

**DEPARTMENT OF INFORMATION AND COMMUNICATION
TECHNOLOGY**

**DIPLOMA IN INFORMATION TECHNOLOGY
(DIGITAL TECHNOLOGY)**

DFT50114: INTEGRATED PROJECT

AR ANIMAL LIFE CYCLE

GROUP MEMBERS:

NIK NURSHAHIRA BINTI MASRUM	17DDT21F1014
FATIN NURQASDINA BINTI RASHID	17DDT21F1022
YUSRA HAZIQAH BINTI MD YUNUS	17DDT21F1008

SUPERVISOR:

NIK NOR AZLYZAE BINTI ABDUL MANAF

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1.0 ABSTRACT

The "AR Animals Life Cycle" project aims to early childhood education by utilizing augmented reality (AR) technology to create an interactive online learning application. The project will focus on enhancing the learning experience at "Taska Permata Nur Hani" in Malacca by replacing conventional teaching methods with visually engaging AR content, including comprehensive animal life cycle explanations and body part labeling. The development of this AR application seeks to address the limitations of current learning approaches, as traditional books and papers can be unstimulating for young learners, while existing applications lack animal life cycle integration, interactive quizzes, and games. Through an agile scrum methodology, the project aims to achieve its objectives, which include providing a multimedia AR application on animal life cycles, implementing body part labeling, and incorporating quizzes and games to enhance interest. The ultimate outcome of this project is to create an innovative and effective learning application that fosters a deeper understanding of animal life cycles in a fun and enjoyable manner.

2.0 PROJECT PLAN

2.1 Problem Statement

1. Lack of Engagement in Traditional Methods:
 - The current methods, which are books and papers with learning the animal life cycle can be uninterested and not interactive anymore.
2. Limited Incorporation of Animal Life Cycles and Body Parts in Applications:
 - Most applications do not incorporate animal life cycles and animal body parts. It is difficult for children to learn about animals.
3. Absence of Interactive Quizzes and Games in Existing Applications:
 - Existing applications do not include quizzes and game to attract interest while studying.

2.2 Objective

1. Augmented Reality (AR) Application for Animal Life Cycles:
 - To provide an application for Augmented Reality (AR) with multimedia elements about animal life cycles.
2. Augmented Reality (AR) Application with Body Part Labelling:
 - To develop an application for Augmented Reality (AR) that provides labelling for different body parts of animals.
3. Educational Application with Animal Life Cycle Quizzes and Games:
 - To provide an application that includes quizzes and games about animal life cycle.

2.3 Scope

2.3.1 User Scope

1. Teacher and Children.
 - i. Can scan the book provided using augmented reality.
 - ii. Can view the video that is provided in this application.
 - iii. Can play games about animal life cycles that are in the application.
 - iv. Can answer the quizzes provided by the application.
 - v. Can click the button to the next page in the application.

2.3.2 System Scope

1. The system will allow users to choose from a wide variety of animals to explore their life cycles and body part development.
2. The system will present an interesting and interactive visual video of the life cycle of the selected animal.
3. The system will display labels for the animal's various body parts, such as head, wings, antenna.
4. The system will offer quizzes and games related to body part development during different life stages.
5. The system will incorporate multimedia elements such as images, videos, and animations.

2.4 Literature Review

Table 1.0: Literature Review

Project			
Name Application	EKID APPS	Assembler EDU App	ARLOOPA
Description	The best mobile Augmented Reality App for kids that allows kids to explore the world around them by using additional flash cards.	Assembler EDU is a one- stop platform for students and teachers to enjoy learning in 3D & Augmented Reality (AR).	ARLOOPA is an augmented reality (AR) platform and application that lets users create, experience, and share AR content.
Interface	Simple	Hard	Hard
Advantages	- Easy to learn and interesting. - Use flash cards to learn. - Can teach pronunciation through listening to audio.	- Safe experiential learning engaging for learners. - Reduce printing costs. - Less dependent on textbooks.	- Application provides a user-friendly interface that allows for easy navigation and interaction with AR content.
Disadvantages (Features)	- Don't have quizzes and games. - Don't have an explanation about animals.	- Don't have quizzes and games. - Need internet to access.	- Don't have quizzes and games. - Need internet to access. - Don't have an explanation about animals.
Platform	Android, Apple iOS	Android, Apple iOS	Android, Apple iOS

2.5 Methodology

The Agile Scrum method is used to create this system because the product is built faster, as each set of goals must be completed within the time frame of each sprint. This method is suitable for small projects. Agile methods can help teams manage work more efficiently and do the work more effectively while delivering the highest quality product within the constraints of the budget.



Figure 1.0: Agile Scrum

Table 2.0: Agile Development Phase

No.	Phase	Activities
1.	Meet and Plan	1. Decide what system to develop. 2. Briefly the system to client. 3. Conduct preliminary investigation.
2.	Design	1. Decide the design in system. 2. Design the UML diagram, data flow diagram and Gantt chart. 3. Decide tools need to optimize production.
3.	Code & Testing	1. Decide software to run the project. 2. Run and debug the system. 3. Technical report.
4.	Release	1. Deliver the project to the client.
5.	Feedback	1. Client feedback from the application.

2.6 Gantt Chart

Sprint	Phase / Activities	Duration	Start Date	End Date
Sprint 1	1. Meet & Plan	1 days	21/6/2023	22/6/2023
	Decide what system to develop.	1 days	21/6/2023	21/6/2023
	Brainstorming with team member.	1 days	21/6/2023	21/6/2023
	Find the project's client.	1 days	21/6/2023	21/6/2023
	2. Design	2 days	22/6/2023	23/2/2023
	Choose the system's design.	1 days	22/6/2023	22/6/2023
	Decide tools need to optimize production.	1 days	23/6/2023	23/6/2023
	3. Code & Testing	2 days	24/6/2023	25/6/2023
	Module testing	1 days	24/6/2023	24/6/2023
	Planning program code	1 days	25/6/2023	25/6/2023
	4. Release	2 days	26/6/2023	27/6/2023
	Release project idea	2 days	26/6/2023	27/6/2023
	5. Feedback	2 days	28/6/2023	29/6/2023
	Review project idea	2 days	28/6/2023	29/6/2023
Sprint 2	1. Meet & Plan	7 days	30/6/2023	6/7/2023
	Collect requirement from client	2 days	30/6/2023	1/7/2023
	Conduct preliminary investigation	5 days	2/7/2023	6/7/2023
	2. Design	7 days	7/7/2023	13/7/2023
	Design the project	7 days	7/7/2023	13/7/2023
	3. Code & Testing	14 days	14/7/2023	27/7/2023
	Choose the software.	3 days	14/7/2023	16/7/2023
	Run and debug the project.	10 days	17/7/2023	26/7/2023
	User testing.	1 days	27/7/2023	27/7/2023
	4. Release	2 days	28/7/2023	29/7/2023
	Deliver the project to client	2 days	28/7/2023	29/7/2023
	5. Feedback	3 days	30/7/2023	1/8/2023
	Collect feedback from client	1 days	30/7/2023	30/7/2023
	Identify any issues and make adjustment	2 days	31/8/2023	1/8/2023

Figure 1.1: Gantt Chart

3.0 REQUIREMENT SPECIFICATION

3.1 Functional Requirement

The functional requirements of this system are as follows:

1. Users shall be able to select an animal and observe its life cycle stages, such as egg, larva, pupa, and adult, using their device's camera.
2. Users shall be able to select an animal and view its body parts in video through the device's camera.
3. Users shall be able to choose any quizzes given, indicating correct and incorrect answers.
4. Users shall be able to play the game and complete the game successfully.
5. The app shall be able to provide Augmented Reality (AR) feature that allows users to view the life cycles of butterfly, frog, chicken, and turtle.
6. The app shall be able to provide detailed information and video for each life cycle stage of the selected animal.
7. The app shall be able to AR feature that enables users to explore the anatomy of butterfly, frog, chicken, and turtle.
8. The app shall be able to offer interactive labels video for different body parts, allowing users to learn the names of each part.
9. The app shall be able to include quizzes related to the life cycles and body parts of the animals.
10. The app shall be able to give quizzes in various formats, such as guess me, multiple choice, and spelling skills.
11. The app shall be able to feature interactive and educational game related to the animals, which is puzzle.
12. The app shall display four different game puzzles that they can choose it.
13. The app shall be able to have an intuitive and visually appealing user interface to ensure ease of navigation and interaction.
14. The app shall be able to have instructions for users to use before using the activities in the app.

3.2 Non - Functional Requirement

The non-functional requirement of this system are as follows:

1. Performance:
 - The response time for the application to open is only 5 seconds.
2. Scalability:
 - The application can be used by anyone without limitation.
3. User Interface (UI) and User Experience (UX):
 - The application has an intuitive and user-friendly interface, making it easy for users of all ages to navigate and interact with the AR videos, quizzes, and game.
4. AR Tracking Accuracy:
 - The application has an accurate tracking and placement of AR objects, so that the virtual animal videos integrate seamlessly with the real-world environment.
5. Content Quality:
 - The AR animal videos, quizzes, and game have of high quality and accuracy, providing educational and entertaining experiences for users.

