

Interactive Location-based Augmented Reality Virtual Chatbot

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Video Presentation: https://youtu.be/2zkGwGx_hHQ



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Problem Background



93.3% out of 45 respondents from UTM community find UTM a large institution to move around



It is difficult for them to locate the destination and seldom come across a human guide to offer guidance.



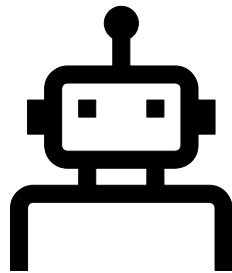
Maps and signs can be confusing and sometimes difficult to interpret



Lead to frustration, confusion, and ultimately impact their overall experience

Proposed Solution

Interactive Location-based Augmented
Reality Virtual Chatbot



Project Aim and Objectives



Aim: To develop an interactive location-based Augmented Reality (AR) virtual chatbot.



Objectives:

- To design an AR virtual chatbot that is accessible, engaging, and user-friendly
- To develop a virtual chatbot using location-based AR and Artificial Intelligence (AI) technology
- To evaluate the interactive AR virtual chatbot in enhancing the experience of the users

Project Scope



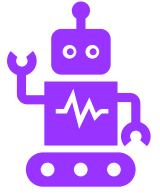
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- Targeted user: UTM community such as students, staff, and visitors.
 - Implement Geo AR to display the virtual chatbot at building N28 of faculty of computing in UTM.
 - Deploy the Wit.ai technology to develop a chatbot that is able to provide information about the facilities when the users ask related questions due to its free availability.
 - Integrate the interactive AR virtual chatbot as a virtual guide in helping the users obtain the needed information such as the directions.
 - The virtual chatbot is accessible through text only by using their smartphone.
 - The virtual chatbot is accessible with English language only.
 - Employ the location-based AR technology to display information of different areas in building N28

Project Importance



-
- Acting as a reference in the future for development and research on AR technologies that pair with AI.
 - Creates a 3D virtual guide using Location-based AR integrated with AI chatbot technology.
 - Allowing users to ask questions and receive information about the different areas, attractions, and facilities in the university
 - Users will be able to obtain the necessary or desired information to carry out their plans accordingly such as locating a specific classroom without having to waste their time finding a human guide to provide assistance

Literature Review



- **Augmented Reality**
 - an enhanced and interactive representation of a real-world environment attained by augmenting and mixing the virtual digital objects or visuals on to the real world.
- **Artificial Intelligence (AI) Chatbot**
 - a computer program that replicates and interprets human dialogue for either oral or written, enabling the users to converse with digital gadgets as if they were speaking to real people

Literature Review



- Geo or Location-based AR
 - a position-based that does not require specific marker to pinpoint the locations of the virtual objects
 - GPS, accelerometer, digital compass, and other sensors are employed by geo or location-based AR to determine the mobile device's precise location
 - Superimpose the virtual object in a specific location and retrievable at any time of day or night, regardless of the weather

Existing System



Title	Pokémon GO	Magical Park	AppAR Chat - AI AR ChatBot	ChatGPT
Supported Platform	Android, iOS	Android, iOS	Android, iOS	All platforms
AR Techniques	Uses Geo AR technology to display the virtual element in the real-world with respect to the GPS location of the user	Uses Geo AR technology to display the virtual element in the real-world with respect to the GPS location of the user	Uses AR to superimpose the 3D avatar into the real-world	No
Location-based	Yes	Yes	No	No
AI Chatbot	No	No	Yes, but it uses the general chatbot technology which does not specific a domain	Yes, but it uses the general chatbot technology which does not specific a domain
Availability	Free	Free	Requires weekly subscription of RM18.99	Free

Literature Review



- ARCore
 - A Software Development Kit (SDK) that developed by Google
 - Utilizes the camera of mobile device to determine the features, also known as interesting points and monitors their movement over time
 - Recognize flat surfaces including table or floor, in addition to detecting key points
 - Employs to superimpose the 3D virtual character and the 3D virtual objects into the real-world environment without the help of any marker image

