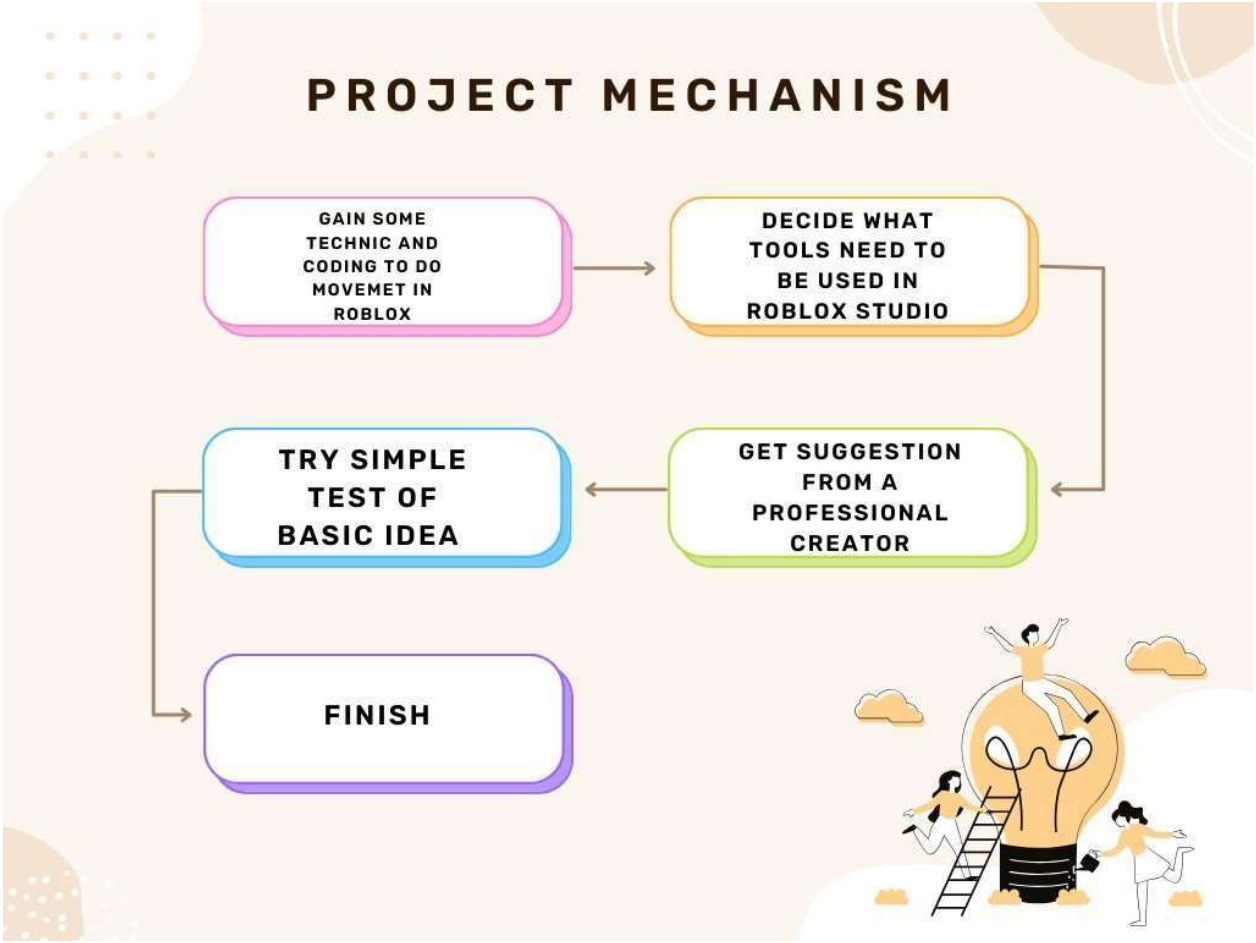


Figure 29: Project mechanism flow chart of our project

3.9.2 Software / Programming

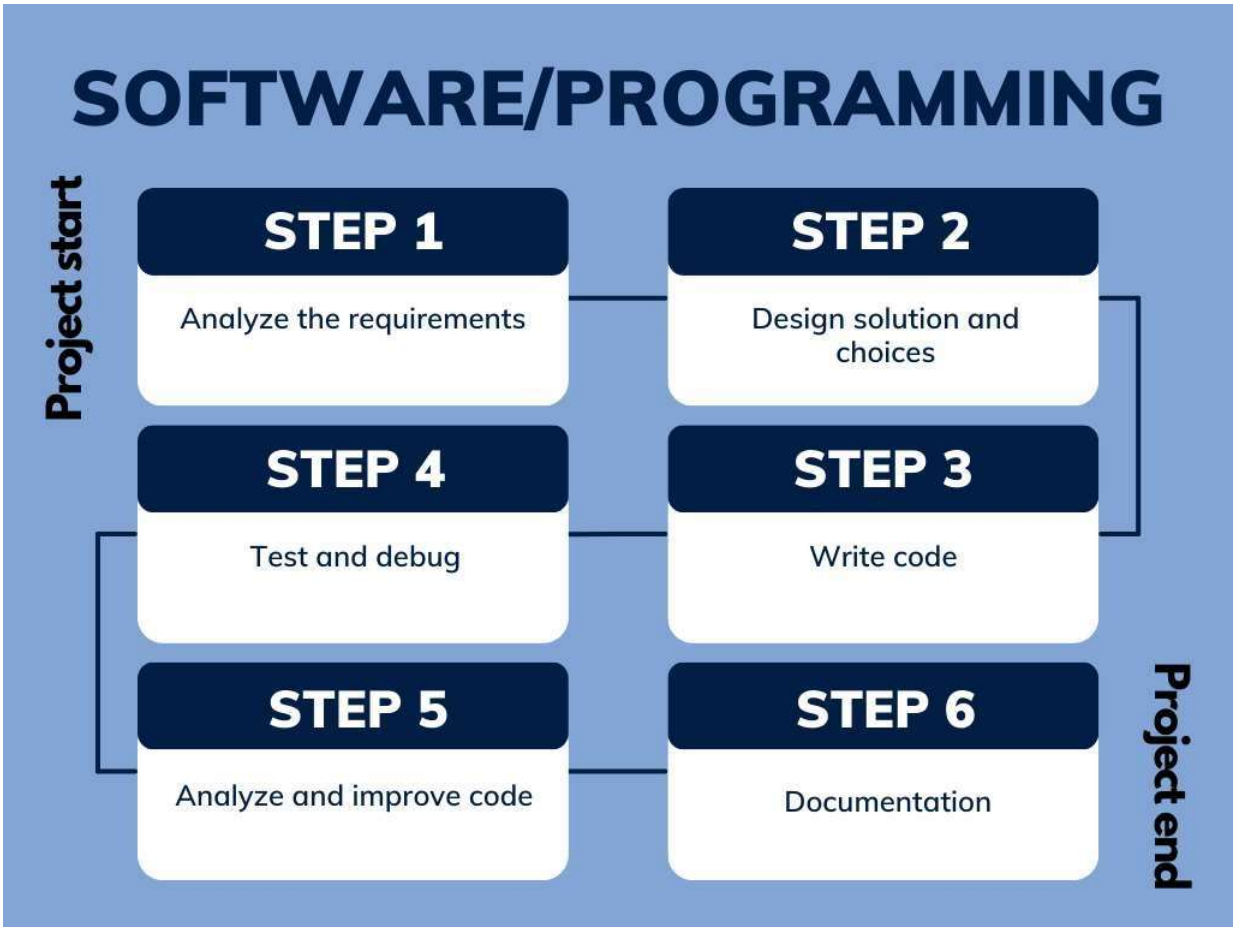


Figure 30: Software flow chart of our project

3.10 PRODUCT DESCRIPTION

3.10.1 General Product Features & Functionalities

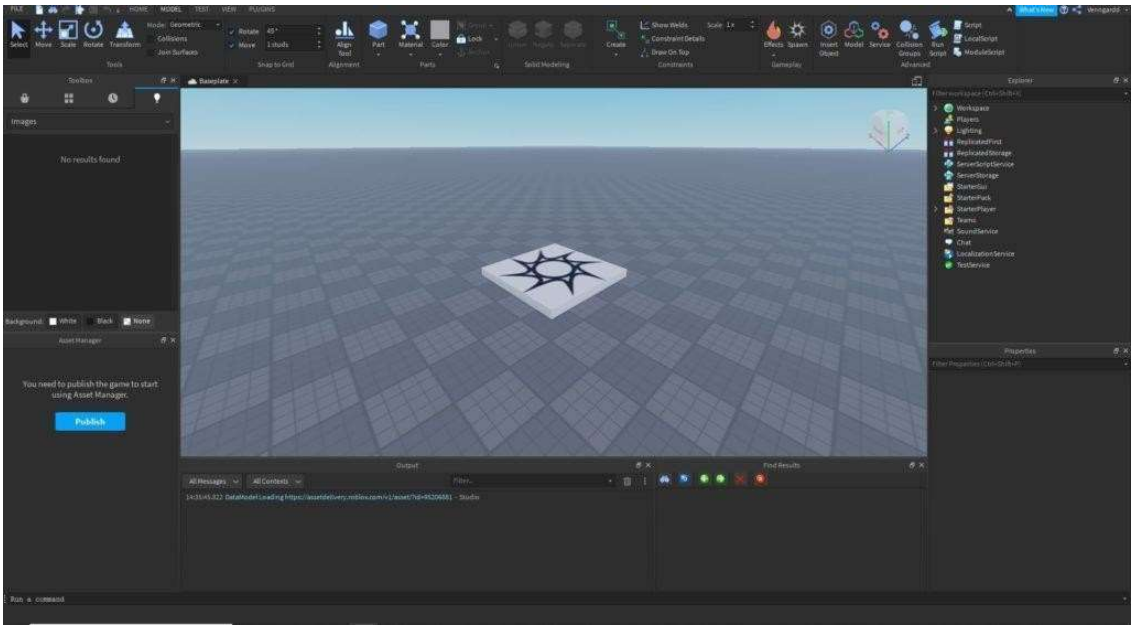


Figure 31: Spawn point.

We can incorporate various functionalities and controls in Roblox to give users interest in learning about the aircraft maintenance field and an entertaining experience. We created the game based on our knowledge and the education material given to us to support the production of the game. That includes maintenance practices, safety precautions, procedures and others. To enhance our gaming experience, we rely on the help of 3D modelling, open world simulation and animation

3.11 GANT CHART

3.11.1 AEM Flow Chart

PROJECT OBJECTIVES		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15
Group formation, supervisor meeting	P															
	I															
Register the project	P															
	I															
Assignment 1	P															
	I															
Assignment 2	P															
	I															
Assignment 3	P															
	I															
Pre-proposal presentation	P															
	I															
Chapter 1	P															
	I															
Chapter 2	P															
	I															
Chapter 3	P															
	I															
Final proposal	P															
	I															

Table 13: AEM Gantt Chart

P = Planning

I = Implementation

3.11.2 AEP Flow Chart

PROJECT ACTIVITIES		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Project proceed to be resume after discussion with supervisor	P														
	E														
Meeting with TRDNT team for 3D design components modelling	P														
	E														
Base planning the servers and planning objectives	P														
	E														
Finalize the Base planning and visualizing the complete product.	P														
	E														
Programming of line maintenance server according to the objective	P														
	E														
Programming and arrange the base maintenance according to the objective	P														
	E														

Table 14: AEP Gantt Chart

P = Planning

I = Implementation

PROJECT ACTIVITIES		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
Debug and finalize the game servers	P														
	E														
Add a VR server for additional objectives. Program VR server and debug.	P														
	E														
Preparing short highlight or video for competition	P														
	E														
Final touches on the FYP project regarding any problems	P														
	E														
Preparing our project on aeromech exhibition regarding the final look of the project	P														
	E														
Aeromech exhibition	P														
	E														
Final touch up of our project thesis	P														
	E														
Handling the project to Politeknik Banting	P														
	E														

3.12 Development of Game

3.12.1 Material Acquisition

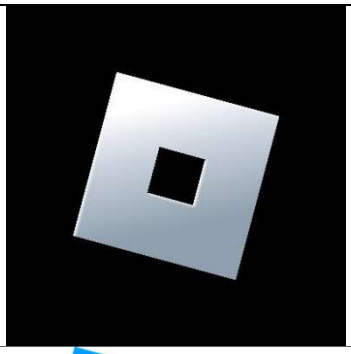
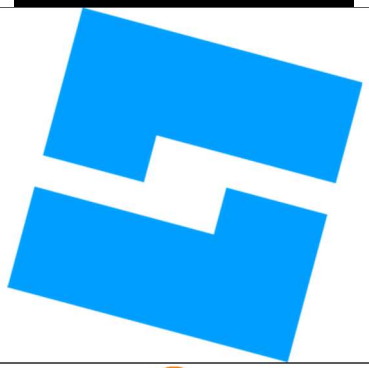
Decsription	Software
Roblox : The main platform to market and distribute our simulation.	
Roblox studio : To develop Aircraft Maintenance Simulation Aeroskill and import our 3D designs of the components.	
Blender : The platform to 3D design the required components, aircraft parts and maintenance building.	