3.3 Hardware and Software Requirement

The following tables show the hardware and software specifications and price used in developing and implementing the system.

Table 3.0: Hardware Requirement

No.	Hardware	Specification	Price
1.	VivoBook ASUS Laptop	• 11th Gen Intel(R) Core (TM) i5-1135G7 • 8.00 GB • 64-bit • 2.40Hz • 2.42GHz	RM3200
2.	Lenovo IdeaPad5 15ARE05	• AMD Ryzen 5 4600U • Radeon Graphics • 64-bit operating system • x64-based processor • 8.00 GB	RM2500
3.	Swift SF314-43	• AMD Ryzen 5 5500u • Radeon Graphics • 64-bit operating system, • X64-based processor • 8.00 GB	RM3500
4.	Galay Tab A8	• SM-X205 • R9YT30AX7RM • 351424288928531	FREE
TOTAL			RM9200

Table 3.1: Software Requirement

No.	Software	Price
1.	Unity	Open Source
2.	Canva Pro	RM5
3.	Adobe Illustrator (AI)	Open Source
4.	Adobe Photoshop (PS)	Open Source
5.	Vuforia Engine	Open Source

3.4 System Configuration

1. Hardware requirements:
 - i. Smartphone and tablet (Android) with AR capability (Vuforia for Android).
 - ii. Back-facing camera (for AR interaction).
 - iii. Sufficient storage space for app installation and content.
2. Software requirements:
 - i. Video Modelling Software for creating video animal models (Adobe Illustrator, Adobe Photoshop, Canva).
 - ii. Video Editing Software for creating educational videos (Microsoft Clipchamp, Canva, Capcut).
 - iii. Game Development Software (Unity3D) for building interactive quizzes and games.
 - iv. Programming Languages: C#.
3. Content and media:
 - i. Educational videos showcasing real animal life cycle and body parts.
 - ii. Quiz questions related to animal life cycle and body parts.
 - iii. Engaging jigsaw game for interactive learning experiences.
4. App structure:
 - i. Welcome screen: Introduce the app and its objectives to users.
 - ii. Main menu: A collection of animals with AR markers for scanning.
 - iii. AR Viewer: Display videos when AR markers are scanned.
 - iv. Quizzes: In-app quizzes to test children's knowledge.
 - v. Jigsaw puzzle: Fun and educational games related to animals that they learn.
5. User interface (UI) and experience (UX):
 - i. Kid-friendly and intuitive UI design with appealing graphics and icons.
 - ii. Simple navigation for easy access to different app sections.
 - iii. Visual cues and animations to guide children through the app.
 - iv. Engaging and encouraging feedback for correct answers and achievements.

3.5 Security Requirement

1. Permission-based Access:
 - i. Users shall have the option to grant or deny camera access when the application requires access to the camera.