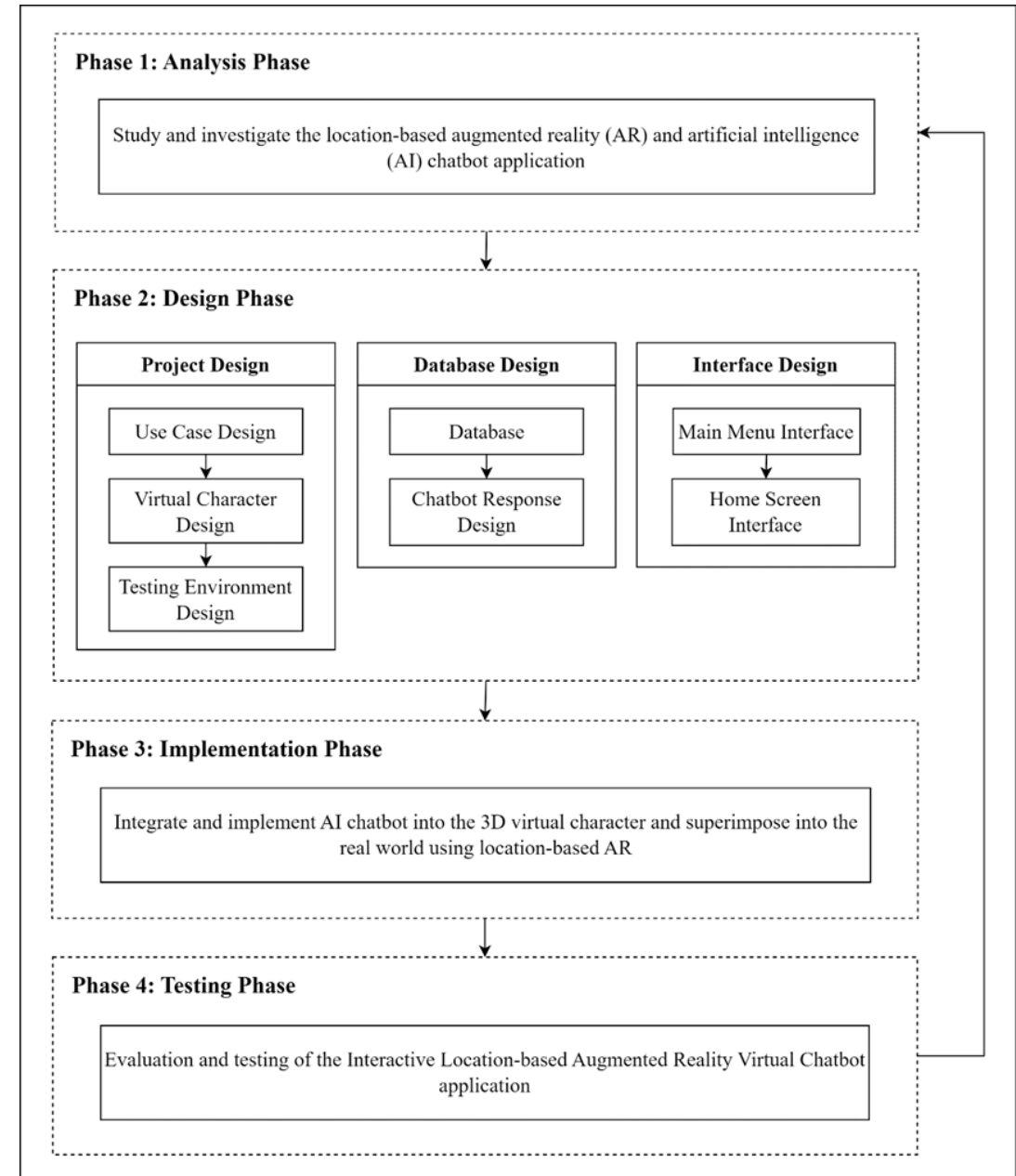
Literature Review



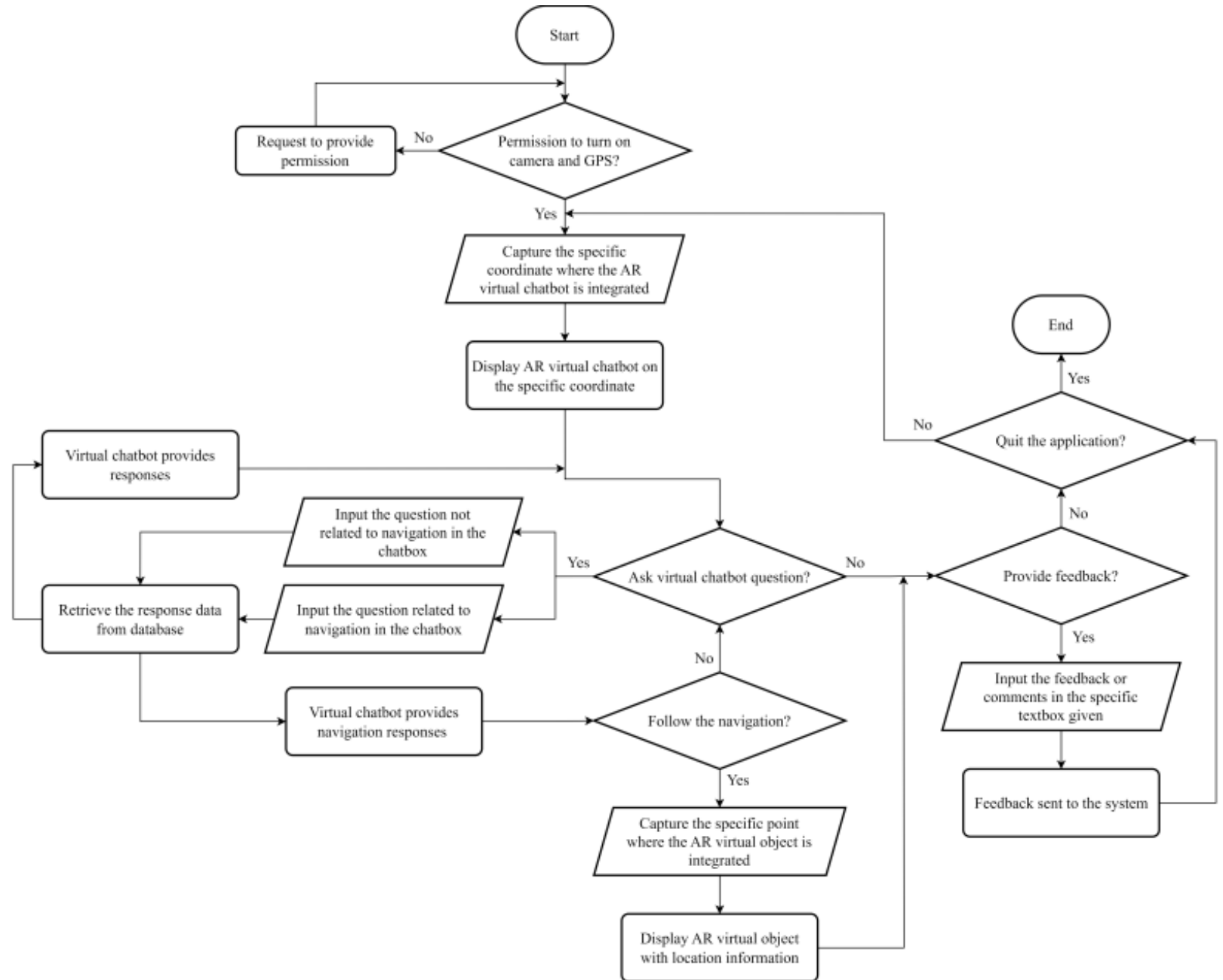
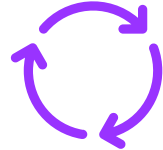
- Wit.ai
 - A natural language processing (NLP) tool for the development of the chatbot
 - Extract structured data from speech or text
 - Offers an API that converts spoken words or written text into useful information
 - Understand human language and process the intends of the question inquired