Table 15: Material Acquisition

3.13 Devices

3.13.1 Computer/Laptop Requirements

Roblox Studio

To ensure that Roblox Studio runs properly, we use a laptop that fulfils the recommended system requirements. The software runs on Windows and macOS, with Windows requiring a 64-bit version of Windows 7, 8, 8.1, 10, or 11. To enable all functionality, Windows 10 or older must require Internet Explorer 11 or higher, as well as the most recent version of WebView2. Mac users require macOS 10.13 (High Sierra) or later. To efficiently produce and execute 3D environments, the processor should have a clock speed of at least 1.6 GHz. Furthermore, at least 4 GB of RAM is required to keep the software and projects running efficiently, with more memory suggested for multitasking or handling larger files.

Storage requirements include at least 10 GB of accessible disc space after installation to accommodate the software, updates, and project data. A laptop with a solid-state drive (SSD) outperforms a regular hard disc drive (HDD). In terms of graphics, a laptop less than three years old with an integrated video card or a computer less than five years old with a dedicated video card is required for peak performance, particularly while working on graphically heavy tasks. Reliable internet access with a speed of at least 4-8 Mb/s is also required to keep Roblox Studio updated and allow for seamless saving and collaboration via a Roblox account. Meeting these conditions allows users to enjoy a smooth and efficient experience.

Figure 32: Roblox Studio logo

Blender Software

To operate Blender software properly, your laptop or computer must meet at least the minimal system requirements; however, striving for the recommended specifications is desirable for peak performance. Blender supports Windows operating systems, with a minimum of Windows 8.1 (64-bit). Windows 10 or 11 is recommended for a better experience, as these latest operating systems increase stability and compatibility with Blender features.

The CPU is an essential component for running Blender, particularly for modelling, animation, and rendering. A processor with at least four cores and SSE4.2 compatibility is necessary, although an eight-core processor is preferred for handling more complicated projects and faster rendering times. In terms of memory, at least 8 GB of RAM is required to operate the software and manage small to medium-sized projects. However, for major projects or multitasking, 32 GB of RAM is strongly advised to ensure smooth performance.

Graphics performance is also a significant consideration, especially for rendering and real-time previews. The minimum need is a GPU with 2 GB of VRAM and OpenGL 4.3 capability, although an 8 GB GPU is suggested for handling more intricate scenes and higher resolutions without lag. Meeting these requirements promotes a smooth workflow when using Blender, whether you're producing 3D models, animations, or visual effects. For best results, attempt to exceed the minimal requirements and use recommended hardware whenever possible.

Figure 33: Blender logo

3.13.2 Tablet/Phones

To have a smooth experience playing Roblox games on a phone or tablet, make sure the device satisfies the required criteria. The device should run a current operating system, such as iOS 11 or later for Apple smartphones or Android 5.0 (Lollipop) or above for Android devices. These operating systems provide the stability and compatibility needed to run Roblox smoothly.

The processor is a critical component for performance. Roblox games, particularly those with intricate graphics and interactivity, require a device with at least a quad-core processor to run smoothly. Furthermore, a minimum of 2 GB of RAM is necessary for basic gameplay, but 4 GB or more is strongly advised for smoother multitasking and handling of more graphically intense games.

Adequate storage space is also important. Roblox itself does not take up much space, but downloaded games and updates can accumulate. Having at least 2-4 GB of free storage available will prevent disruptions caused by running out of space. For the greatest visual experience, a device with a dedicated GPU or a current integrated GPU that supports sophisticated graphics rendering is recommended.

Finally, a reliable internet connection is required because Roblox relies largely on online functionality. A Wi-Fi connection with a speed of at least 4-8 Mb/s is suggested for seamless gameplay and minimal lag. You may enjoy Roblox games easily on any device that meets or surpasses these specs, whether it's a phone or tablet.

3.14 Functionality Test

3.14.1 Game Operating Procedure

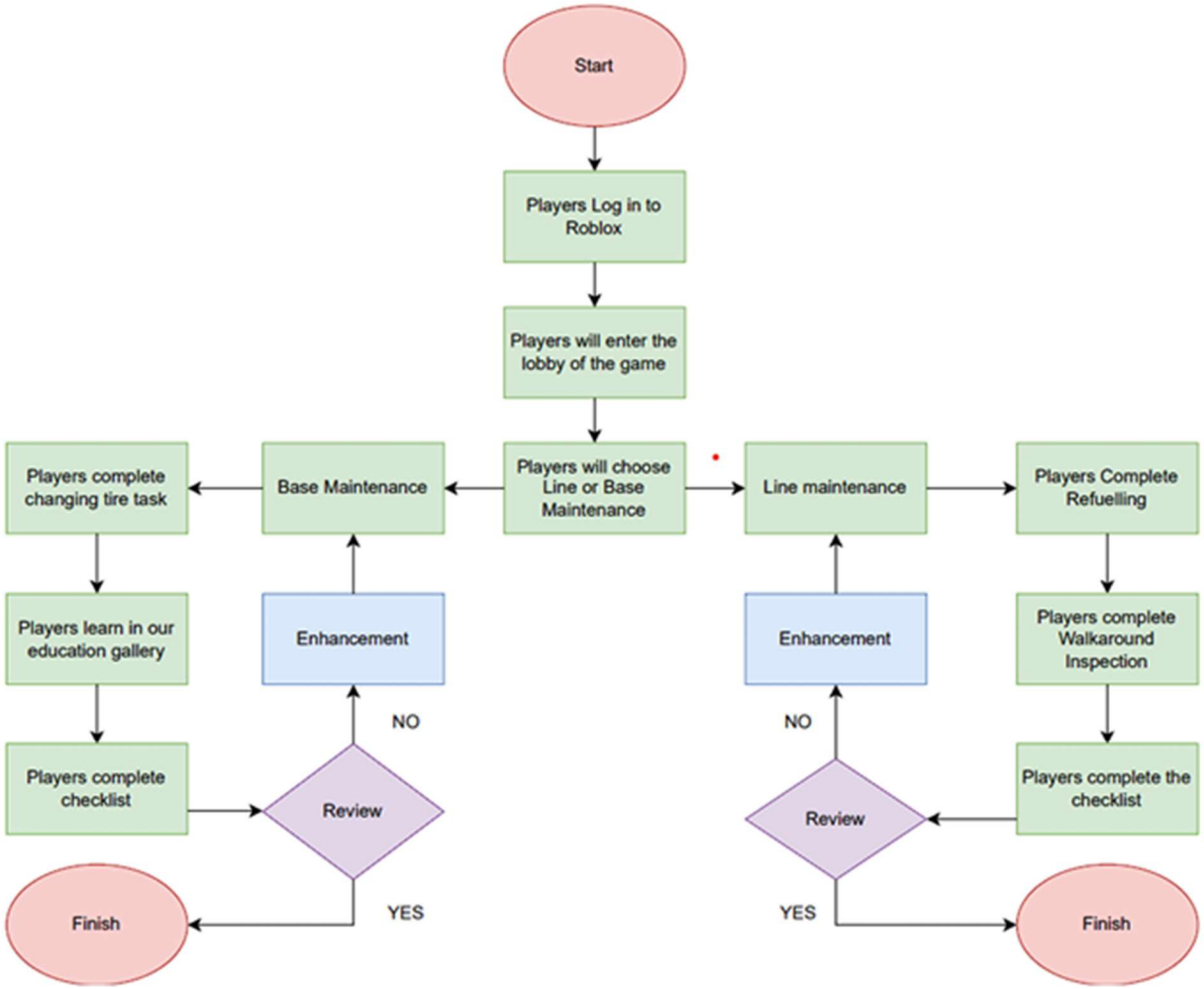


Figure 34: Overall Project Flowchart

Players can explore the game and complete tasks intended to test its functionality and engagement. After that, feedback and performance are evaluated to determine whether the game satisfies its objectives. If it falls short, fixes and upgrades are implemented, and the game is reviewed again. This process is continued until the game reaches the required requirements and is ready for approval.

CHAPTER 4

RESULT & DISCUSSION

4.1 PRODUCT DESCRIPTION

4.1.1 General Product Features & Functionalities

The Roblox Aircraft Maintenance Aeroskill project is specifically designed to boost students' understanding and awareness of the aircraft maintenance field, providing an interactive and realistic look into the daily tasks and responsibilities within this sector. Players can simulate a range of typical maintenance tasks, such as line maintenance refueling, replacing landing gear wheels, conducting walk-around inspections, and other critical routines that ensure aircraft are safe and operational. By replicating these real-world tasks, the project serves as an accessible, gamified entry point for students to gain hands-on experience and develop an appreciation for the technical skills involved in aviation maintenance.

This project addresses a pressing issue within the aviation industry: the low enrollment of students in aircraft maintenance programs at universities and training centers. As the demand for air travel and aviation technology grows, there is an increasing need for qualified professionals, such as Licensed Aircraft Engineers, Technicians, and specialists. A shortage of certified professionals could lead to significant challenges, including longer maintenance times, delays in operations, and ultimately, an economic impact on the aviation industry. By making the field more visible and engaging to young people, the "Roblox Aircraft Maintenance Aeroskill" project aims to spark interest and encourage students to pursue careers in aircraft maintenance, helping to ensure a skilled and steady workforcefor the future of aviation.

4.1.2 Specific Part Features

4.1.2.1 Product Structure

The game educates players about basic aircraft maintenance procedures, emphasising effective learning, realistic experiences, and knowledge acquisition in a virtual hangar environment. A hangar, a large structure used to store, maintain, and house aircraft, is an ideal setting for inspections and maintenance. This immersive setting is intended to pique the interest and engagement of school- aged students, making the field of aircraft maintenance more appealing and accessible.

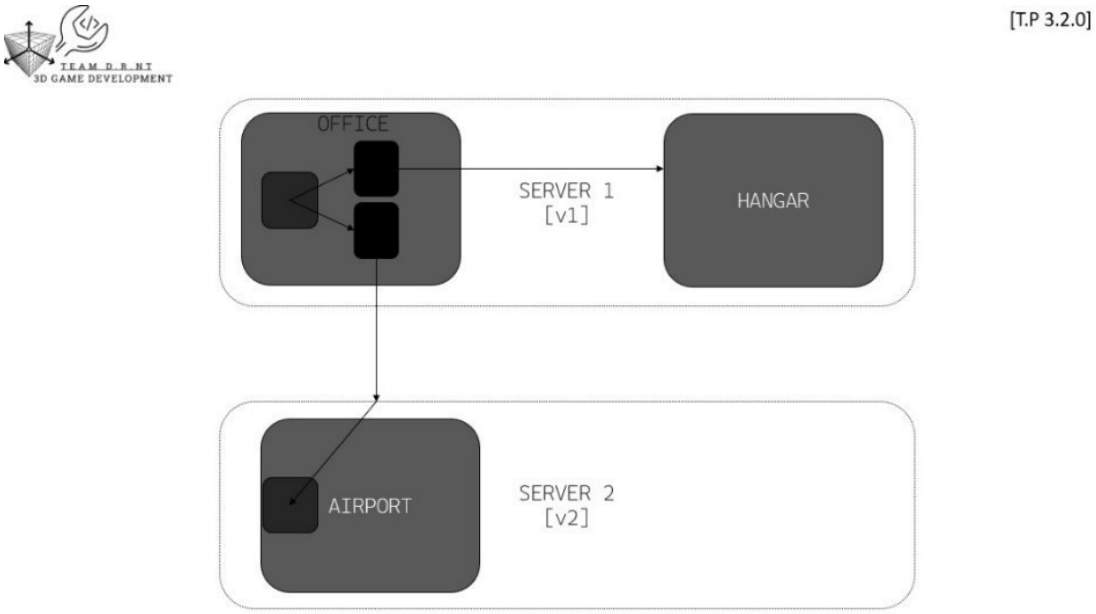


Figure 35: Map Structure

This is the structure of the Roblox Aircraft Maintenance Aeroskill game environment, which is divided into two major servers: Server 1 and Server 2. Each server hosts different sections of the game, which represent different areas in the virtual environment designed to simulate real-world aviation facilities. Server 1 contains the Office and Hangar areas or base maintenance, while Server 2 houses the Airport section or line maintenance, resulting in a segmented layout for easy navigation and resource management.