4.0 FINAL DESIGN

4.1 Logical Design

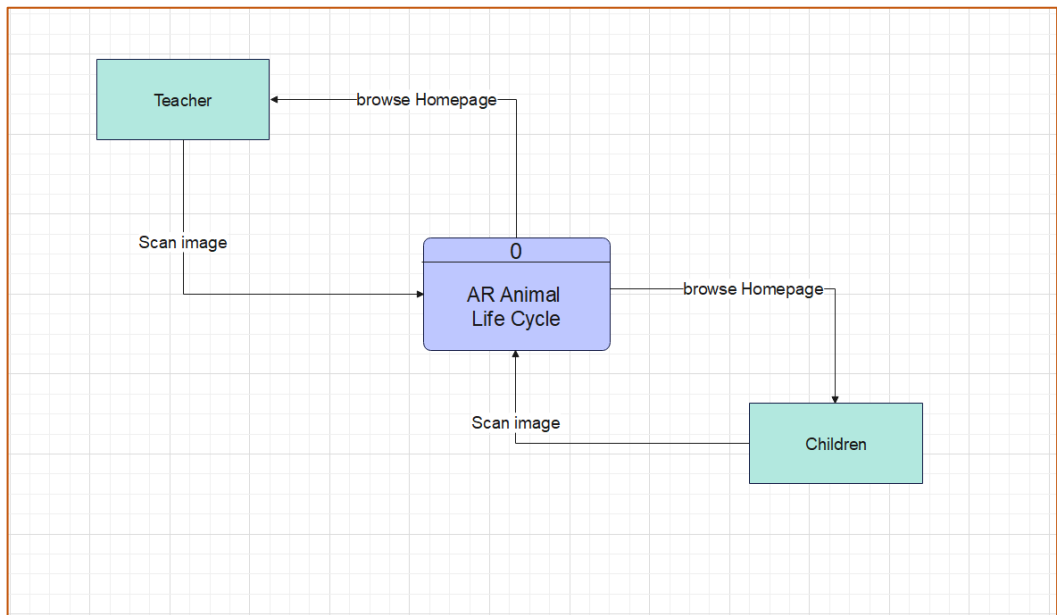


Figure 2.0: Data Flow Diagram – Context Diagram

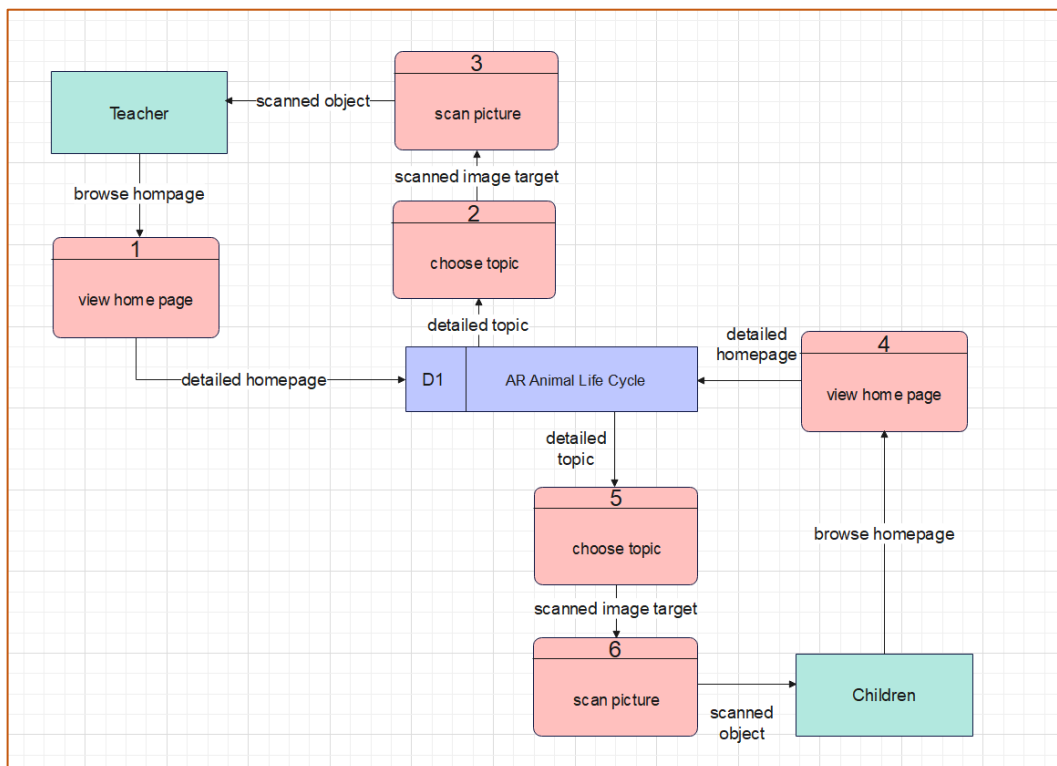


Figure 2.1: Data Flow Diagram – Diagram 0

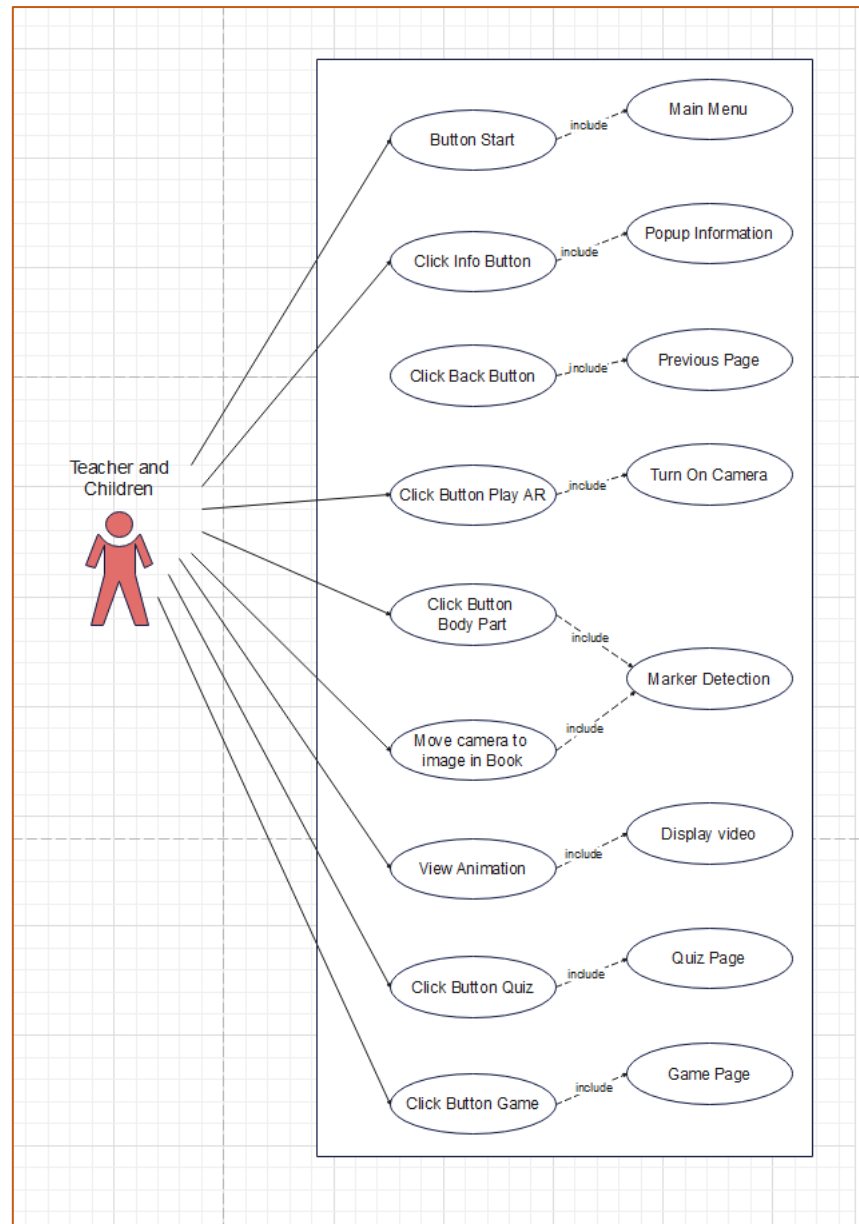


Figure 2.2: Use Case Diagram

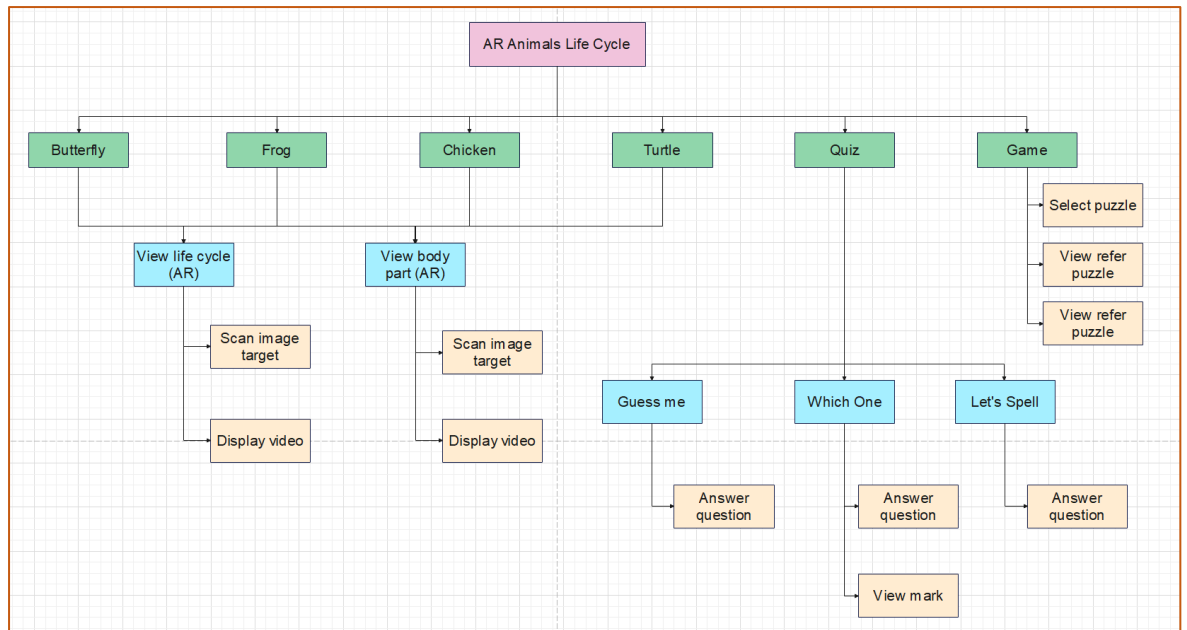
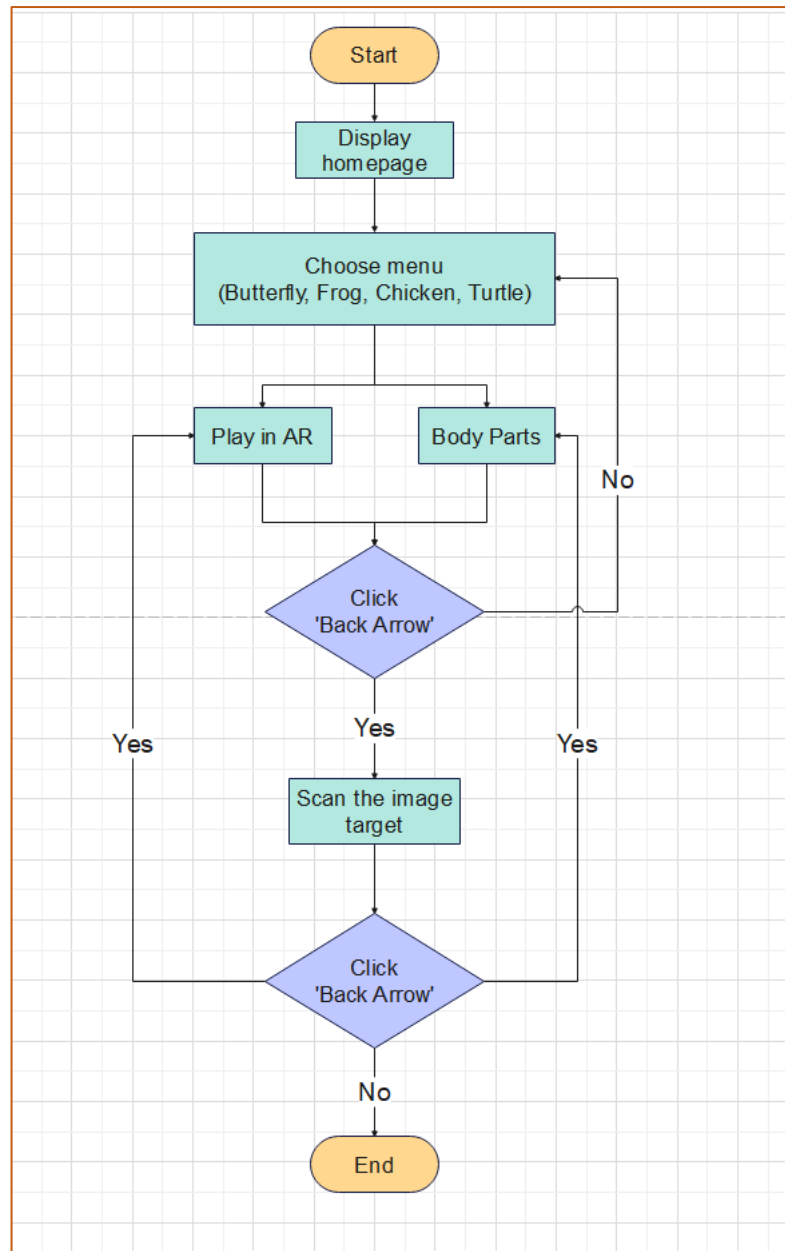
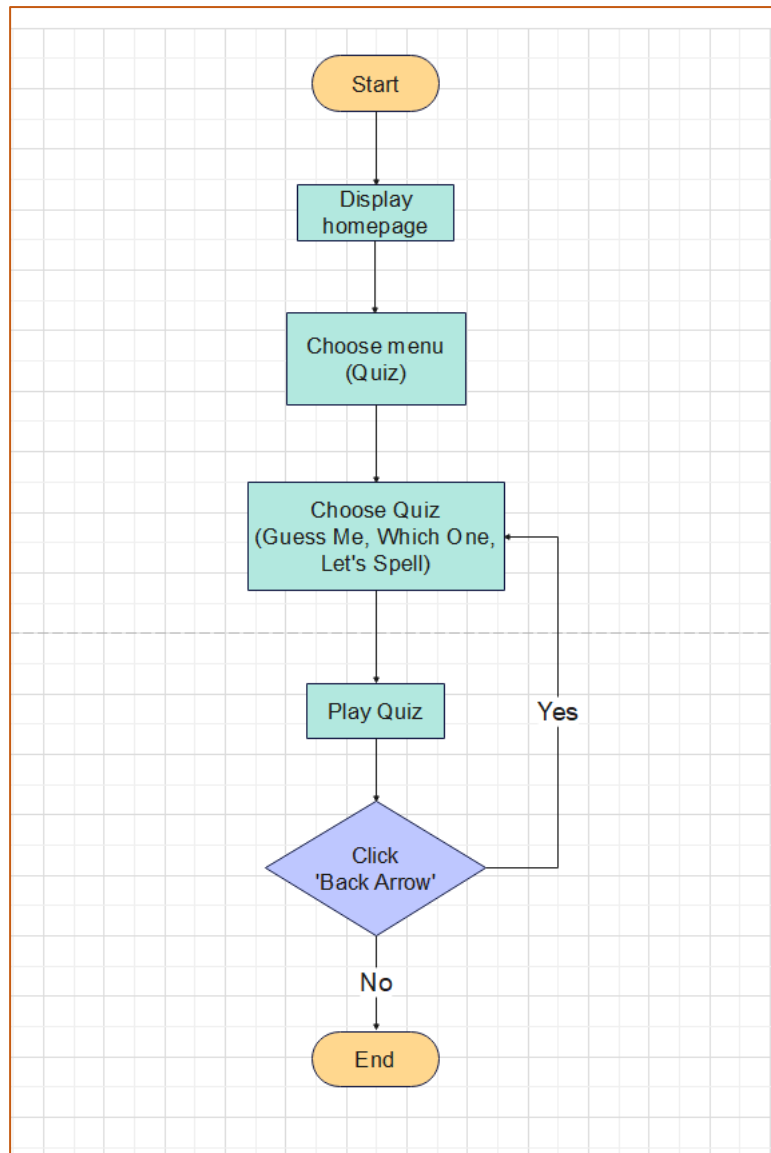