System Development Methodology

- Agile Model
 - A software development methodology based on iterative development
 - An excellent option for this project as the size of project is not enormous



System Flow



Software Used



UNITY



VISUAL STUDIO CODE

System Requirement Analysis (Hardware)

Type	Hardware	Specification
Computer	Laptop Model	Asus ROG Strix G15 G512L
	Central Processing Unit (CPU)	Intel® Core™ i7-10750H Processor @ 2.60GHz
	Graphics Processing Unit (GPU)	NVIDIA GeForce GTX 1650 Ti GDDR6 4GB
	Random Access Memory (RAM)	16GB
	System Type	64-bit Operating System, x64- based processor
Smartphone	Smartphone Model	Mi Note 10 Lite
	Central Processing Unit (CPU)	Octa-core Max 2.2GHz
	Random Access Memory (RAM)	8GB

System Requirement Analysis (Software)

Type	Software	Specification
Computer	Operating System (OS)	Windows 10
	Software	Unity 2021.3.21f1
		Visual Studio Code
	AR System Development Kit (SDK)	ARCore
	Chatbot Service Platform	Wit.ai
Smartphone	Operating System (OS)	Android 11

Requirement Analysis and Design



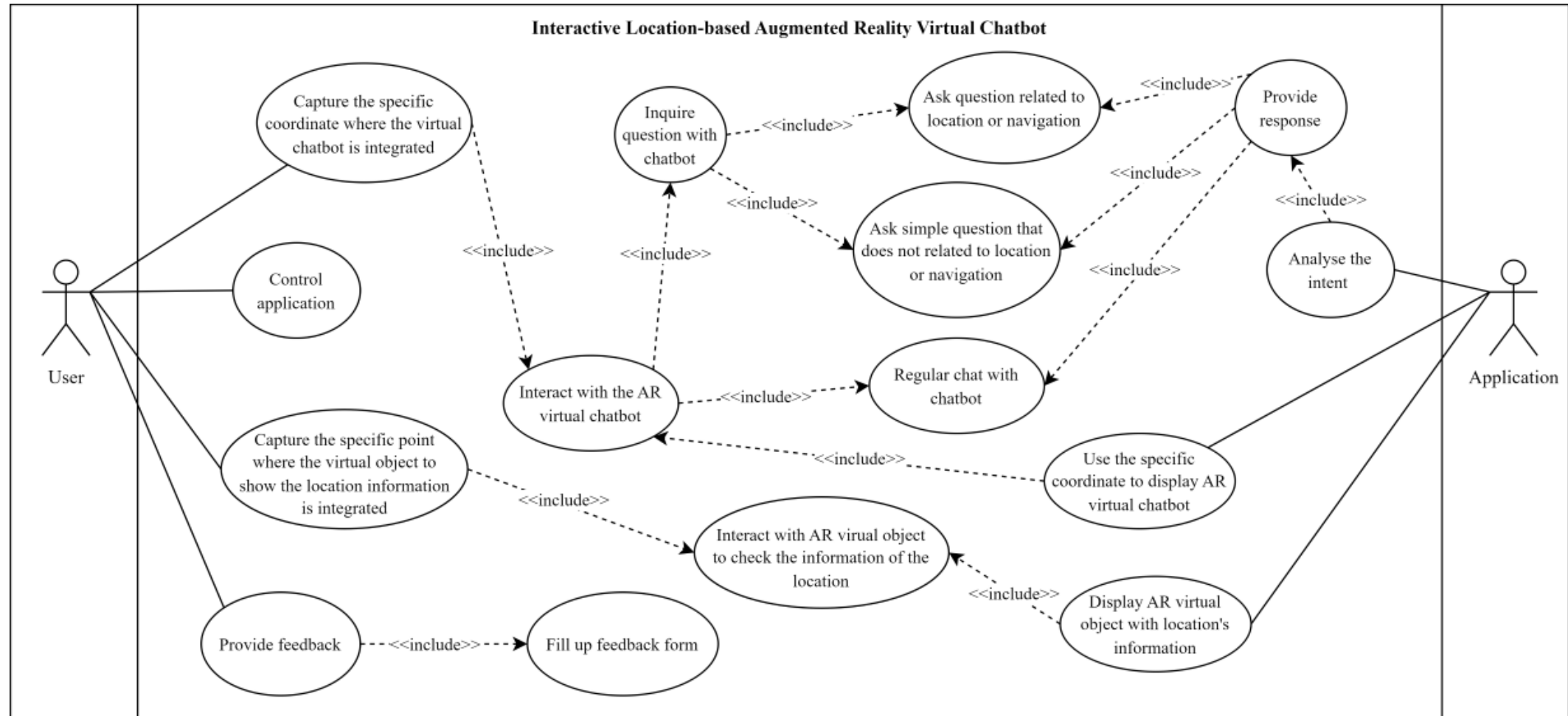
- **Functional Requirements:**
 - The system shall provide graphical user interface (GUI) for the user.
 - Users shall be able to capture their surroundings using the camera in their device through the application.
 - The system shall display the AR virtual character in the specific location captured by the users.
 - Users shall be able to move around the AR 3D virtual character and observe the character in any angle with their device capturing the specific location.
 - Users shall be able to interact with the chatbot with the chat box using English language.
 - Users shall be able to have regular chat sessions with the chatbot.
 - Users shall be able to inquire questions regarding location or navigation to the chatbot.
 - Users shall be able to ask simple questions that are not related to location or navigation.
 - The system shall provide response for the question and interaction in real time.
 - The response provided by the system shall be accurate and correct.
 - The system shall display the AR virtual objects in the specific point captured by the user.
 - Users shall be able to obtain the information of the area through the AR virtual objects displayed.