Figure 36: Server 1 Office

Server 1 manages the office and hangar environments. The Office section is where players should start. Users can move from the Office to the Hangar, where they can perform more hands-on technical aircraft maintenance tasks, such as landing gear change procedure. This organisation enables the game to effectively separate administrative and hands-on activities, increasing the realism of moving between different parts of a maintenance facility.

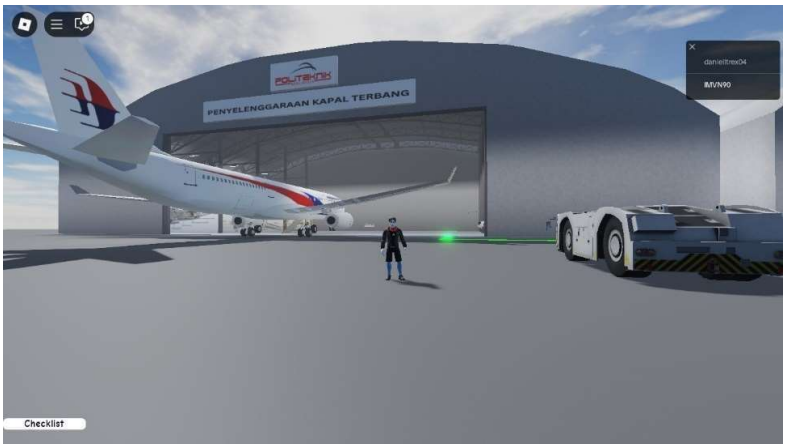


Figure 37: Server 1 Hangar

Server 2 runs on its own and is solely dedicated to the airport or line maintenance. This section could be used for activities such as ground operations, refuelling, and walkaround inspection. By placing the Airport on a separate server, the game can efficiently handle the high traffic and unique processes associated with the airport environment without overburdening Server 1. This layout allows players to experience both the technical and operational aspects of aviation, providing a comprehensive understanding of aircraft maintenance and operations.

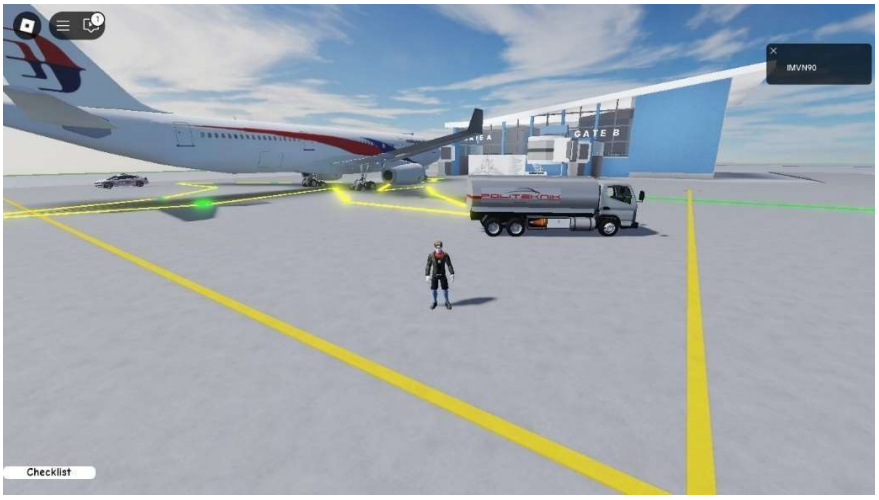


Figure 38: Server 2 Line Maintenance on Apron Area

4.1.2.2 Product Mechanisms

The Aircraft Maintenance Roblox Aeroskill product mechanism centers on offering an engaging and instructive aircraft mechanics experience. The game uses several crucial mechanisms to do this: The Aircraft Maintenacne Roblox Aeroskill product mechanism centers on offering an engaging and instructive aircraft mechanics experience. The game uses several crucial mechanisms to do this:

a) Detailed Aircraft Components:

Players navigate through visually rich environments where they can actively inspect and interact with detailed representations of specific aircraft parts, which are the engine, landing gear, pitot tube, wing, and ram air turbine. This not only involves visual observation but also interactive elements like clicking or interacting with controls to delve deeper into each aircraft part.

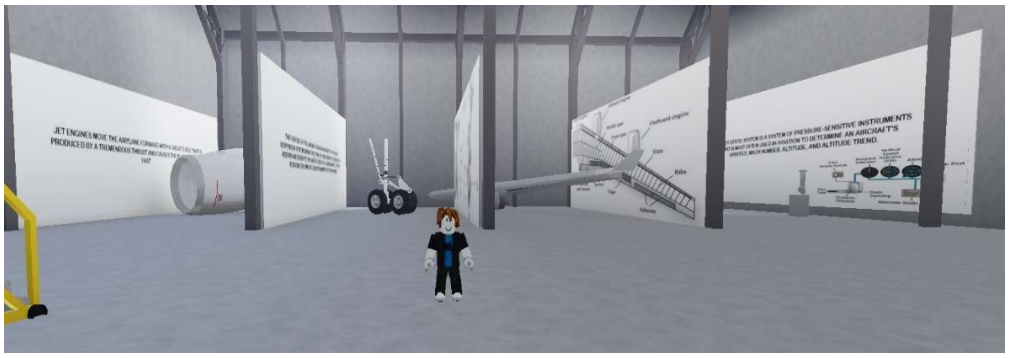


Figure 39: Detail Aircraft Component

b) Interactive Learning:

Interactive learning is facilitated through tasks that emphasize the identification of aircraft parts. Players engage in challenges where they need to identify specific components. For each part of the aircraft, an explanation is also provided. The hands-on approach ensures that players actively engage with the educational content in the specific context of identifying aircraft parts.

Figure 40: Interactive Learning

c) Cockpit Controls:

Players are empowered to fully operate the aircraft's cockpit, engaging in immersive mini-games that include initiating a simulated engine start-up sequence, calibrating flight controls such as ailerons and flaps for optimal performance, and interacting with additional features like lights and doors. Players can learn and get practical insights into the many facets of aircraft operation through this hands-on experience, which enhances the realism and enjoyment of the operation.

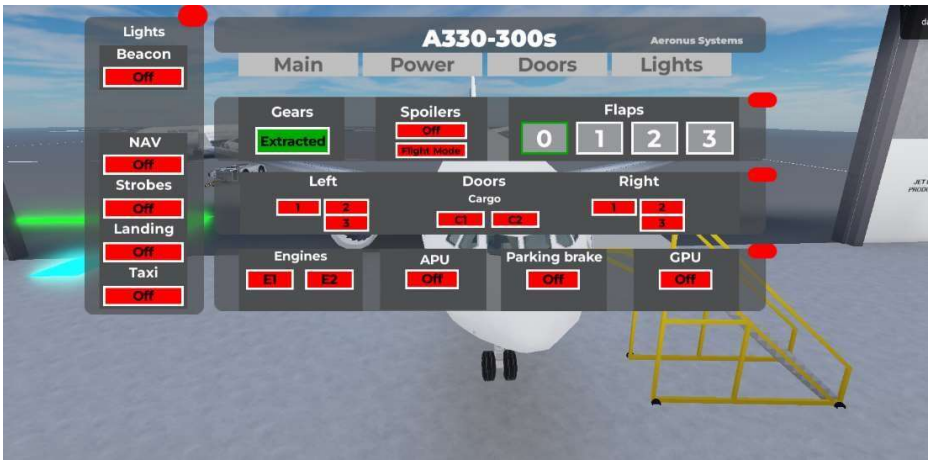


Figure 41: Cockpit Contro

d) User-Friendly Interface:

The user-friendly interface enhances the gaming experience.The game provides a checklist of aircraft parts, which simplifies the identification procedure. The chat box, meanwhile, facilitates communication and collaboration among players.

Figure 42: User Friendly Interface

e) Transportation

This added feature introduces a handy garage in the game for storing vehicles, including the provided transport. In addition to simplifying exploration and enhancing overall gameplay ease, it offers players a convenient central location to access and manage the vehicles.

Figure 43: Transportation

4.1.2.3 Software/Programming

The Roblox Aircraft Maintenance Aeroskill must have a specialized interface in order for it to be a functional game. Interface refers to the visual elements and buttons that players interact with on the computer screens. These elements can include menus, health bars, controls and more. Developers use these tools to enable the users to easily navigate the game and access any necessary information. It's what connects players to the game , making it an integral part of the overall design and functionality.

a. Menu and settings

Figure 44: Roblox Menu

The game already prepares the menu for users to be able to easily control their own preferences to play the game. The settings included the volume , camera mode, experience language, camera sensitivity, Graphics mode and many more. The game will also show the game's controls in detail so that it can help new players.

b. Buttons and controls

Figure 45: Replacement of Wheel Task

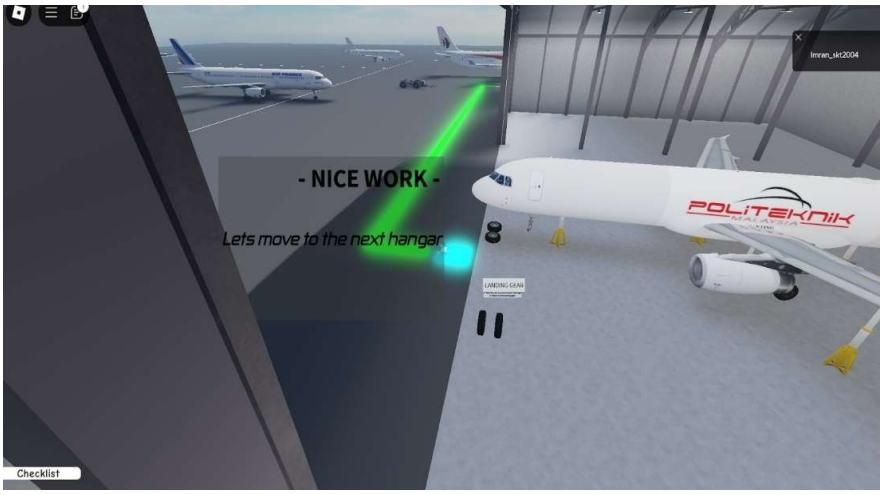


Figure 46: Guided Interface

We developed the game to be easily controllable and easy to remember. For example, for our changing tyre task the player is required to press ‘E’ in order to lift the tyre to be attached tothe landing gear. Besides that, we also placed a guide after the players completed the task so that the players are able to know where to go and not be lost in the game. Our aim is the players to explore our game and get the full experience of the aircraft maintenance environment and consume knowledge as well.

4.1.3 General Operations of the Product

The Roblox Aircraft Maintenance Aeroskill game is an accessible, virtual platform that introduces users to the fundamental skills and procedures of aircraft maintenance. Because of the Roblox platform's cross-device compatibility, the game reaches a wide range of audiences, from school-aged children to teenagers, making it an ideal tool for sparking early interest in aviation careers. Users can play the game on computers, tablets, or mobile devices, ensuring a consistent experience that can be tailored to specific schedules and learning environments. This accessibility enables the game to serve as a versatile learning resource for a diverse range of users, including those who may not have access to traditional aviation education opportunities.