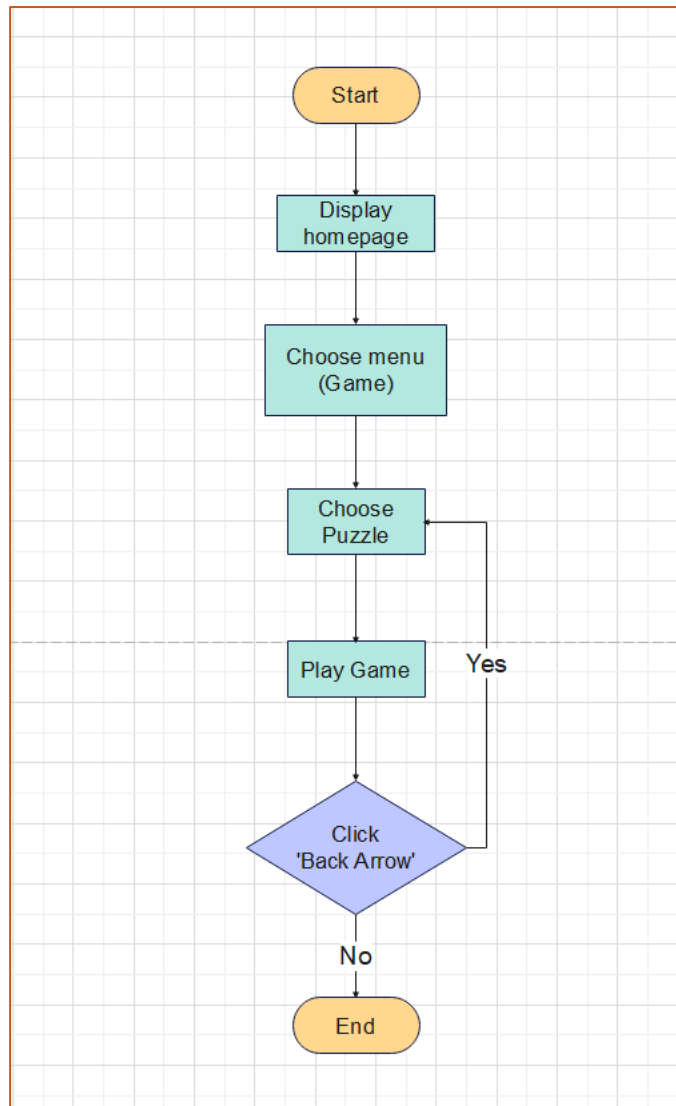
Figure 2.3: Functional Decomposition Diagram



**Figure 2.3: Flowchart – Main Menu
(Butterfly, Frog, Chicken, Turtle)**



**Figure 2.4: Flowchart – Main Menu
(Quiz)**



**Figure 2.5: Flowchart – Main Menu
(Game)**

4.2 Physical Design

4.2.1 Main Page

The home page interface is designed with user-friendliness, featuring three essential buttons: the Play button, the Menu button, and the Exit button. The Play button serves as the gateway to the main page of the application. Meanwhile, the Menu button has provided an Information button and Email button. The Email button enables users to contact support or share feedback conveniently. Lastly, the Exit button offers a pop-up confirmation to ensure users' intentional decision to quit the application.



Figure 2.6: Home page Interface

The app has a user-friendly main page with eight buttons: Butterfly, Frog, Chicken, Turtle, Quiz, Game, Info and Home. Each button leads to different function or content. The Info button provides app details. A Home button is available for easy return to the home page. It's easy to explore and enjoy the app with this simple design.

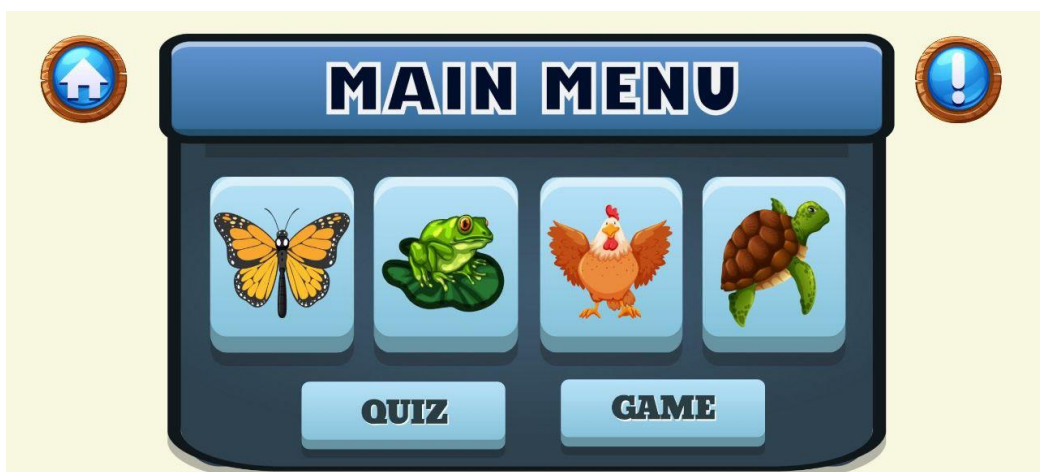


Figure 2.7: Main page Interface

4.2.2 Butterfly

The butterfly interface has two buttons: "Play in AR" and "Body Part." To activate the augmented reality (AR) experience, the user must click on either of these buttons. Once clicked, the camera on their device will open, and they can scan the image target in the book to trigger the AR content related to butterflies.

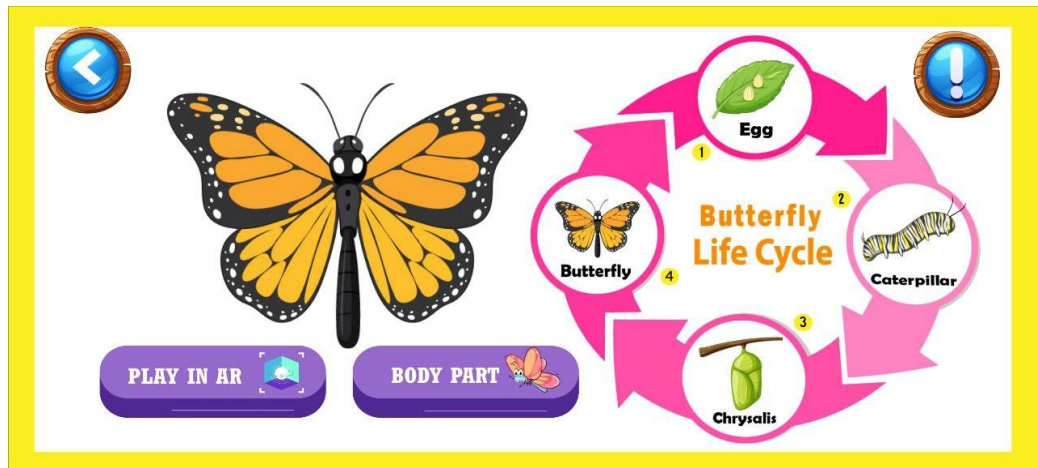


Figure 2.8: Butterfly Interface

The interface displays the butterfly's life cycle when you scan the image target in the book. It shows the stages from egg to caterpillar, pupa, and butterfly. It's a fun and educational way to learn about butterflies.