Requirement Analysis and Design

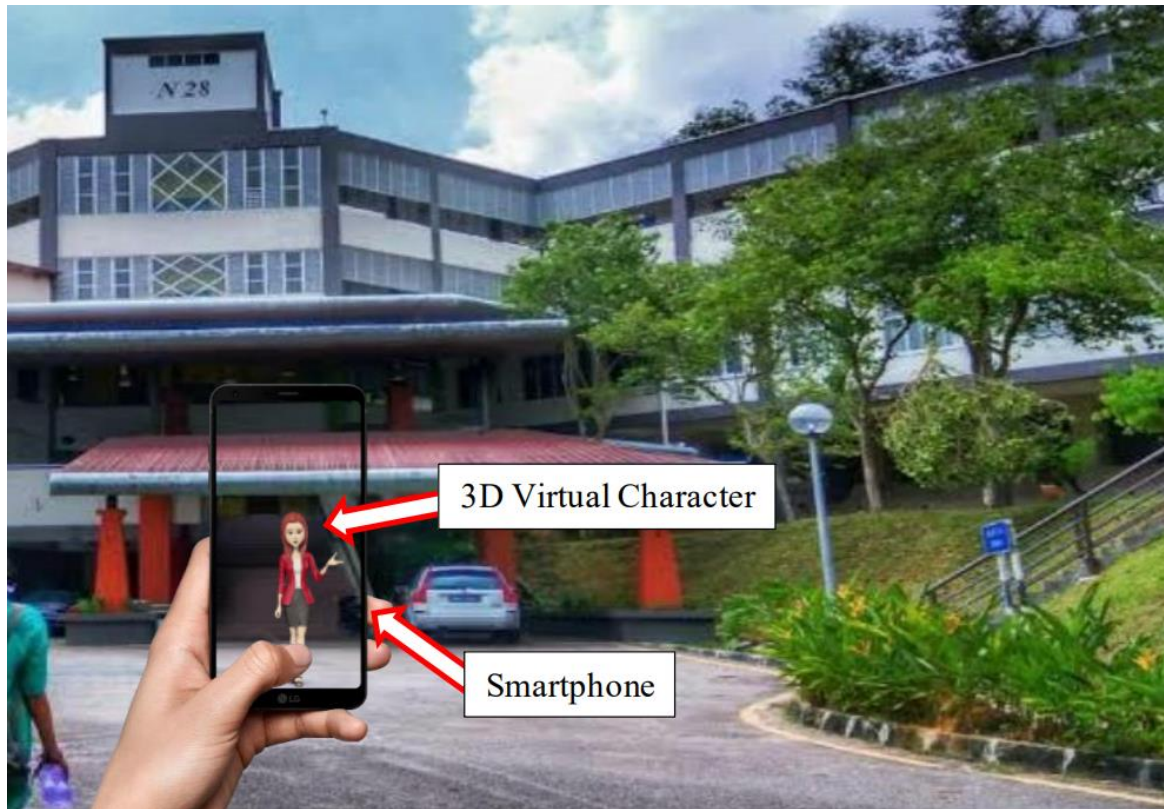


- Non-functional Requirements:
 - The graphical user interface (GUI) shall be user-friendly, straightforward and easy to use by the users.
 - The system shall be able to superimpose the AR virtual character and virtual objects at the specific location within 3 seconds when it is captured by the device of the user.
 - The system shall be able to respond to any actions made by the user within 10 seconds.