Each module in the game is carefully designed to simulate realistic tasks and challenges that aircraft maintenance engineers face in the field. Hands-on simulations teach players how to inspect various aircraft parts, follow maintenance procedures, and identify and resolve technical issues. By completing modules and scenarios, players gradually gain both foundational knowledge and practical skills, progressing from simple concepts to more complex tasks that require critical thinking and problem-solving abilities. These immersive tasks are intended to provide an authentic experience, assisting players in understanding the complexities and responsibilities associated with safe andefficient aircraft maintenance.

The game promotes collaborative learning through multiplayer features, allowing players to work together on challenges, mimicking real-world aircraft maintenance teamwork. This fosters communication and teamwork skills essential for the aviation industry. Gamified elements like leaderboards and badges boost engagement, while regular updates keep the game aligned with industry standards, introducing players to the latest technologies and practices. *Roblox Aircraft Maintenance Aeroskill* offers an engaging and interactive way for young users to explore an important but less-highlighted career path.

4.1.4 Operation of Product Feature

The Roblox Aircraft Maintenance Aeroskill is a simple game but many functionalities at thesame time. Here are how the game functions:

a. Players can choose Line maintenance or Base maintenance

Figure 47: Office to Choose The Section of Maintenance

There are two types of aircraft maintenance sections on the field, which are line maintenance and base maintenance. It is provided that the players can choose which they are interested in and comfortable with. Line maintenance provides the tasks such as refueling, walk around inspections and any related operations on the line maintenance section which are close to the airport terminal. Other than that, Base maintenance provides a task that requires heavy repair on the aircraft in the hangar. Tasks that are available in the base maintenance server are the tire change and an education gallery for the users to explore more on the game.

b. Base maintenance

Figure 48: Replacement of Wheel Task

Figure 49: Second Hangar Base Maintenance

Base maintenance involves the removal of an aircraft from service to perform heavier maintenance tasks. We added the replacement of the aircraft tyre in the game. It also includes a guide to the players so they can perform the task correctly. Besides that, the next hangar also provides an educational gallery for the players to learn more detail on the aircraft components that they are working on.

c. Line maintenance

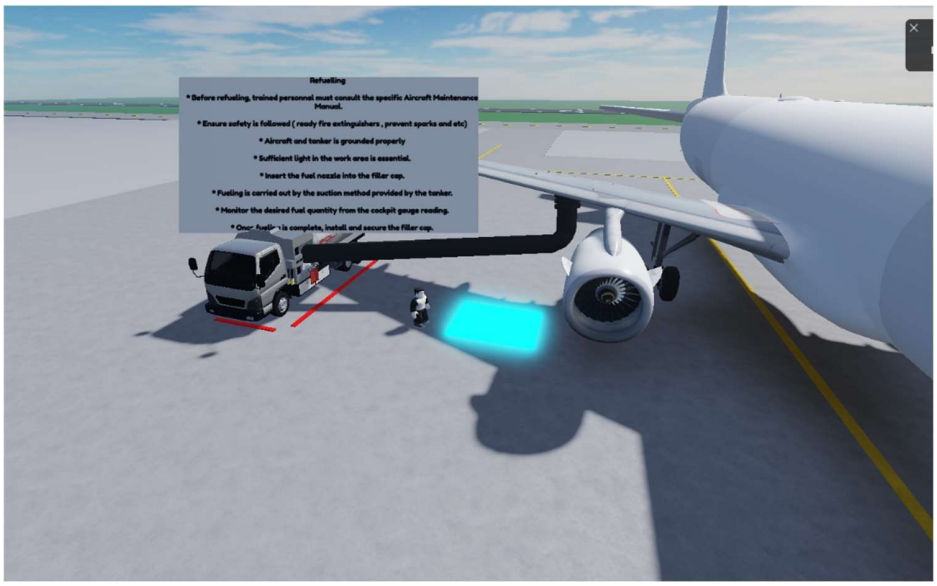


Figure 50: Refueling Task

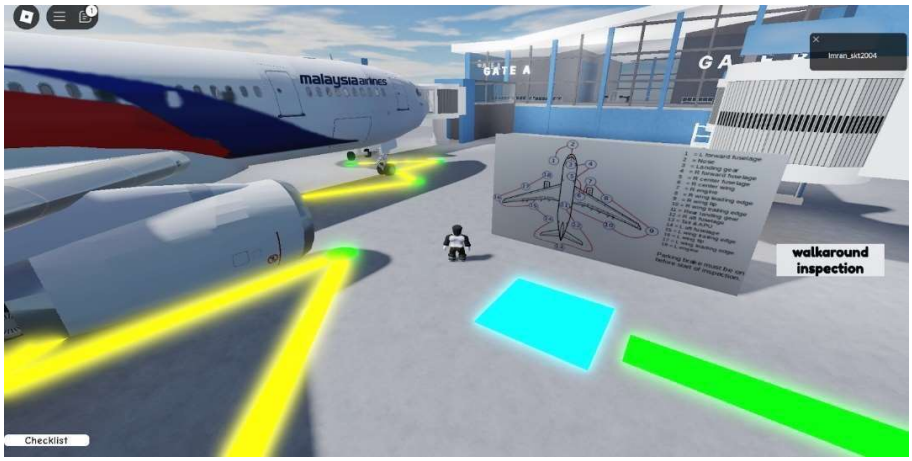


Figure 51: Walkaround Inspection

This aspect of maintenance is carried out on the apron, during turnarounds, while the aircraft remains in its operating environment. The game presents refueling as one of the main tasks in this server. There are guides in the game for users. It also included the detailed procedures for users to relate it to the real-life aircraft maintenance experience. There are also safety procedures to remind them about safety. The walkaround inspection also includes guides for users to be able to follow thecorrect way to do walkaround checks.

d. Checklists

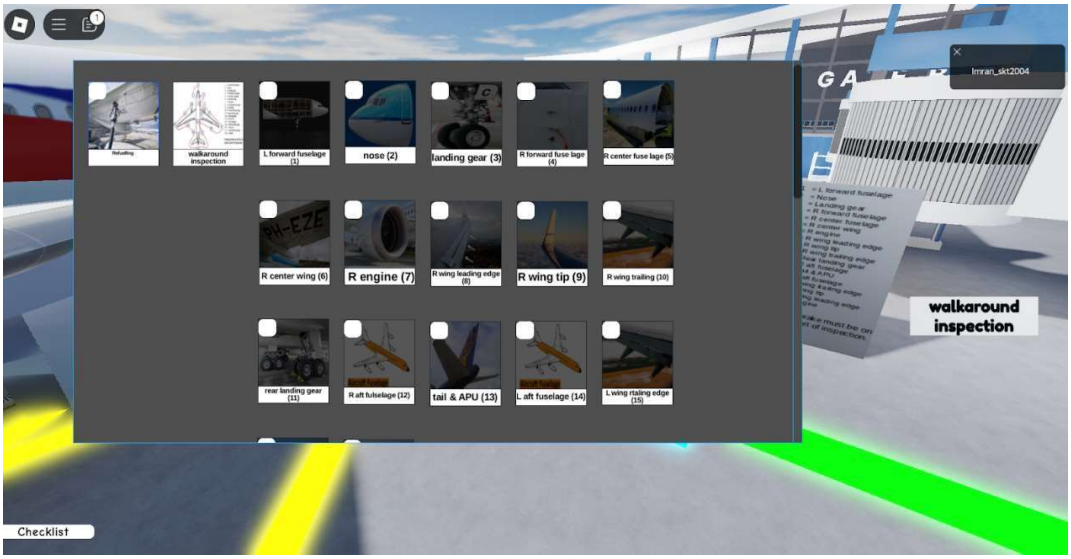


Figure 52: Checklist

Checklists are included so that users can identify the tasks that they completed. Walk Aroundinspections have each detailed checklist on every part that is inspected on the aircraft.

4.2 PROJECT IMPACTS/ PURPOSE OF PRODUCT

The goal of this project is to address Malaysia's aviation talent shortage by encouraging youngpeople to express an early interest in aviation maintenance careers. This project's goal is to introduce school leavers, teenagers, and children to the fundamentals of aircraft maintenance in an engaging, accessible manner by developing Roblox Aircraft Maintenance Aeroskill, an interactive game on the popular platform Roblox. This project aims to bridge the gap in exposure to aviation careers by providing an immersive experience that simulates real-world aviation maintenance tasks, sparking curiosity and encouraging young users to learn more about the field.

Finally, the project aims to contribute to the aviation industry's long-term viability by training a new generation of skilled professionals. By raising awareness of aviation maintenance careers, it hopes to bridge the gap between industry demand and available talent, ensuring a consistent supply of qualified individuals in the future. This project also investigates the potential of gaming as an educational tool, demonstrating how technology can be used to improve learning and career development in technical fields such as aviation.

A) Educational Purpose

The Roblox Aircraft Maintenance Aeroskill project has a significant educational impact because it provides an engaging, interactive environment for students and young enthusiasts to learn about aircraft maintenance. Using the easily accessible Roblox platform, the project exposes users to real- world maintenance tasks through hands-on simulations, supplementing theoretical knowledge with practical experience. This immersive approach not only improves knowledge retention, but also fosters critical thinking and problem-solving abilities, making complex aviation concepts more accessible to younger audiences.

Furthermore, the project aims to spark early interest in aviation careers among students who may have had little exposure to the industry. By allowing players to explore and interact with realistic scenarios in a virtual hangar, the game demystifies aircraft maintenance, making it more approachable and inspiring. This gamified learning experience is consistent with modern educational strategies, offering students a fun and accessible way to interact with technology. Over time, the project has the potential to help address the aviation industry's skills gap by encouraging more young people to pursue careers in aircraft maintenance.

B) Interactive Design

Aeroskill creates a dynamic and immersive teaching experience by mixing interactive elements and compelling material. Users can learn about aviation maintenance in an accessible and engaging way by participating in hands-on activities and using realistic 3D models. The game fosters active engagement by allowing students to interact with virtual tools, components, and scenarios, making the learning experience more memorable and effective. This strategy fosters curiosity and improves comprehension, ensuring that consumers remain motivated and engaged while learning about the aviation business.

The game also incorporates real-time scenarios and challenges that mirror real-world circumstances, allowing players to solve problems, make decisions, and witness the implications of their choices. Active participation in these exercises helps learners retain material more efficiently and improve critical thinking abilities, which are vital in the field of aircraft repair. The game's immersive nature keeps users engaged, making learning more pleasurable and inspiring them to explore new concepts.

Furthermore, rich 3D models and simulations provide a level of realism that textbooks and lectures cannot match, resulting in a more thorough and engaging learning environment. This technique not only makes learning more fun, but it also better prepares users for real-world applications, allowing them to have a solid foundation in aviation knowledge.

C) Independent Learning of Fundamental Concepts

Aeroskill enables students to grasp essential concepts independently, decreasing their dependency on traditional lectures. Students can learn about fundamental aircraft maintenance principles at their own pace thanks to interactive gameplay and hands-on activities. The game provides users with clear, understandable explanations and visual representations of aircraft systems and components, helping them to grasp how each part works and contributes to overall aircraft performance.

Students can gain a deeper knowledge of these concepts by engaging directly with them through realistic 3D models and actual scenarios, without the need for ongoing coaching. This emphasises self-directed problem-solving and critical thinking, allowing students to actively develop their own knowledge. As a result, students build confidence in their capacity to understand and apply aviation topics, encouraging a more self-directed approach to education that extends beyond the classroom.

4.3 ANALYSIS OF PROBLEM ENCOUNTERED & SOLUTIONS

4.3.1 Product Structure/Storyboard

One significant issue encountered during Roblox Aircraft Maintenance Aeroskill development was the need for separate servers to address lag issues. With multiple complex, interactive environments (such as the Office, Hangar, and Airport), a single server struggled to handle all elements without lagging. This lag could disrupt gameplay, resulting in poor user experience and undermining the game's educational purpose. The solution was to divide the game into two separate servers: Server 1 for the Office and Hangar and Server 2 for the airport. This division allowed each server to handle a smaller, more manageable load, resulting in less lag and better game performance. Separating servers also allowed for more efficient management of in-game assets, resulting in smoother transitions and interactions within each environment, which improved the overall gameplayexperience.