Figure 2.9: Butterfly Life Cycle AR Camera detection

The interface displays the different body parts of a butterfly when you scan the image target in the book. It showcases the various parts like wings, antennae, legs, and body.

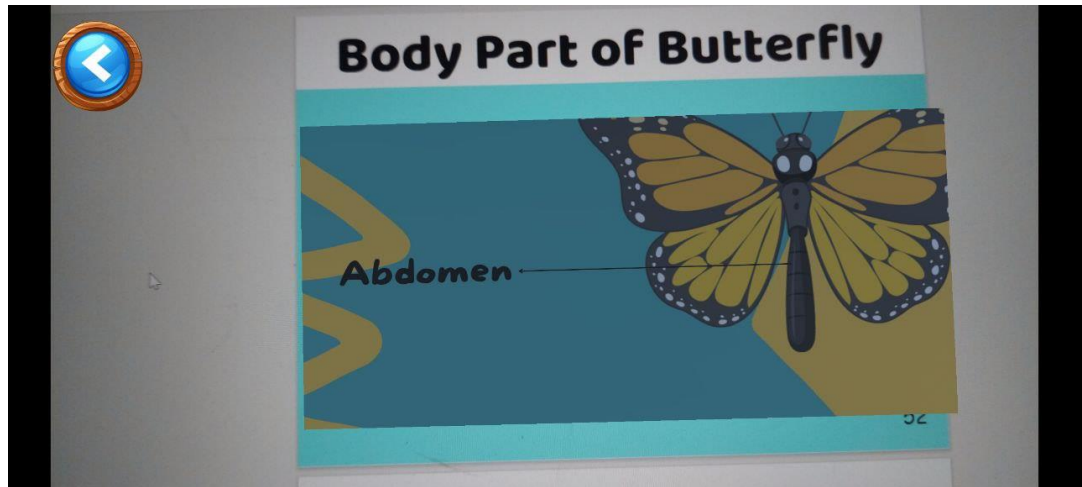


Figure 2.10: Butterfly Body Part AR Camera detection

4.2.3 Frog

The frog interface has two buttons: "Play in AR" and "Body Part." To activate the augmented reality (AR) experience, the user must click on either of these buttons. Once clicked, the camera on their device will open, and they can scan the image target in the book to trigger the AR content related to frogs.



Figure 2.11: Frog Interface

The interface displays the frog's life cycle when you scan the image target in the book. It shows the stages from egg to tadpole, froglet, and adult frog. It's a fun and educational way to learn about frogs.

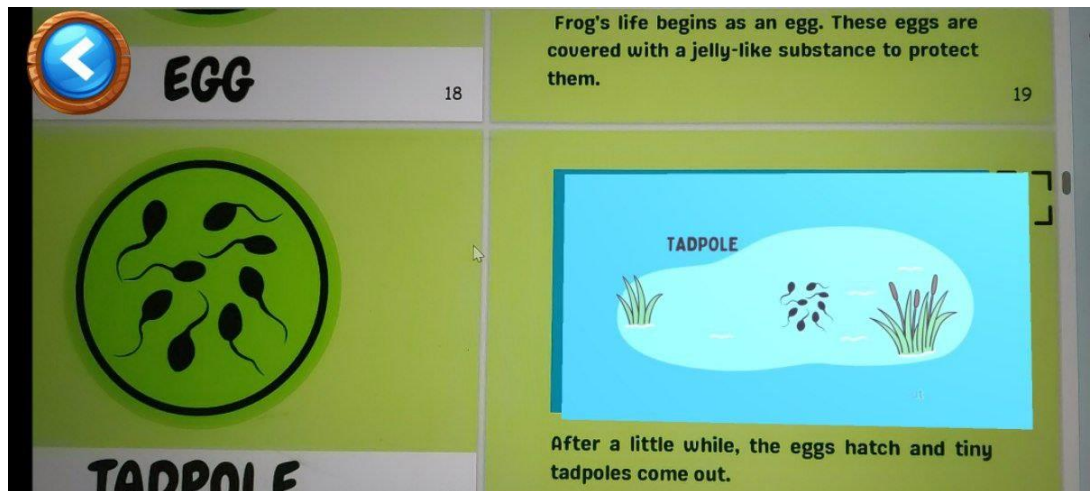


Figure 2.12: Frog Life Cycle AR Camera detection

The interface displays the different body parts of a frog when you scan the image target in the book. It showcases the various parts like legs, eyes, and skin.

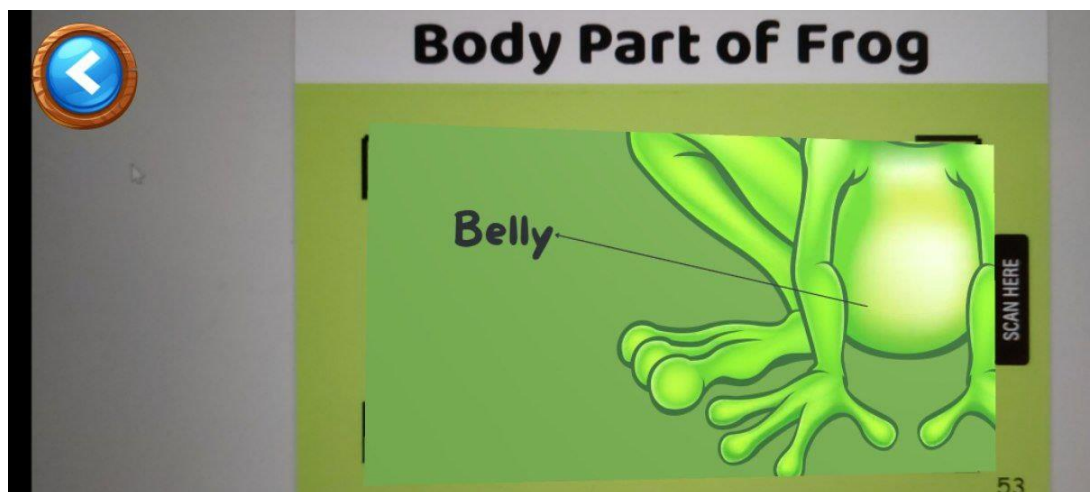


Figure 2.13: Frog Body Part AR Camera detection

4.2.4 Chicken

The chicken interface has two buttons: "Play in AR" and "Body Part." To activate the augmented reality (AR) experience, the user must click on either of these buttons. Once clicked, the camera on their device will open, and they can scan the image target in the book to trigger the AR content related to chickens.



Figure 2.14: Chicken Interface

The interface displays the chicken's life cycle when you scan the image target in the book. It shows the stages from egg to chick, pullet or cockerel, and adult chicken. It's a fun and educational way to learn about chickens.

The interface displays the different body parts of a chicken when you scan the image target in the book. It showcases the various parts like beak, wings, and thigh.



Figure 2.13: Chicken Life Cycle AR Camera detection

The interface displays the different body parts of a chicken when you scan the image target in the book. It showcases the various parts like beak, wings, and thigh.

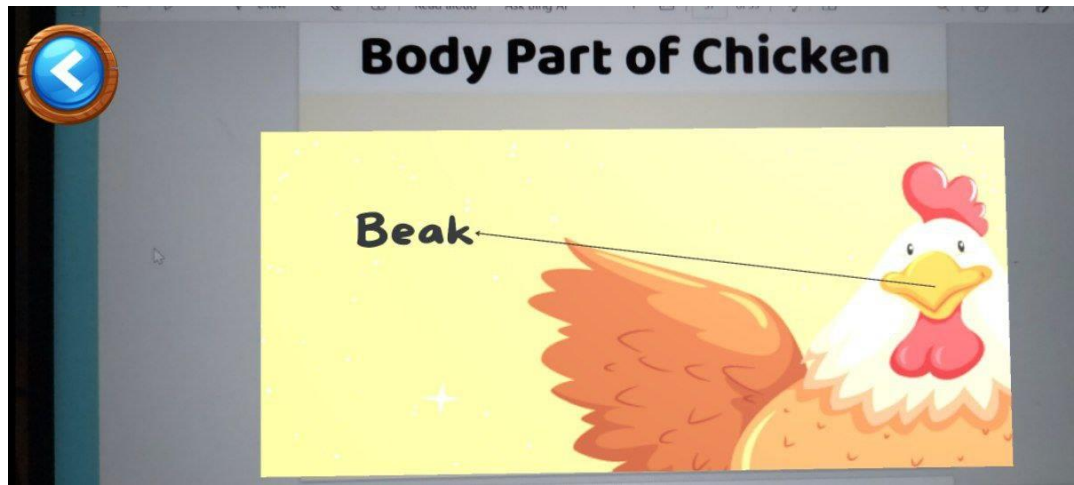


Figure 2.14: Chicken Body Part AR Camera detection

4.2.5 Turtle

The turtle interface has two buttons: "Play in AR" and "Body Part." To activate the augmented reality (AR) experience, the user must click on either of these buttons. Once clicked, the camera on their device will open, and they can scan the image target in the book to trigger the AR content related to turtles.