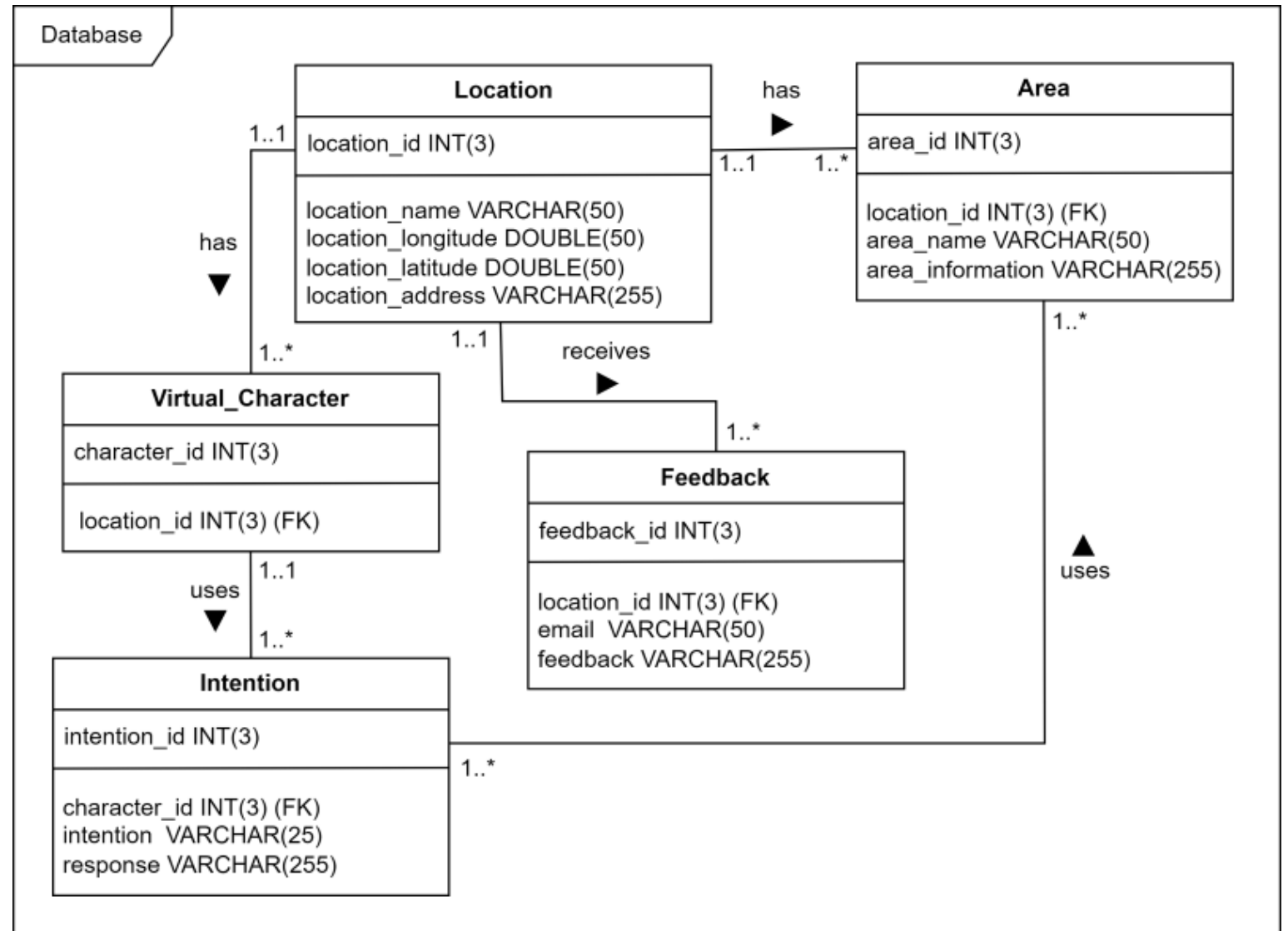
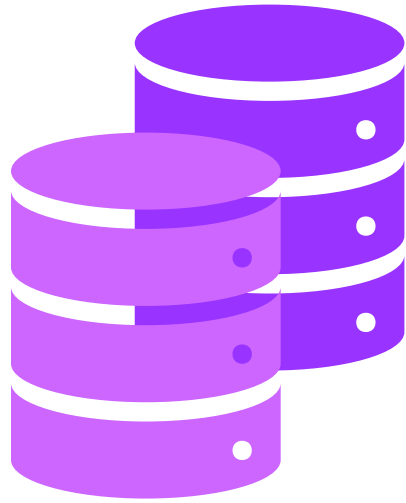
Use Case Design



Project Design



Database Design

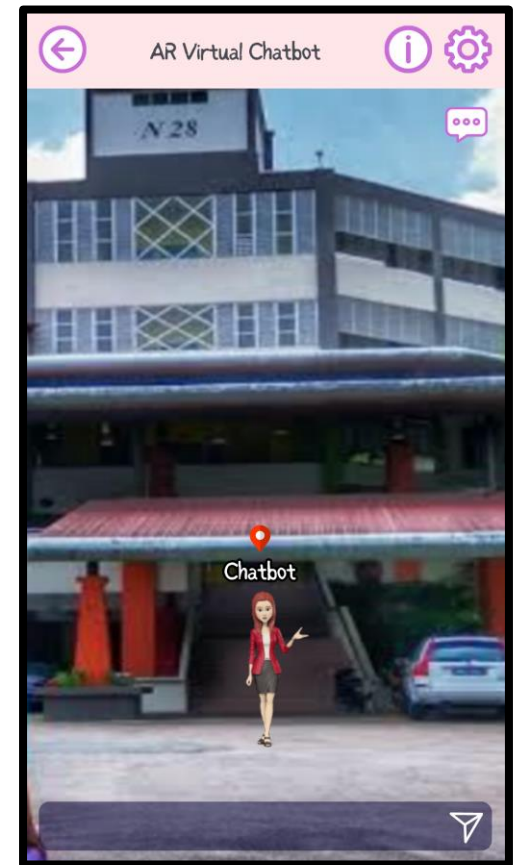
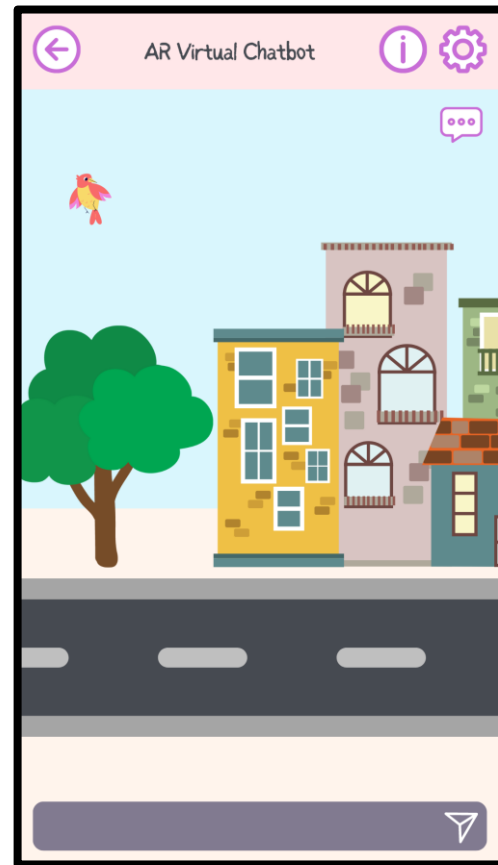
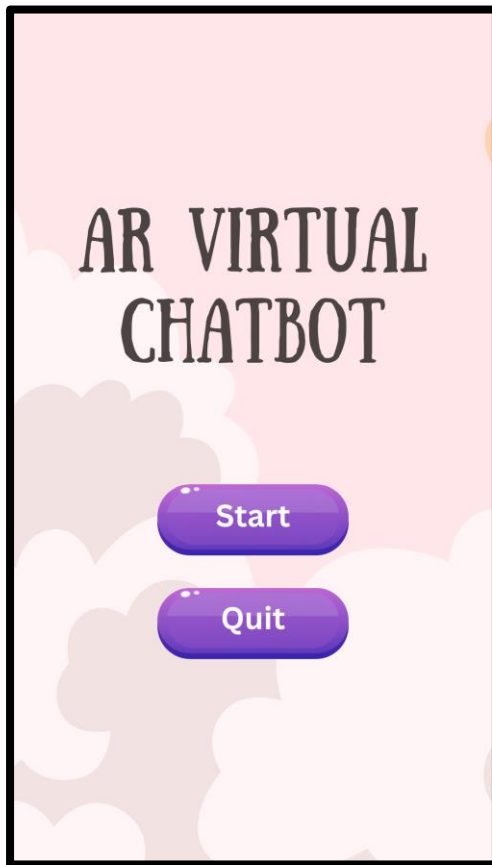