Another challenge was to design the placement of each mockup and structure the game layout for maximum usability. The goal was to create an intuitive, immersive environment that resembled real- world aviation maintenance facilities while remaining simple for younger players. Careful planning was required to determine where each mockup—such as aircraft, tools, and maintenance stations— would be placed within each area to ensure a realistic and educational experience.

To address this, the team used a modular approach, organising the game layout into clearly defined areas for various tasks and interactions. For example, the Hangar area focusses on maintenance simulations, whereas the Office supports administrative functions. By segmenting these spaces and ensuring that each serves a specific purpose, players can easily navigate the game, complete tasks without confusion, and fully immerse themselves in learning about aircraft maintenance in a structured, engaging manner.

4.3.2 Product Mechanism/Technical

Technical problems with the interactive exploration component of Roblox's Aircraft Maintenance Aeroskill game occurred during development, disrupting the user experience. Debugging and extensive testing were done to find and fix the technical difficulties. We were able to identify and address issues earlier in the development cycle by utilizing continuous integration and deployment techniques. This proactive strategy improved the overall effectiveness and dependability of the game's production in addition to making it easier to identify and address technical issues early on. The experience's lessons emphasized the value of thorough testing and ongoing development in guaranteeing a technically sound and intuitive learning environment on the Roblox platform.

4.3.3Software/Programming

In order to successfully complete our game, we also faced many challenges and tribulations when making the game. Roblox studio is a simple and fun game-making platform but many problems can arise if you are not prepared. One of them being programming the game usingthe programming language Lua. Lua is relatively a simple programming language. However, if you're new to programming, it will be challenging. Our solution is to get help by learning about programming from a local company close to our Polytechnic. Other than that, we also failed to add the tasks that we planned to add. This is due to a lack of programming skills to operate the tasks way we wanted. The solution is to replace the tasks with an education gallery where students can learn about aircraft parts while playing the game at the same time. Last but not least, in order to programme the game in Roblox studio, It is crucial to get a high performance laptop to programme the game smoothly without any issues and bugs. The solution is just to get a better performance laptop in order for the game to be developed and also tested at the same time without causing the laptop to overheat and fail.

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1 ACHIEVEMENT OF AIM & OBJECTIVE OF RESEARCH

5.1.1 General Achievement of the Product

The Roblox Aircraft Maintenance Aeroskill has achieved its objectives, it also has done an excellent job of giving its players a way to expose them to the world of aircraft maintenance. It helps young children develop their interest in aircraft maintenance. The game aims to target these youngsters to increase the enrolment of aircraft maintenance students in universities and colleges. The game has simple controls and easy guides to navigate throughout the game. There are also education galleries in the game so that the children can learn more deeply about aircraft components and parts. Moreover, Aeroskill is adaptable and includes platform compatibility ensuring that players can participate in the educational exploration of aircraft parts on the popular Roblox platform. Finally, there is a VR mode so that children can have a more immersive experience when playing the game.

5.1.2 Specific Achievements of Project Objectives

5.1.2.1 Product Structure

The Roblox Aircraft Maintenance Aeroskill game was developed successfully, meeting several key project objectives related to its product structure. First, by using a multi-server setup to combat lag, the project met its goal of providing a smooth, engaging gameplay experience. Splitting the game across two servers—one for the Office and Hangar, and another for the Airport—helped to reduce latency and ensure that each environment ran smoothly. This setup enables users to interact with complex, resource-intensive elements within each area without causing performance disruptions, improving the game's overall usability and playability.

Furthermore, the project met its goal of creating an organised, immersive layout that simulates real-life aircraft maintenance facilities. Each environment was carefully planned, with strategically placed mockups and interactive areas that walk players through realistic maintenance scenarios. The game provides players with a structured experience that mirrors the actual flow of work in aviation maintenance by dividing tasks into Office, Hangar, and Airport sections. This method makes learning more intuitive and accessible, allowing players to investigate and comprehend various aspects of aircraft maintenance in a realistic environment. Overall, these achievements contribute to an engaging, educational experience that achieves the game's objectives of generating interest in aviation and providing practical insights into the industry.

5.1.2.2 Product Mechanism

By successfully achieving specific goals in the product mechanism, the project has shown notable accomplishments. Players may easily interact with and learn about different aircraft thanks to the game's design, which places a high priority on straightforward user engagement. components, improving the educational process as a whole. The game system also guarantees cross-platform compatibility, making it simple to access instructional content on the Roblox platform from a variety of devices. Furthermore, it aids high school students in developing progressive skills, which aligns with the project's primary goal of effectively disseminating educational content. Together, these achievements make the project successful by offering a fun and easy method to learn about airplane parts within the Roblox Aircraft Maintenance Aeroskill game.

5.1.2.3 Software/programming

During the making of Roblox Aircraft Maintenance Aeroskill, it is achieved that the game is simple, user-friendly and being able to minimize the learning curve. This game has proven that the aircraft maintenance industry is more than what other people's perception of it. It is successful to make the game a real-life aircraft maintenance environment to maximize the user’s exposure to the industry. The game's progress tracker and user feedback, combined with visually appealing design elements, effectively engaged players. This simulation serves as an interactive learning tool, enabling users to practice the essential aircraft maintenance task virtually. The simulation was programmed to incorporate interactive features such as guided tutorials and realistic aircraft components.

5.2 CONTRIBUTIONS OR IMPACT OF THE PROJECT

The "Aircraft Maintenance Roblox Aeroskill" project provides an innovative and engaging way to learn about the aviation industry. The project uses Roblox, a popular platform among younger audiences, to allow users to interact with the various components of an aircraft. This hands-on approach allows players to develop important skills such as critical thinking, problem-solving, and attention to detail while completing maintenance tasks similar to real-world aircraft operations.

Aside from the educational benefits, the project may encourage users to learn more about aviation and aerospace careers. Many young people who play the game may develop an interest in furthering their education or pursuing a career in aviation. The game offers a fun introduction to complex topics such as engineering and mechanics, which may entice users to pursue formal education or training in these fields.

Overall, the project is more than just a game; it is also an effective tool for introducing users to the world of aircraft maintenance. It offers a fun and interactive learning experience while also encouraging future interest in aviation and related fields.

5.3 IMPROVEMENT AND SUGGESTIONS FOR FUTURE RESEARCH

5.3.1 Product Structure

To improve the effectiveness and educational value of the "ROBLOX Aircraft Maintenance Aeroskill" project, several key improvements and recommendations for future research can be made. For starters, expanding the game's product customisation options could provide users with a more personalised experience while more accurately simulating real-world aircraft maintenance scenarios. The inclusion of real-world data, such as aircraft part lifecycles and maintenance schedules, would significantly improve the game's authenticity and conformity to industry standards. Furthermore, optimising the user interface (UI) for younger audiences and expanding the platform to mobile and virtual reality (VR) may improve accessibility and user engagement.

Future research should also consider the impact of emerging technologies, such as automation and artificial intelligence, on the aircraft maintenance industry, and incorporate these advancements into the game to reflect current trends. Furthermore, research on user behaviour and engagement across age groups would provide valuable insights into the game's effectiveness as an educational tool, while long-term learning assessments could assess knowledge retention through gameplay. Investigating opportunities for cultural adaptation and localisation would ensure that the game appeals to a larger, global audience, while collaborations with industry leaders could provide access to more realistic content, increasing the project's relevance to both learners and professionals. These enhancements, as well as future research directions, will ensure that the "ROBLOX Aircraft Maintenance Aeroskill" project continues to be an innovative, engaging, and educational resource for those seeking a career in aircraft maintenance.

5.3.2 Product Mechanism

The Roblox Aircraft Maintenance Aeroskill game has great potential to be an effective instructional medium for future aircraft maintenance personnel, however, the interactive features and components can be improved. With the enhancement of the game by the inclusion of elaborate models of intricate actors such as the hydraulic system, the avionics, and the landing gear, players will be able to explore how components interact with each other in a practical way, hence a risk-free environment to practice particular skills.

Tasks like troubleshooting, inspecting, or repairing systems may all be integrated in an interactive way to develop important skills such as that of resolving issues. In order to enhance understanding and facilitate recall, in-game assessments in the form of quizzes and challenges that are feedback orientated may be included to assist players in evaluating their own performance and progress as well as how each and every one of them fits in the picture highlighting their merits and weaknesses. Using the real case studies that include practical examples, current up to date trends of the industry and recent developments would help in making the players' experience more engaging and enjoyable.

Incorporating special modules on topics that include but are not limited to safety management preventions, compliance with regulations and quality management system policies will offer support to players who wish to advance their understanding of the game or who want to follow specific career paths. Numbering all these advancements in the game, both the play and the instructor activity would be focused on a better result and would be a calling for stretching oneself, thus rendering the game a complete, up to date, and ever developing educational tool around aircraft maintenance

5.3.3 Software/Programming

Several enhancement recommendation steps might be taken in order to strengthen the 'Roblox Aircraft Maintenance Aeroskill'. One of them is the main problem of this game which is being unable to add more tasks to the game. The game is very simple as there are no requirements to perform detailed actions on the tasks. For example, changing the aircraft Tyre on the base maintenance server of the game. There is no detailed screw, lockwire, or tools to attach the Tyre to the landinggear.

The game will be more educational and will prove the real mechanisms and the workingstructure of the aircraft part if there are such features. The integration of Aircraft Maintenance Manual (AMM) and other maintenance references on the game could greatly enhance the user's ability togain knowledge from the game especially aircraft maintenance course students as most of them lack referring to the physical manual for study due to its. Improving the UI/UX could also help with the user's experience.

Streamline the user interface with clear instructions, task prompts and tooltips to assist players in understanding their objectives. Additional Quizzes and Knowledge checks can also include the understanding and post-game experience of the user. Integrate periodic quizzes on aircraft systems and safety procedures. Players must pass these to unlock new aircraft or tools. Besides that, time-based challenges can help where players need to complete repairs within a set timeframe to simulate real-world pressure scenarios.

5.4 Result of Objectives

5.4.1. Objectives 1

To design an aviation simulation on Roblox to attract the young generation.

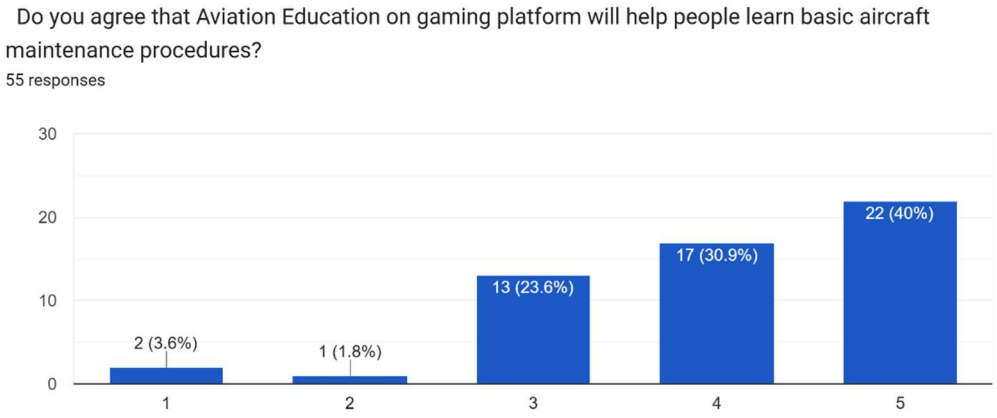


Figure 53: Survey of First Objectives

The figure depicts the findings of a survey to determine whether aviation education on a gaming platform such as Roblox can assist people learn basic aircraft maintenance procedures. Among 55 responders, the majority (40%) strongly agreed (rating 5), while 30.9% agreed (rating 4), demonstrating considerable support for the concept.