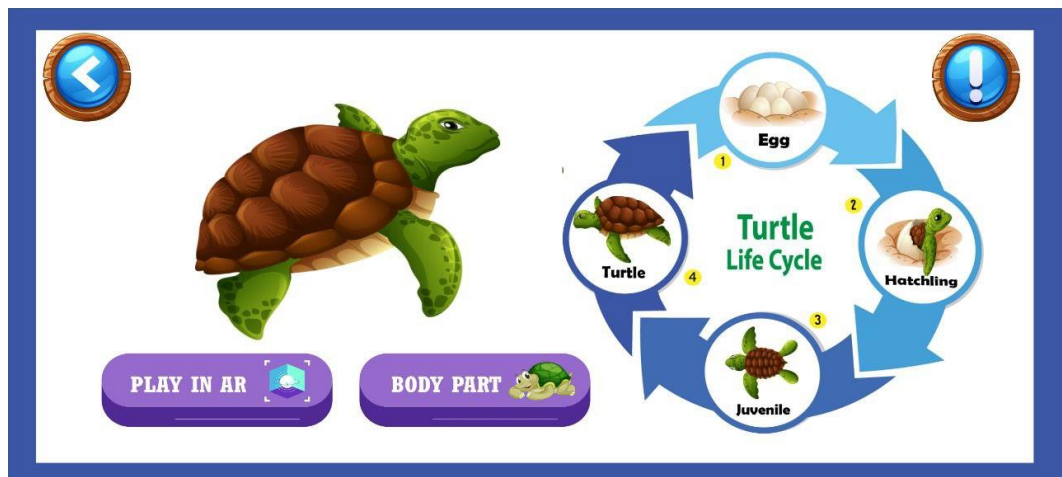


Figure 2.15: Turtle Interface

The interface displays the turtle's life cycle when you scan the image target in the book. It shows the stages from egg to tadpole, froglet, and frog. It's a fun and educational way to learn about turtles.

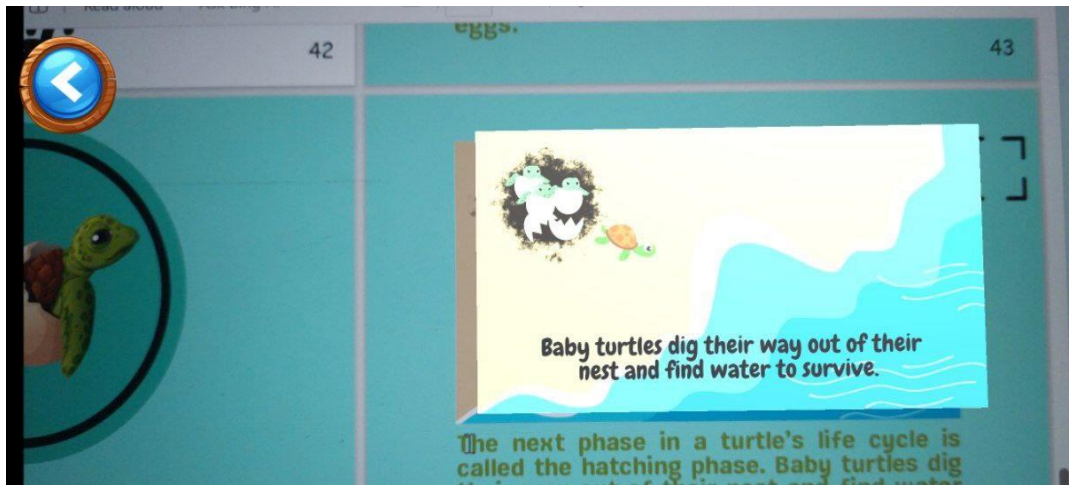


Figure 2.15: Turtle Life Cycle AR Camera detection

The interface displays the different body parts of a turtle when you scan the image target in the book. It showcases the various parts like shell, flipper, and head.

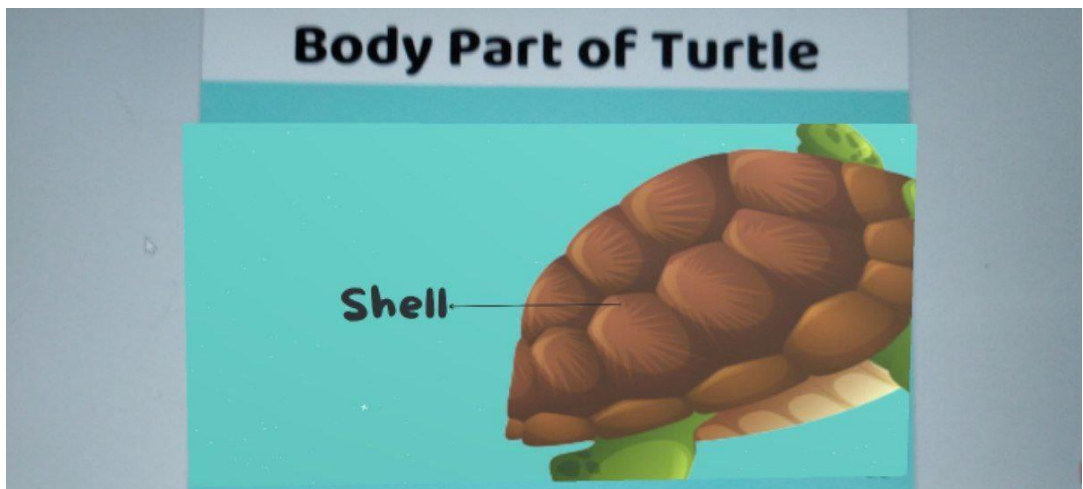


Figure 2.16: Turtle Body Part AR Camera detection

4.2.6 Quiz

The quiz interface offers three different types of quizzes for an engaging and fun learning experience: "Guess Me," "Which One," and "Let's Spell." Each quiz has its own unique challenge and educational value.



Figure 2.17: Quiz Interface

4.2.6.1 Guess Me

This is the "Guess Me" quiz interface. The "Guess Me" quiz is a drag and drop quiz, where users must correctly match elements to their corresponding categories and problem-solving skills.

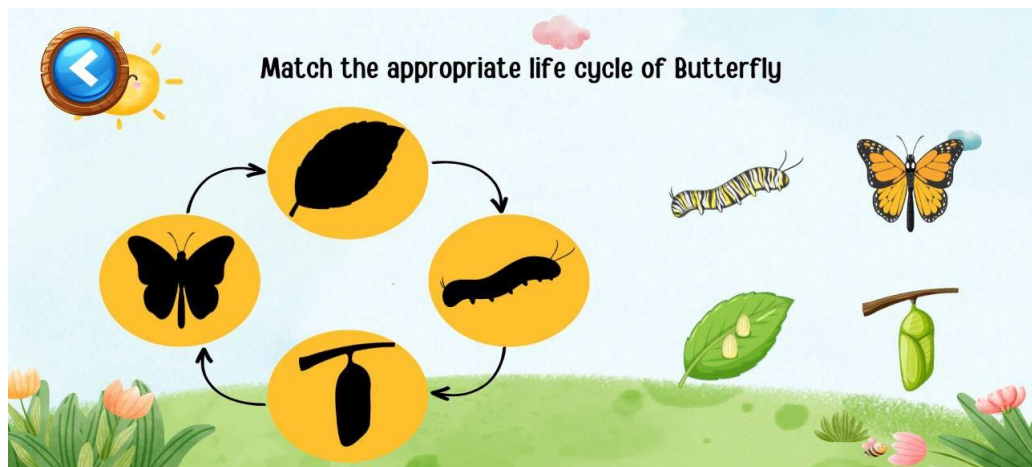


Figure 2.18: Quiz (Guess Me)

4.2.6.2 Which One

This is the “Which One” quiz interface. The “Which One” quiz presents multiple-choice questions, challenging users to select the right answer from a list of options, thereby enhancing their knowledge and decision-making abilities.