Chatbot Response Design

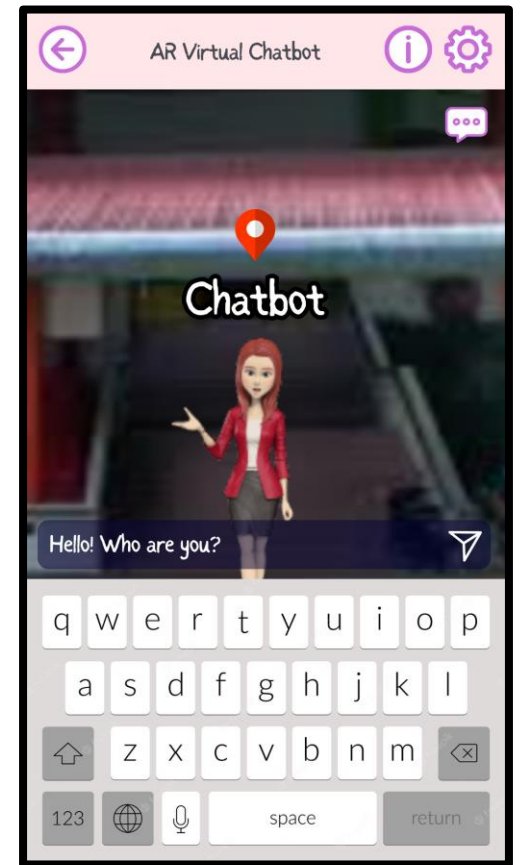
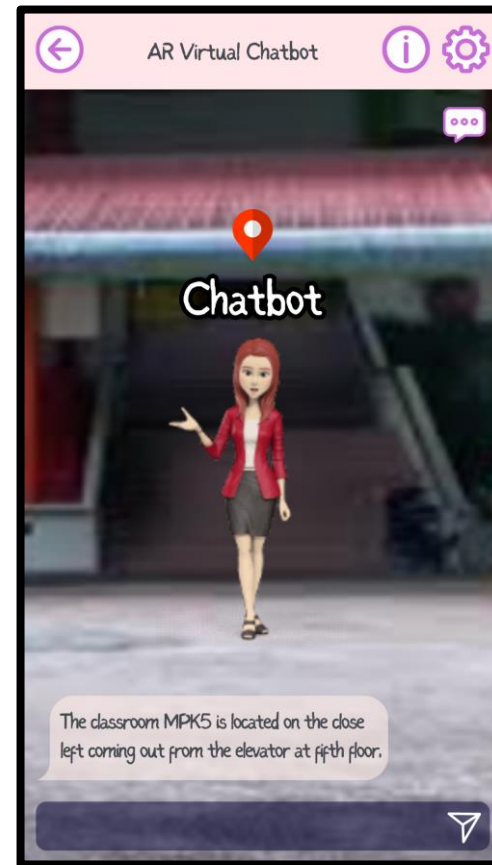
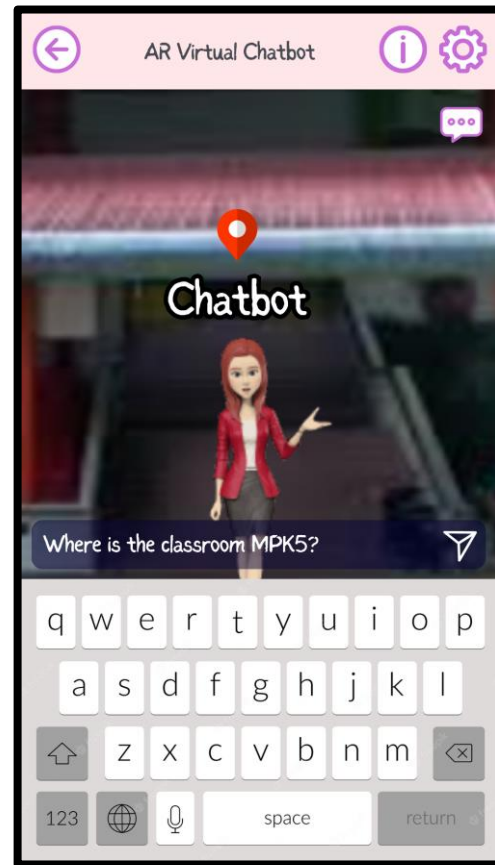
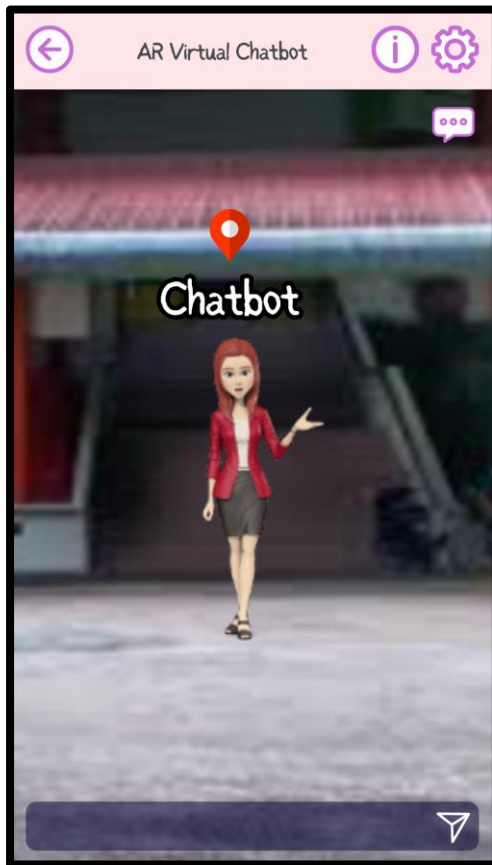