This data is highly aligned with the purpose of "designing an aviation simulation on Roblox to attract the young generation." The respondents' high degree of agreement demonstrates the platform's ability to effectively engage younger consumers. It shows that the concept resonates with people who recognise the value in combining education with gaming. This shows that the simulation's design not only meets its educational objectives, but also appeals to the target demographic.

The survey findings support the project's goal of using Roblox to attract and teach young people about aviation and aircraft repair. The passion in the comments suggests that such an approach is engaging, encouraging interest in the field while offering educational knowledge in an interactive and accessible format.

5.4.2 Objectives 2

My Aeroskill project directly supports the purpose "to develop a Roblox simulation focused on aircraft maintenance to increase student enrolment in related courses." The project creates an interactive and immersive learning environment in which users, particularly young audiences, can discover the foundations of aircraft maintenance in an entertaining manner. The simulation, which gamifies aviation education, produces a one-of-a-kind platform that piques students' interest in the topic.

The use of Roblox, a popular platform among teens, guarantees that the simulation is effectively delivered to its intended audience. Through games, pupils can get a rudimentary understanding of maintenance processes and aviation concepts, sparking an early interest in studying aviation-related courses. This is consistent with my goal of expanding enrolment by closing the gap between education and entertainment. The poll results support the potential viability of this method, as the majority of respondents believe that aviation education on gaming platforms is useful.

Additionally, my Aeroskill project serves as a promotional tool for aviation courses, making the subject more accessible and enticing to school leavers. As students get more familiar with aircraft maintenance principles through simulation, they may be more likely to enrol in formal courses to further their expertise and pursue a career in the sector. By integrating education and innovation, my project helps to develop the future generation of aviation professionals.

5.4.3 Objectives 3

To Evaluate Roblox Aeroskill to enhance aviation education efficiency, cost-effectiveness, and innovation.

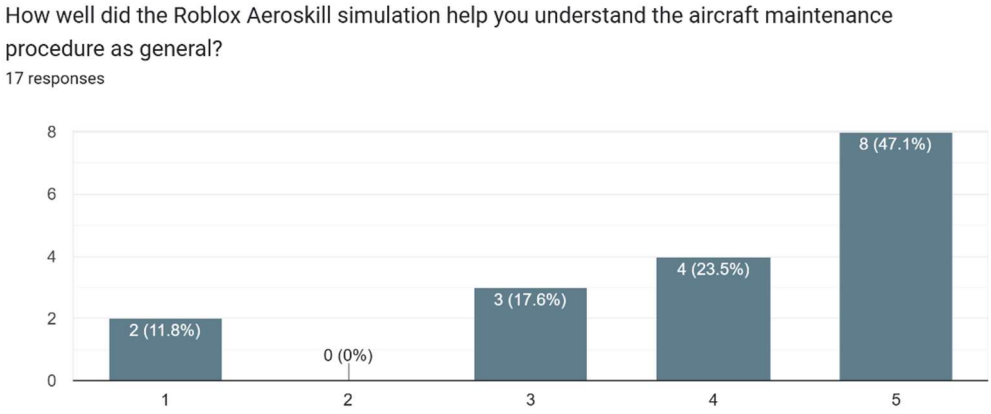


Figure 54: First question from Post survey

The survey results show that Roblox Aeroskill considerably improves the effectiveness of aviation instruction by efficiently simplifying and communicating complicated aircraft repair ideas to students. According to the first graph, 47.1% of respondents gave the simulation the highest possible score (5), showing a strong consensus that it helped them learn general aircraft maintenance processes. Furthermore, 23.5% gave it a 4, supporting the excellent feedback. Together, this accounts for more than 70% of participants recognising the simulation's effectiveness in meeting its teaching objectives.

This high level of agreement demonstrates how Roblox Aeroskill simplifies the learning process by converting complex technical procedures into an approachable and engaging style. The simulation uses gamification to attract learners' attention and teach complex aviation concepts in a visual, step-by-step format that is easier to understand than traditional textbook or lecture-based methods. This interactive technique not only makes learning more enjoyable, but it also improves information retention by having users actively participate in simulated maintenance activities.

Furthermore, the simulation's capacity to appeal to a wide range of audiences—from school leavers and teenagers to people interested in aviation—demonstrates its adaptability and inclusion. By providing an immersive and realistic environment within the Roblox platform, the initiative removes numerous entrance hurdles, such as the requirement for actual equipment or prior technical expertise, allowing users to quickly master the principles of aircraft repair. This efficiency is crucial for developing early enthusiasm and confidence in the aviation field, ultimately encouraging more students to consider aviation as a career option.

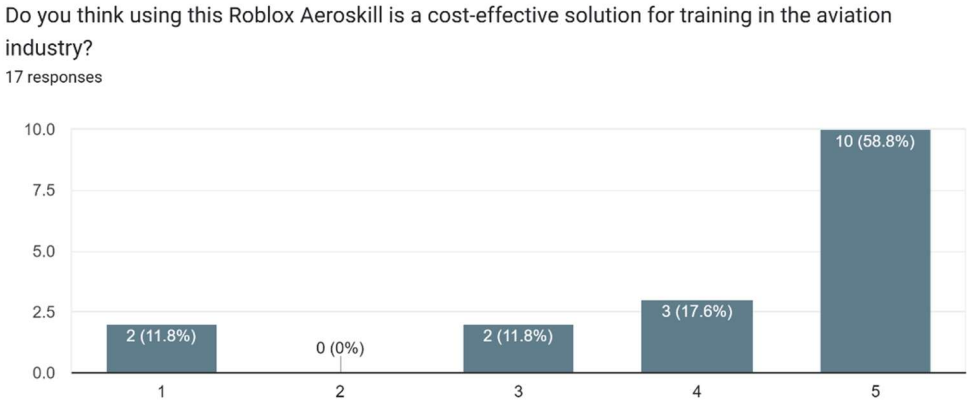


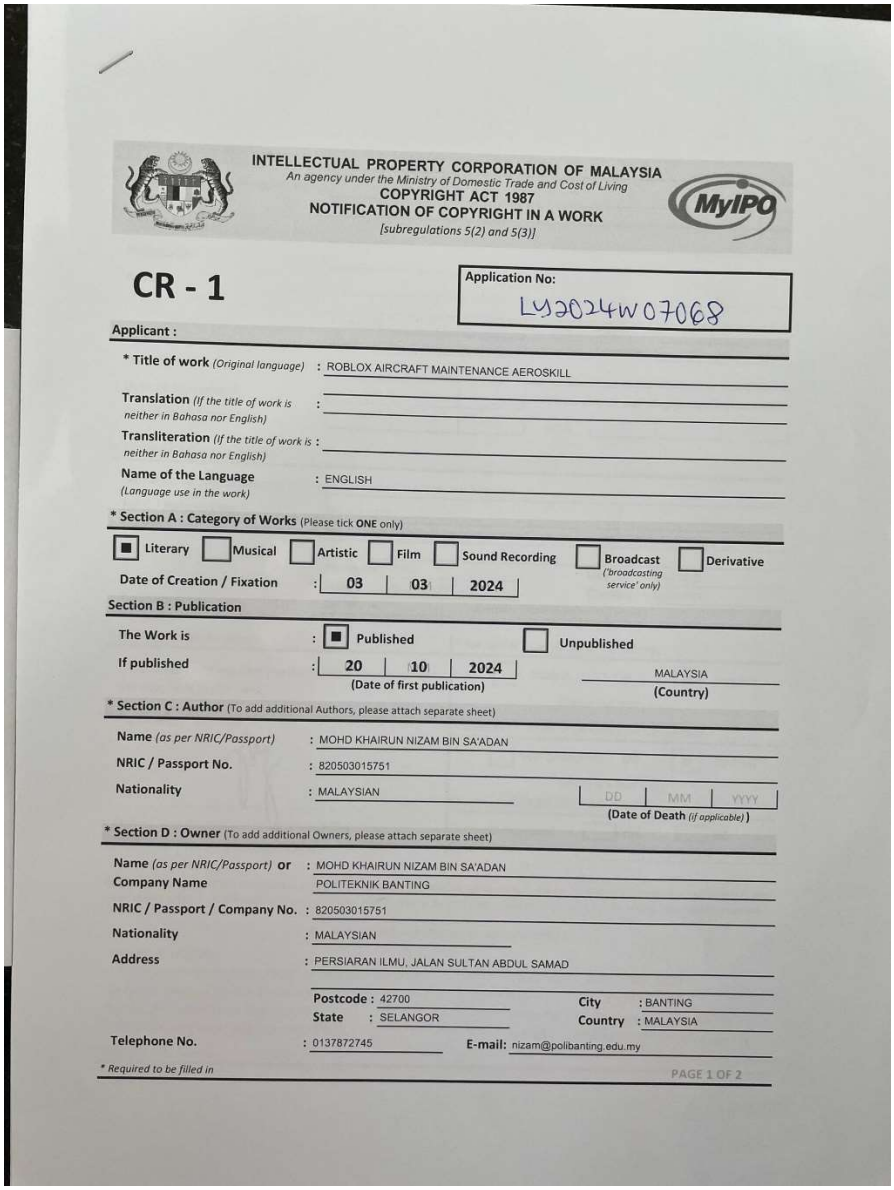
Figure 55: Second question from Post survey

The second graph emphasises the simulation's cost-effectiveness, with 58.8% strongly agreeing (rating 5) and 17.6% agreeing (rating 4) that it is a financially viable option for aviation instruction. This demonstrates that the platform is more accessible and practical than traditional approaches, making it appropriate for a larger audience. Furthermore, the integration of gamification with aviation education demonstrates a highly creative approach, as indicated by the excellent reception across both graphs.

The simulation offers an immersive and interesting learning experience, modernising how aviation skills are taught. Overall, the results corroborate Roblox Aeroskill's achievement in meeting its goal of improving aviation education through efficiency, affordability, and innovation.

5.5 Certificates of Achievements

Figure 56: Certificates of Achievement from BIPC 2024



INTELLECTUAL PROPERTY CORPORATION OF MALAYSIA
An agency under the Ministry of Domestic Trade and Cost of Living
COPYRIGHT ACT 1987
NOTIFICATION OF COPYRIGHT IN A WORK
[subregulations 5(2) and 5(3)]

MyIPO

CR - 1

Application No: LY2024W07068

Applicant :

* **Title of work** *(Original language)* : ROBLOX AIRCRAFT MAINTENANCE AEROSKILL

Translation *(If the title of work is neither in Bahasa nor English)* :

Transliteration *(If the title of work is neither in Bahasa nor English)* :

Name of the Language *(Language use in the work)* : ENGLISH

*** Section A : Category of Works** (Please tick **ONE** only)

☑ Literary ☐ Musical ☐ Artistic ☐ Film ☐ Sound Recording ☐ Broadcast *('broadcasting service' only)* ☐ Derivative

Date of Creation / Fixation : 03 | 03 | 2024

Section B : Publication

The Work is : ☑ Published ☐ Unpublished

If published : 20 | 10 | 2024 (Date of first publication) MALAYSIA (Country)

*** Section C : Author** (To add additional Authors, please attach separate sheet)

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NRIC / Passport No. : 820503015751

Nationality : MALAYSIAN

DD | MM | YYYY (Date of Death *(if applicable)*)

*** Section D : Owner** (To add additional Owners, please attach separate sheet)

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State : SELANGOR **Country** : MALAYSIA

Telephone No. : 0137872745 **E-mail:** nizam@polibanting.edu.my

** Required to be filled in*

PAGE 1 OF 2

Figure 57: Our project MyIPO

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APPENDIX A: DECLARATION OF TASK SEGREGATION

ITEMS	DESCRIPTION
	DANISH IMAN BIN FAIZZA
1.1	BACKGROUND OF STUDY
1.3.2.1	PRODUCT STRUCTURE
1.4	PURPOSE OF PRODUCT
1.5.1	GENERAL PROJECT SCOPE
1.5.2.1	PRODUCT STRUCTURE
1.5.2.4	PRODUCT STRUCTURE
1.6	PROJECT IMPACT
2.1	GENERAL LITERATURE REVIEW
2.1.1	ROBLOX POTENTIAL AS A TEACHING TOOL FOR FUNDAMENTAL AIRCRAFT MAINTENANCE
2.1.2	EDUCATIONAL POTENTIAL OF ROBLOX
2.1.3	ENGAGEMENT AND IMMERSION
2.1.4	ACCESIBILITY AND INCLUSITIVITY
2.1.5	IMPACT ON CAREER ASPIRATIONS
2.2.1	PRODUCT STRUCTURE
2.3.1.1	PRODUCT A
2.4.1	PRODUCT A VS OUR PRODUCT
3.1	PROJECT BRIEFING AND RISK ASSESMENT