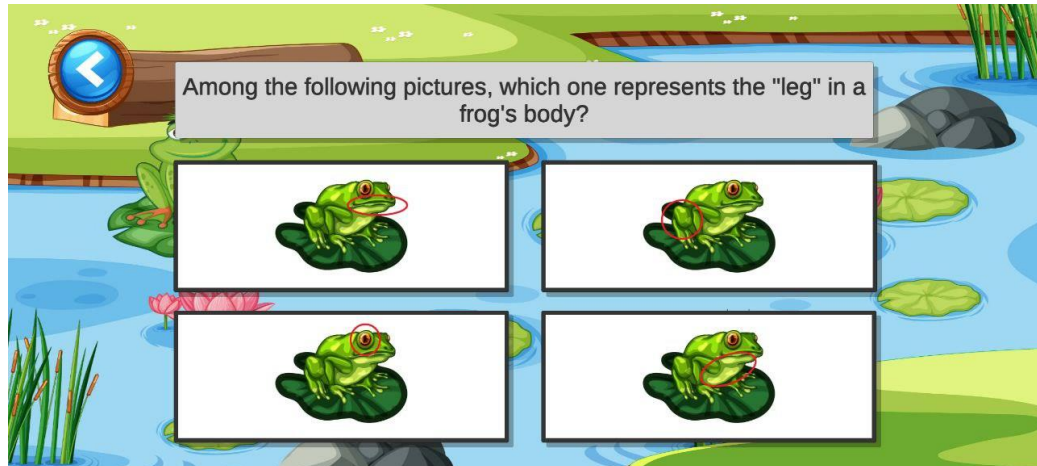


Figure 2.19: Quiz (Which One)

4.2.6.3 Let's Spell

This is the “Let's Spell” quiz interface. The "Let's Spell" quiz provides users with a word, and they must spell it correctly, promoting language and spelling skills.



Figure 2.18: Quiz (Let's Spell)

4.2.7 Game

The game interface is designed with a focus on jigsaw puzzles to offer an enjoyable and challenging gaming experience. The main attraction is the "Selected Puzzle" button, which allows players to choose from a variety of jigsaw puzzles.



Figure 2.19: Game Interface

When clicked, it opens a selection screen where players can browse through different puzzle options, each featuring unique image. Users can then select their preferred puzzle and start playing immediately.



Figure 2.20: Game (Selected Puzzle)

This is an example for the puzzle game. User can refer the image in “Puzzle” button.

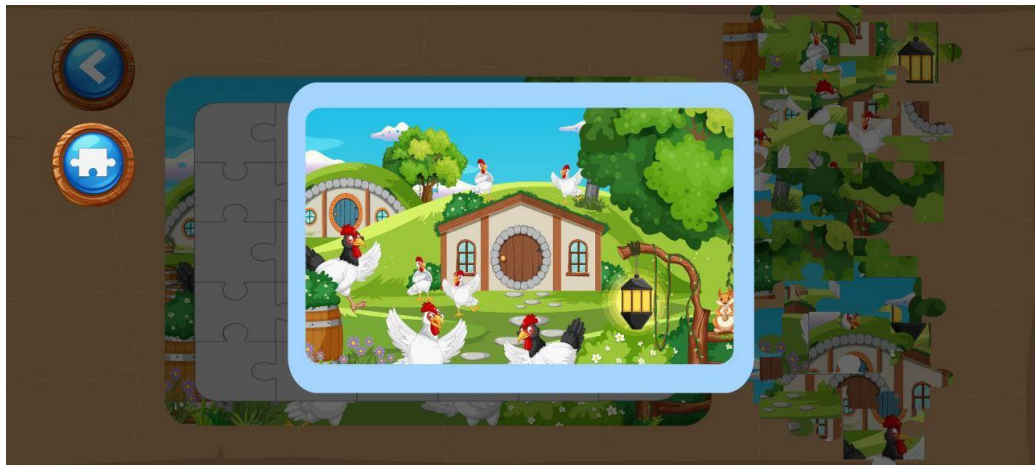


Figure 2.21: Refer Puzzle

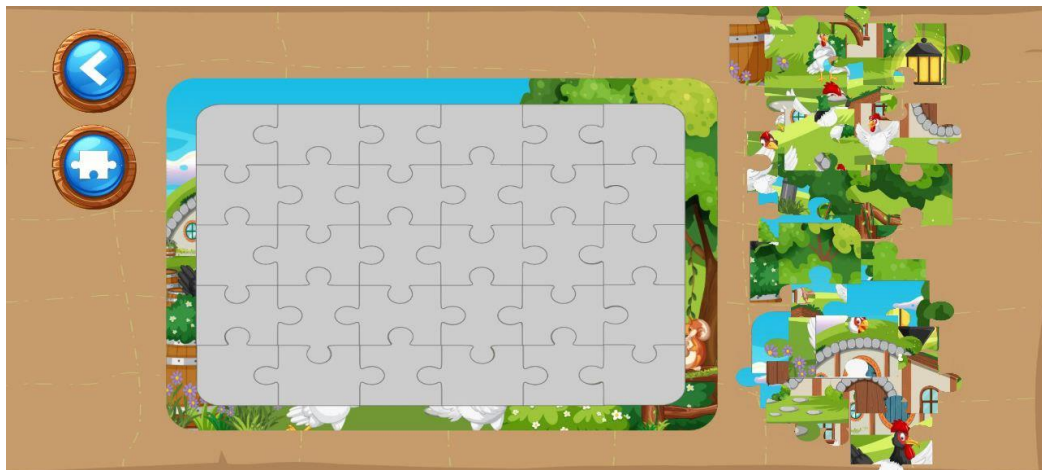


Figure 2.22: Play Game

5.0 TEST DESCRIPTION AND RESULTS

5.1 Unit Testing Plan (UTP)

Table 4.0: Integration Testing Plan

MODULE START							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Start button	None	Pressed the start button	Change to main page	Change to choose page without fail.	Puan Azmirah	Pass
2.	Info button	None	Pressed the info button	Display the information how to use application.	Information pop-pup display	Puan Azmirah	Pass
3.	Email button	None	Pressed the Email button	Go to the E-mail	The E-mail page will display	Puan Azmirah	Pass
4.	Exit button	None	Pressed the exit button	Display the pop-pup “Do you really want to Exit ?”	The pop-pup will display without fail.	Puan Azmirah	Pass
5.	“Yes” exit button	None	Pressed the exit button and select yes	Exit from Application	Exit from Application without fail.	Puan Azmirah	Pass
6.	“No” exit button	None	Pressed the exit button and select no	Stay on the main page	Stay on the main page without fail	Puan Azmirah	Pass
MODULE MAIN MENU							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Butterfly button	None	Pressed the butterfly button	Change to butterfly page	Change to butterfly page without fail.	Puan Azmirah	Pass
2.	Frog button	None	Pressed the frog button	Change to frog page	Change to frog page without fail.	Puan Azmirah	Pass
3.	Chicken button	None	Pressed the chicken button	Change to chicken page	Change to chicken page without fail.	Puan Azmirah	Pass

4.	Turtle button	None	Pressed the turtle button	Change to turtle page	Change to turtle page without fail.	Puan Azmirah	Pass
5.	Quiz button	None	Pressed the quiz button	Change to quiz page	Change to quiz page without fail.	Puan Azmirah	Pass
6.	Game button	None	Pressed the game button	Change to game page	Change to game page without fail.	Puan Azmirah	Pass
7.	Home button	None	Pressed the back button	Change to previous page which is the Home page	Change to previous page which is the Home page without fail.	Puan Azmirah	Pass
8.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display	Puan Azmirah	Pass

MODULE BUTTERFLY

No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
4.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display	Puan Azmirah	Pass

MODULE FROG

No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass

3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
4.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display	Puan Azmirah	Pass

MODULE CHICKEN

No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
4.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display	Puan Azmirah	Pass

MODULE TURTLE

No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
4.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display	Puan Azmirah	Pass