Intention	Response
Greeting or Profile	"Hi. I am a Virtual Chatbot. You can ask me questions related to navigation or location for the building N28."
Agree	"That's right!"
Disagree	"That's not true."
Toilet	"The toilet is located beside the staircase along the corridor behind me of each floor."
Classroom_MPK5	"The classroom MPK5 is located at the left side coming out from the elevator at fifth floor."
Classroom_BK4	"The classroom BK4 is located at the end of the corridor behind me."
Lift or Elevator	"The elevator is located right behind me."
Prayer Room	"The prayer room is located on your left."
Inappropriate	"Sorry I will not reply to that."

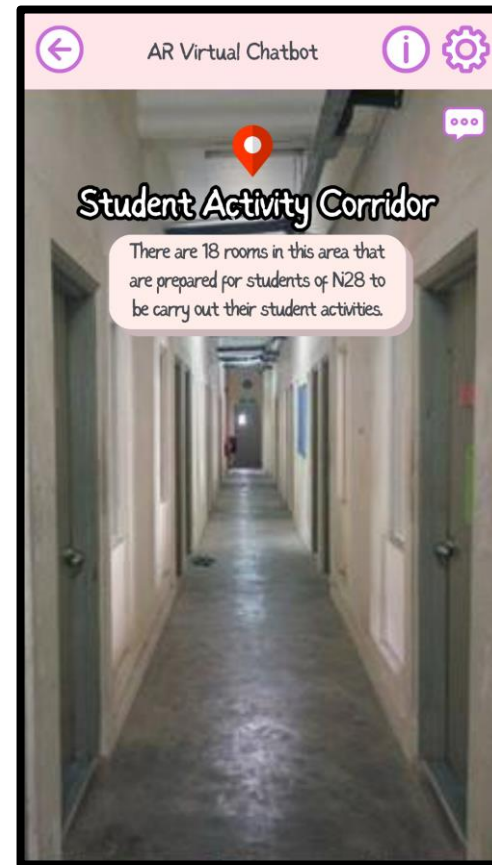
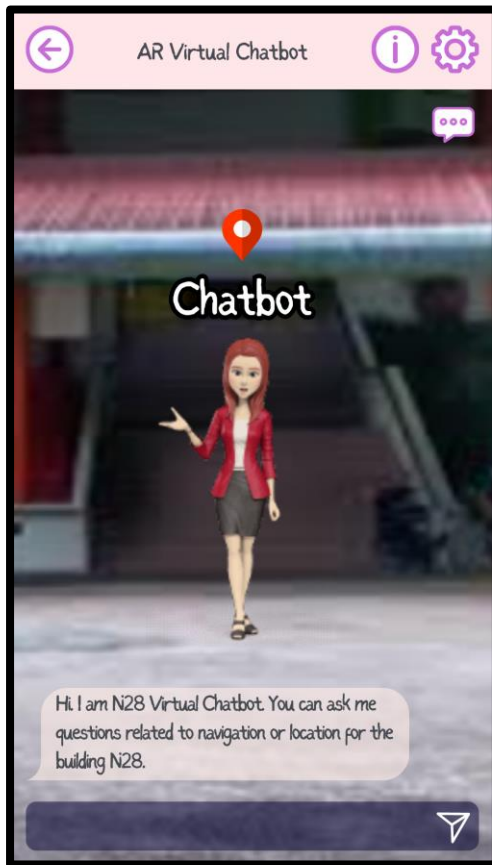
Interface Design