5.1.2	SPECIFIC ACHIEVEMENTS OF PROJECT OBJECTIVES
5.1.2.1	PRODUCT STRUCTURE
5.2	CONTRIBUTIONS OR IMPACT OF THE PROJECT
5.3	IMPROVEMENT AND SUGGESTIONS FOR FUTURE RESEARCH
5.3.1	PRODUCT STRUCTURE
5.4	RESULT OF OBJECTIVES

	DANIAL IMAN BIN SHAMSUL KAMAL ARIFIN
1.2	PROBLEM STATEMENT
1.3.1	GENERAL PROJECT OBJECTIVE
1.3.2.2	PRODUCT MECHANISM
1.4	PUROSE OF PRODUCT
1.5.2.2	PRODUCT MECHANISM
2.1	GENERAL LITERATURE REVIEW
2.2	SPECIFIC LITERATURE REVIEW
2.2.2	STUDENT RESOURCES
2.3.1.2	PRODUCT B
2.4	COMPARISON PRODUCT
2.4.2	PRODUCT B VS OUR PRODUCT
3.1	PROJECT BRIEFING AND RISK ASSESMENT
3.4	PARETO DIAGRAM
3.5.2.2	PROPOSED DESGIN CONCEPT 2
3.6	EVALUATION & SELECTION CONCEPTUAL DESIGN
3.6.1	PUGH MATRIX
3.8	PROJECT FLOW CHART
3.9.1	PRODUCT MECHANISM
3.11	GANTT CHART

3.12	DEVELOPMENT OF GAME
3.13	DEVICES
3.14	FUNCTIONALITY TEST
4.1.1	GENERAL PRODUCT FEATURES & FUNCTIONALITIES
4.1.2	SPECIFIC PART FEATURES
4.1.2.2	PRODUCT MECHANISM
4.2	PROJECT IMPACTS/PURPOSE OF PRODUCT
4.3.2	ANALYSIS OF PROBLEM ENCOUNTERED & SOLUTIONS
5.1	PRODUCT MECHANISM
5.1.2	ACHIEVEMENT OF AIM & OBJECTIVE OF RESEARCH
5.1.2.2	SPECIFIC ACHIEVEMENTS OF PROJECT OBJECTIVES
5.2	PRODUCT MECHANISM
5.3	CONTRIBUTIONS OR IMPACT OF THE PROJECT
5.3.2	IMPROVEMENT AND SUGGESTION FOR FUTURERESEARCH

	MOHAMMAD IMRAN BIN MOHAMMAD HISHAM
1.3	PRODUCT OBJECTIVES
1.3.2.3	SOFTWARE/PROGRAMMING
1.4	PURPOSE OF PRODUCT
1.5.2.3	SOFTWARE/PROGRAMMING
1.6	PROJECT IMPACT
2.1	GENERAL LITERATURE RIVIEW
2.2.3	SOFTWARE/PROGRAMMING
2.3.1.3	PRODUCT C
2.4.3	PRODUCT C VS OUR PRODUCT
3.1	PROJECT BRIEFING AND RISK ASSESSMENT
3.3	QUESTIONNAIRE SURVEY
3.5.2.3	PROPOSED DESIGN CONCEPT 3
3.7.1	GENERAL INTERFACE LAYOUT
3.7.2	SPECIFIC INTERFACE LAYOUT
3.8	PROJECT FLOWCHART
3.9.2	SOFTWARE/PROGRAMMING
3.10.1	GENERAL PRODUCT FEATURES & FUNCTIONALITIES
3.11	GANTT CHART
3.11.1	AEM GANTT CHART
3.12	DEVELOPMENT OF GAME

3.13	DEVICES
3.14	FUNCTIONALITY TEST
4.1.1	GENERAL PRODUCT FEATURES & FUNCTIONALITIES
4.1.2.3	SOFTWARE/PROGRAMMING
4.1.4	OPERATION OF PRODUCT FEATURE
4.3.3	SOFTWARE/PROGRAMMING
5.1.1	GENERAL ACHIEVEMENT OF THE PRODUCT
5.1.2.3	SOFTWARE/PROGRAMMING
5.3.3	SOFTWARE/PROGRAMMING

APPENDIX B: SUMMARY OF SIMILARITY REPORT

THESIS TEST 1.pdf

ORIGINALITY REPORT

9%	4%	1%	6%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Jabatan Pendidikan Politeknik Dan Kolej Komuniti Student Paper	3%
2	www.l3harris.com Internet Source	1%
3	appadvice.com Internet Source	<1%
4	Submitted to Sim University Student Paper	<1%
5	www.steamdiscovery.com Internet Source	<1%
6	Submitted to Embry Riddle Aeronautical University Student Paper	<1%
7	listens.online Internet Source	<1%
8	www.the74million.org Internet Source	<1%
9	Submitted to University of New South Wales	

	Student Paper	<1%
10	eprints.ums.edu.my Internet Source	<1%
11	apps.apple.com Internet Source	<1%
12	Youwakeem, Bahgat. "Inclusiveness of English as a Second Language Nursing Students in the Academic Setting", Walden University, 2024 Publication	<1%
13	Submitted to Asia Pacific University College of Technology and Innovation (UCTI) Student Paper	<1%
14	Submitted to Hereford Sixth Form College Student Paper	<1%
15	education.roblox.com Internet Source	<1%
16	Ferreira, Luis Miguel Moreira Lino. "A Multiple Logical Ring Approach to Real-time Wireless-enabled Profibus Networks", Universidade do Porto (Portugal), 2024 Publication	<1%
17	Mohamed Lahby. "Empowering Digital Education with ChatGPT - From Theoretical to Practical Applications", CRC Press, 2024	<1%

	Publication	
18	Submitted to Florida Virtual School Student Paper	<1 %
19	Submitted to Coventry University Student Paper	<1 %
20	Submitted to University of the Andes Student Paper	<1 %
21	create.roblox.com Internet Source	<1 %
22	Submitted to Brickfields Asia College Student Paper	<1 %
23	Submitted to Carnegie Mellon University Student Paper	<1 %
24	Submitted to Notre Dame of Marbel University Student Paper	<1 %
25	ir.unimas.my Internet Source	<1 %
26	www.coursehero.com Internet Source	<1 %
27	Submitted to University of Huddersfield Student Paper	<1 %
28	Submitted to University of Wales, Lampeter Student Paper	<1 %

29	Salem Al-Naemi, Rachid Benlamri, Rehan Sadiq, Aitazaz Farooque, Michael Phillips. "Innovation and Technological Advances for Sustainability", CRC Press, 2024 Publication	<1 %
30	opencollective.com Internet Source	<1 %
31	Submitted to Rutgers University, New Brunswick Student Paper	<1 %
32	allcasinobonus.video.blog Internet Source	<1 %
33	economicsnetwork.ac.uk Internet Source	<1 %
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36	www2.mdpi.com Internet Source	<1 %
37	Gail Sofer. "Process Validation in Manufacturing of Biopharmaceuticals - Guidelines, Current Practices, and Industrial Case Studies", CRC Press, 2019 Publication	<1 %

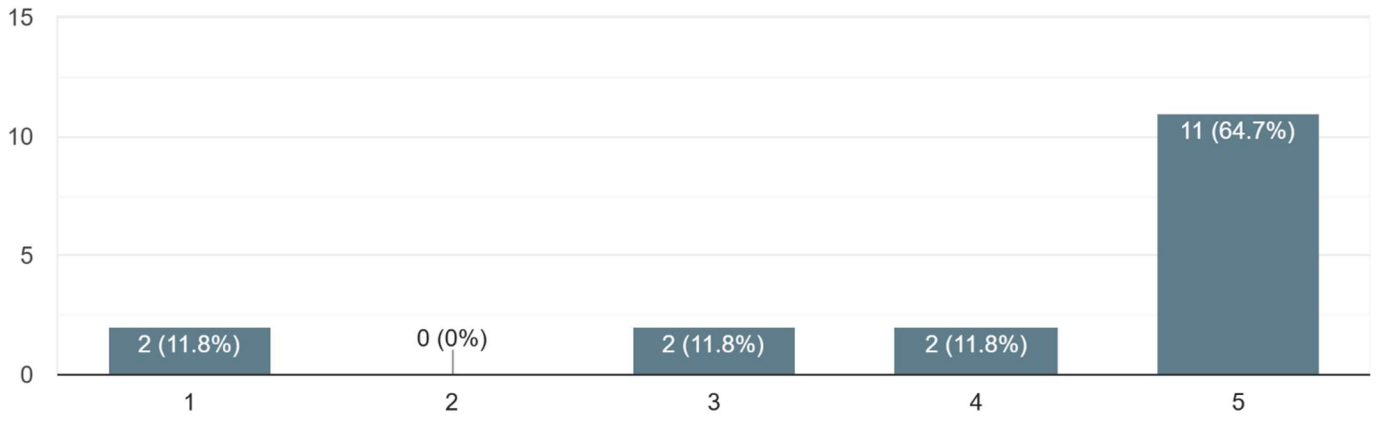
38	M.R. Dileep, Ajesh Kurien. "Air Transport and Tourism - Interrelationship, Operations and Strategies", Routledge, 2021 Publication	<1%
39	Martin Ward, Carlo Eugeni, Callum Walker. "Teaching Translation - Contexts, Modes, and Technologies", Routledge, 2024 Publication	<1%
40	Nicola Fraschini, Jieun Kiaer. "Innovative Methods in Korean Language Teaching", Routledge, 2024 Publication	<1%
41	docsbay.net Internet Source	<1%
42	projekter.aau.dk Internet Source	<1%
43	E Ya Smirnov. "Stabilization of Programmed Motion", CRC Press, 2019 Publication	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		

APPENDIX C: POST SURVEY

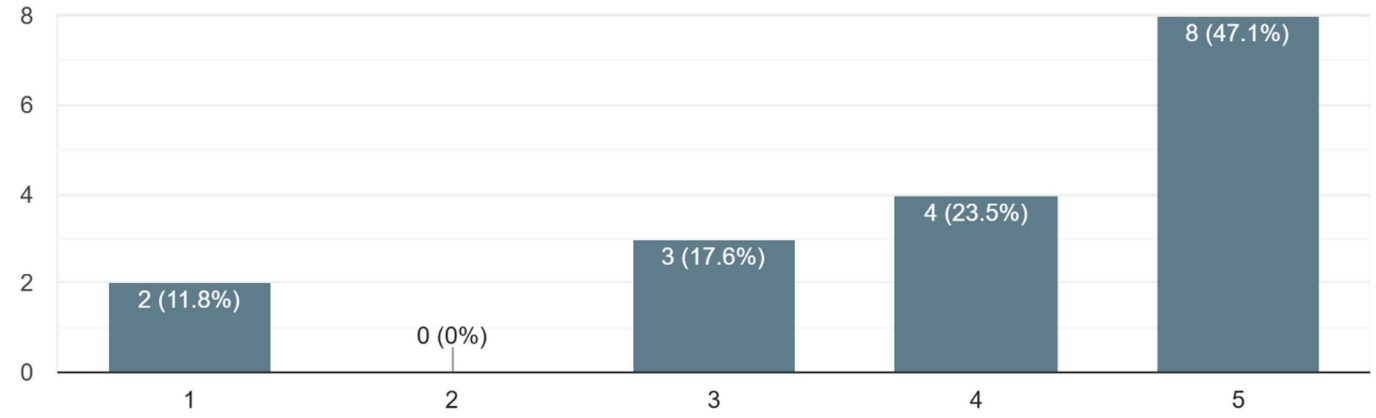
How easy was it to navigate and use the Roblox Aeroskill?