MODULE QUIZ							
1.	Guess Me button	None	Pressed guess me button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
2.	Which One button	None	Pressed the which one button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
3.	Let's Spell button	None	Pressed the back button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
4.	Back button	None	Pressed the back button	Change to previous page which is the Quiz page	Go to previous page without fail.	Puan Azmirah	Pass
5.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display.	Puan Azmirah	Pass
MODULE GUESS ME							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Butterfly button	None	Match pictures based on the shadow that have been given.	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Run as planned without fail	Puan Azmirah	Pass
2.	Frog button	None	Match pictures based on the shadows that have been given and have been learned.	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Run as planned without fail	Puan Azmirah	Pass
3.	Chicken button	None	Match pictures based on the shadows that have been given	If the match is correct, the user can be engraved to answer otherwise the user needs to	Run as planned without fail	Puan Azmirah	Pass

			and have been learned.	repeat until correct			
4.	Turtle button	None	Match pictures based on the shadows that have been given and have been learned.	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Run as planned without fail	Puan Azmirah	Pass
5.	Answer quiz	None	Users need to answer all question given	Go to the next question automatically after answering the question	Go to the next question without fail	Puan Azmirah	Pass
6.	Button "Back"	None	Pressed the back button	Change to previous page which is the Module Quiz	Go to previous page without fail.	Puan Azmirah	
7.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display.	Puan Azmirah	Pass
MODULE WHICH ONE							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	"Which one" button	None	Pressed the "Which One" button	Go to the Module "Which One" quiz	Go to the Module "Which One" quiz without fail	Puan Azmira	Pass
2.	Butterfly button	None	Users required to choose the right answer based on the questions given	Go to the next question and show the total mark	Run as planned without fail	Puan Azmira	Pass
3.	Frog button	None	Users required to choose the	Go to the next question and	Run as planned without fail	Puan Azmira	Pass

			right answer based on the questions given	show the total mark			
4.	Chicken button	None	Users required to choose the right answer based on the questions given	Go to the next question and show the total mark	Run as planned without fail	Puan Azmira	Pass
5.	Turtle button	None	Users required to choose the right answer based on the questions given	Go to the next question and show the total mark	Run as planned without fail	Puan Azmirah	Pass
6.	Answer quiz	None	Users need to answer all question given	Go to the next question automatically after answering the question	Go to the next question without fail	Puan Azmirah	Pass
7.	Total correct answer	None	None	The number of correct and incorrect answers will be displayed at the end	Display without fail	Puan Azmirah	Pass
8.	Button back	None	Pressed the button Back	Go to Module quiz	Go to module quiz without fail	Puan Azmirah	Pass
9.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display.	Puan Azmirah	Pass

MODULE LET'S SPELL							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Butterfly button	None	Users need to spell the displayed picture	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Continue to next scene without fail	Puan Azmirah	Pass
2.	Frog Button	None	Users need to spell the displayed picture	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Continue to next scene without fail	Puan Azmirah	Pass
3.	Chicken Button	None	Users need to spell the displayed picture	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Continue to next scene without fail	Puan Azmirah	Pass
4.	Turtle Button	User is required to click on the Turtle button	Users need to spell the displayed picture	If the match is correct, the user can be engraved to answer otherwise the user needs to repeat until correct	Continue to next scene without fail	Puan Azmirah	Pass
5.	Button back	None	Pressed the button Back	Go to Module quiz	Go to module quiz without fail	Puan Azmirah	Pass
6.	Info button	None	Pressed the info button	Display the pop-pup information.	Information pop-pup display.	Puan Azmirah	Pass

MODULE GAME							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Start button	None	Pressed the start button	Change to selected puzzle	Change to selected puzzle without fail.	Puan Azmirah	Pass
2.	Select Puzzle	None	User required to choose image to solve	Display Puzzle has been chosen	Display Without Fail	Puan Azmirah	Pass
	Drag and drop puzzle	None	User required to drag and drop the puzzle snippets to the plat	Puzzle snippets can drag and drop to the plate	Drag and Drop Without fail	Puan Azmirah	Pass
	Puzzle button	None	User required to click preferences button to view reference pictures	Preferences Picture of puzzle picture will pop-up	Preferences Picture of puzzle picture will pop-up without fail	Puan Azmirah	Pass
	Back Button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
MODULE CAMERA							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Camera	None	Scan the output with the specific book	The video output will be display on the book	The video output will be display on the book without fail	Puan Azmirah	Pass
2.	Back button	None	Pressed the back button	Change to previous page	Change to previous page without fail	Puan Azmirah	Pass

5.2 Integration Testing Plan (ITP)

Table 4.1: Integration Testing Plan

MODULE START							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Start button	None	Pressed the start button	Change to main page	Change to choose page without fail.	Puan Azmirah	Pass
2.	Info button	None	Pressed the info button	Display the information how to use application.	Information pop-pup display	Puan Azmirah	Pass
3.	Email button	None	Pressed the Email button	Go to the E-mail	The E-mail page will display	Puan Azmirah	Pass
4.	Exit button	None	Pressed the exit button	Display the pop-pup “Do you really want to Exit ?”	The pop-pup will display without fail.	Puan Azmirah	Pass
MODULE MAIN MENU							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Butterfly button	None	Pressed the butterfly button	Change to butterfly page	Change to butterfly page without fail.	Puan Azmirah	Pass
2.	Frog button	None	Pressed the frog button	Change to frog page	Change to frog page without fail.	Puan Azmirah	Pass
3.	Chicken button	None	Pressed the chicken button	Change to chicken page	Change to chicken page without fail.	Puan Azmirah	Pass
4.	Turtle button	None	Pressed the turtle button	Change to turtle page	Change to turtle page without fail.	Puan Azmirah	Pass
5.	Quiz button	None	Pressed the quiz button	Change to quiz page	Change to quiz page without fail.	Puan Azmirah	Pass
6.	Game button	None	Pressed the game button	Change to game page	Change to game page without fail.	Puan Azmirah	Pass
7.	Home button	None	Pressed the back button	Change to previous page which is the Home page	Change to previous page which is the Home page.	Puan Azmirah	Pass

MODULE BUTTERFLY							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page.	Go to previous page without fail.	Puan Azmirah	Pass
MODULE FROG							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
MODULE CHICKEN							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page.	Go to previous page without fail.	Puan Azmirah	Pass

MODULE TURTLE							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Play in AR button	None	Pressed the AR button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
2.	Body part button	None	Pressed the body part button	Change to camera	Open camera without fails.	Puan Azmirah	Pass
3.	Back button	None	Pressed the back button	Change to previous page which is the Main page	Go to previous page without fail.	Puan Azmirah	Pass
MODULE QUIZ							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Guess Me button	None	Pressed guess me button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
2.	Which One button	None	Pressed the which one button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
3.	Let's Spell button	None	Pressed the back button	Change to choose your animal	Go to next page without fail.	Puan Azmirah	Pass
4.	Back button	None	Pressed the back button	Change to previous page which is the Quiz page	Go to previous page without fail.	Puan Azmirah	Pass
MODULE GAME							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Start button	None	Pressed the start button	Change to selected puzzle	Change to selected puzzle without fail.	Puan Azmirah	Pass
2.	Back Button	None	Pressed the back button	Change to previous page which is the Main page.	Go to previous page without fail.	Puan Azmirah	Pass

MODULE CAMERA							
No.	Test Case Name	Pre-Condition	Test Procedure	Expected Result	Actual Result	Tester	Result
1.	Back button	None	Pressed the back button	Change to previous page	Change to previous page without fail	Puan Azmirah	Pass

6.0 MAJOR FINDING AND DISCUSSION

6.1 Advantages of the Project

After collection of data from user through UAT, there are several advantages and limitations of the system to be highlighted for future reference. There are:

1. The application's use of AR and interactive elements such as quizzes and puzzle games facilitate visual and kinesthetic learning, appealing to different learning styles and helping users retain information better.
2. The mobile app offers convenient access to educational content and activities, making it valuable for formal and informal learning.
3. The application's design allows users to learn at their own pace. They can revisit and review specific sections or concepts as needed, promoting personalized learning experiences.
4. Since the app is likely to be available on mobile devices, it allows users to access educational content and learning activities at their convenience, making it a valuable resource for both formal and informal learning environments.

6.2 Disadvantages of the Project

1. Only 4 animals are available for users to learn about Body Part and Life Cycle.
2. The use of Augmented Reality may require devices with specific hardware capabilities, limiting accessibility to users with compatible devices.
3. Some users, especially those who are not familiar with AR technology, may face a learning curve to navigate and interact with the AR features effectively.
4. The application's drawback lies in its lack of support for dual languages like Malay and others, which may limit accessibility and understanding for non-English speaking users.

7.0 RECOMMENDATION AND CONCLUSION

Based on the project objectives, it is recommended to develop a single comprehensive Augmented Reality (AR) application that encompasses all three features. By integrating multimedia elements about animal life cycles, interactive labeling of animal body parts, and engaging quizzes/games, users will have a cohesive and enriching learning experience. This approach ensures a unified and user-friendly application, reducing the need to switch between multiple apps, and offering a holistic educational platform for users interested in animals and biology. Enhance the app by adding bilingual support, allowing users to seamlessly switch between languages for more inclusive and user-friendly experience.

In conclusion, the proposed Augmented Reality (AR) application with multimedia elements, animal body part labeling, quizzes, and games provides an innovative and immersive way to learn about animal life cycles. Through this app, users can explore and interact with virtual animal models, label their body parts, test their knowledge through quizzes, and enjoy educational games. By combining these features into one application, we create a well-rounded and engaging educational tool that fosters curiosity and understanding of the natural world around us.

8.0 REFERENCES

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