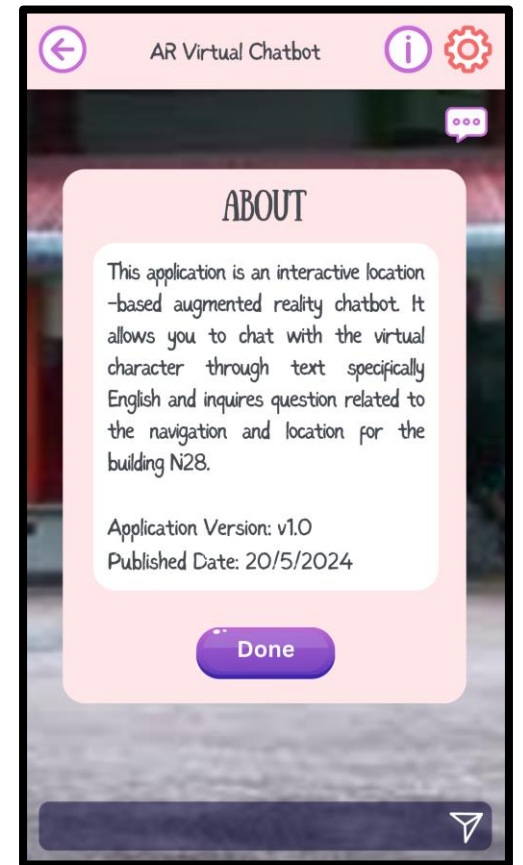
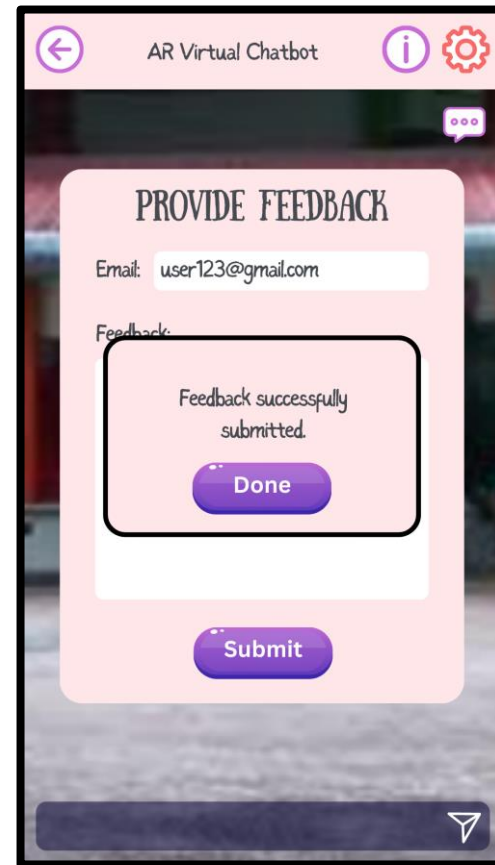
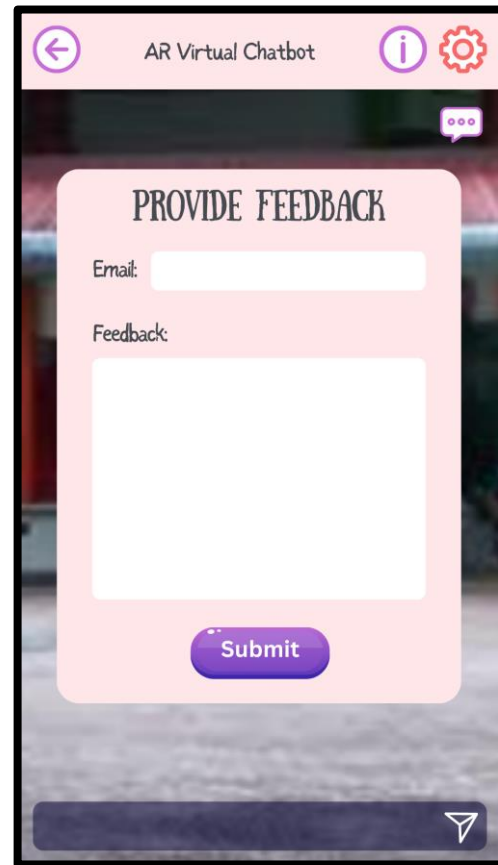
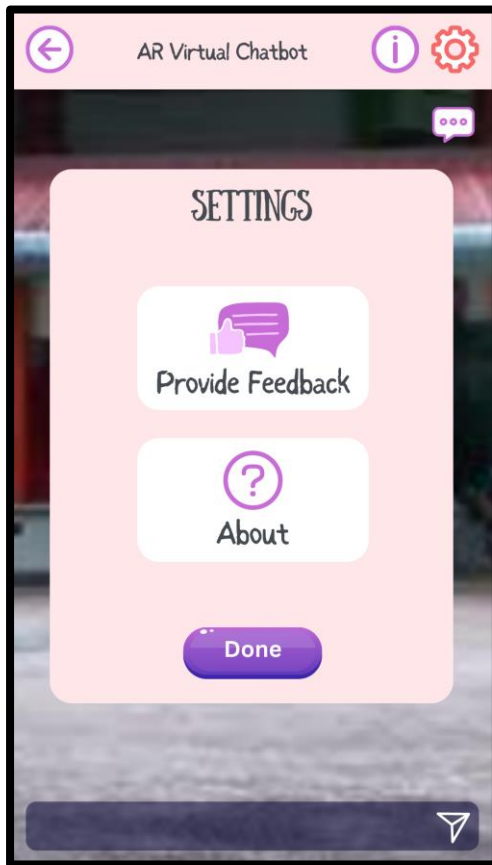
Interface Design



Interface Design



Interface Design



Conclusion

- Planning for PSM2
 - Required and necessary libraries or framework will be implemented and utilized into the system.
 - Virtual character and interface of the application will be designed.
 - Integration of the chatbot into the virtual character will be carried out.
 - User testing will be conducted to collect feedback and comments from the users
 - Black box testing will be used to find usability issues that could arise when people interact with the system

Thank You