17 responses



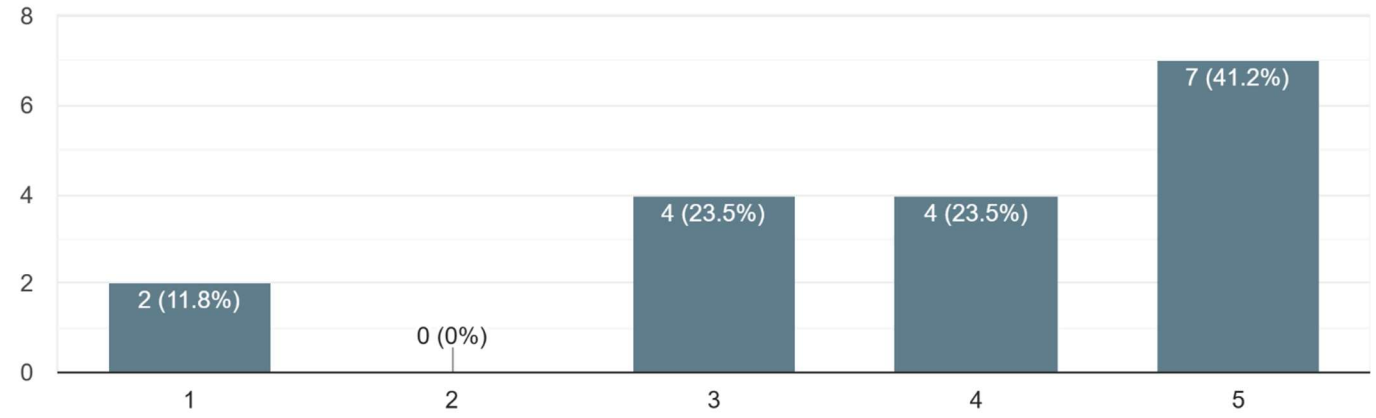
How realistic were the Roblox Aeroskill models in representing actual aircraft maintenance procedure and operations?

17 responses



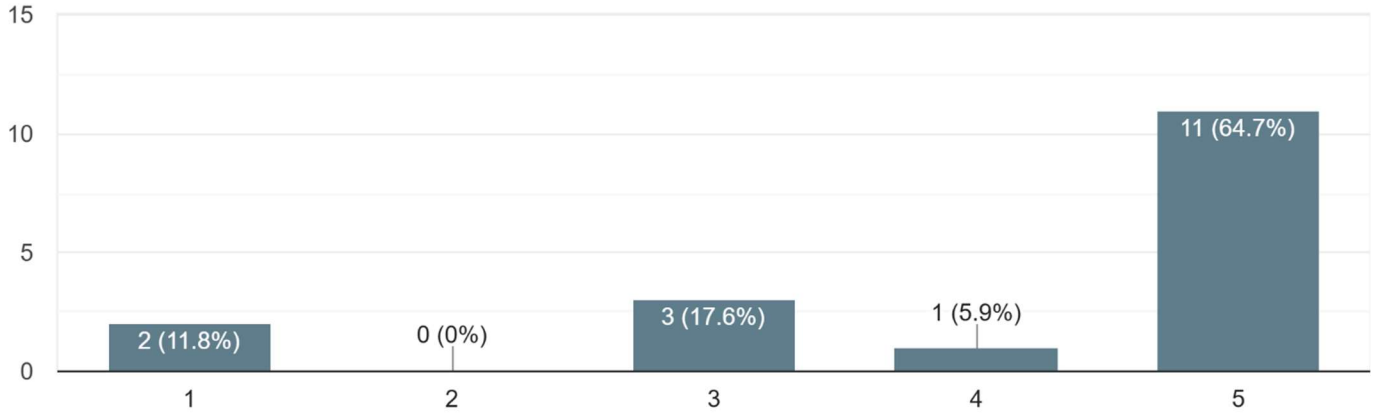
How immersive did you find the interaction with the aircraft maintenance procedure in the Roblox Aeroskill environment?

17 responses



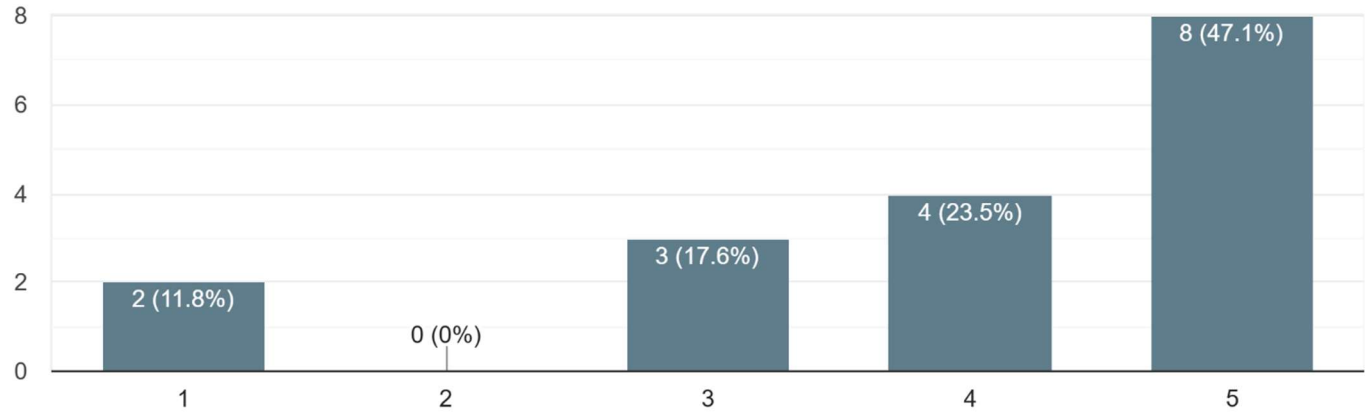
How would you rate the user-friendliness of the Roblox Aeroskill interface for navigating and conducting basic aircraft maintenance procedure?

17 responses



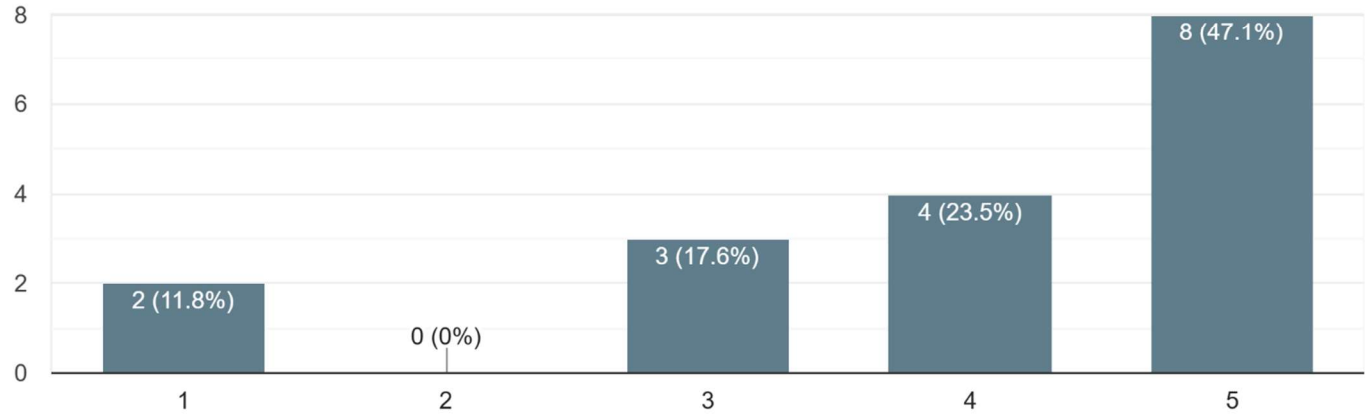
How well did the Roblox Aeroskill simulation help you understand the aircraft maintenance procedure as general?

17 responses



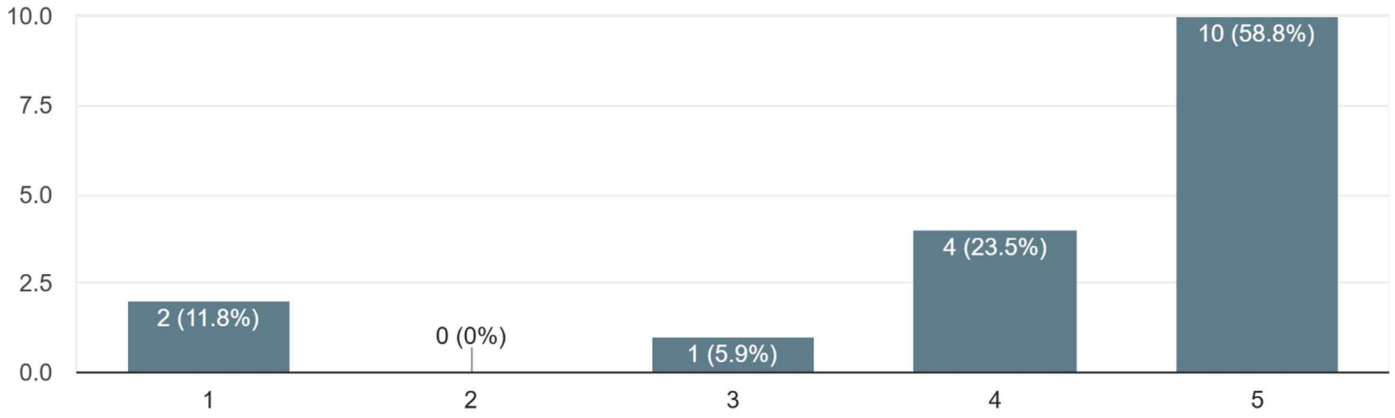
Do you agree that the Roblox Aeroskill provides a safe and practical alternative to real-world aircraft maintenance procedure?

17 responses



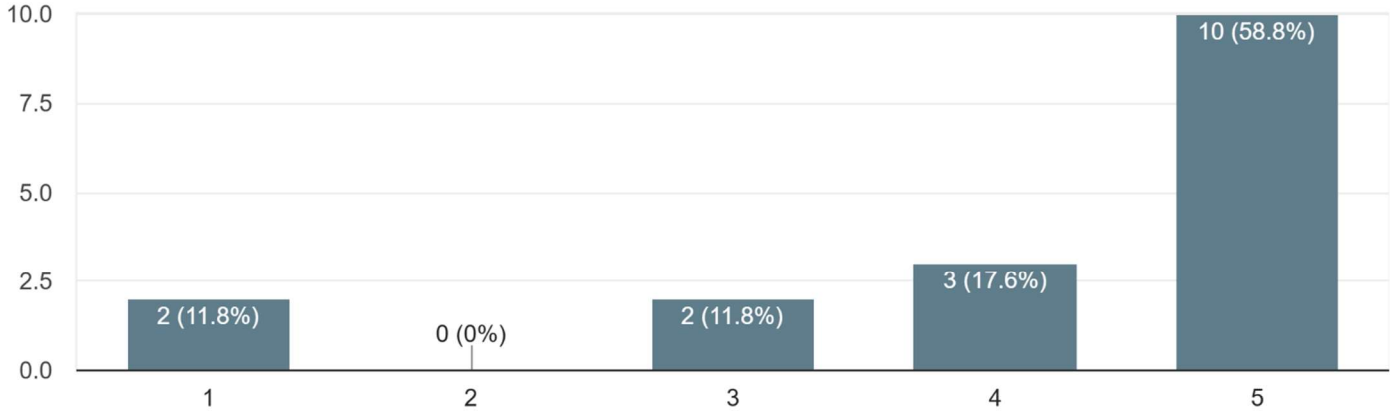
How useful was the Roblox Aeroskill in providing early exposure to basic aircraft maintenance procedure without the need for physical hands-on?

17 responses



Do you think using this Roblox Aeroskill is a cost-effective solution for training in the aviation industry?

17 responses



How would you rate your overall experience with the Roblox Aeroskill: Aircraft Maintenance Mastery?

17 responses