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THE DESIGN AND DEVELOPMENT OF MOBILE APPLICATION NAVIGATION: UUM NAVIGATE CAMPUS COMPANION

¹Nur Sauri Yahaya, ²Yeck Hon Weng & ³Lee Thai Weng

School of Multimedia Technology and Communication, Universiti Utara Malaysia

¹Corresponding author: nursauri@uum.edu.my

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ABSTRACT

In recent years, the proliferation of mobile devices has revolutionised the accessibility and functionality of location-based applications, rendering traditional computer devices less effective for real-time location tracking and navigation. Recognising this shift, this paper presents the design and development of "UUM Navigate: Campus Companion," a mobile application specifically tailored for students at Universiti Utara Malaysia (UUM). The application is designed to assist new and lower-semester students in navigating the campus, accessing essential service facilities information, and find answers to frequently asked questions (FAQs) about UUM. The development process of UUM Navigate followed the ADDIE model, encompassing five key stages: Analysis, Design, Development, Implementation, and Evaluation. The evaluation phase was conducted in two parts: formative and summative assessments. Formative evaluation involves expert reviews to gather feedback for refining the application during its development. A summative evaluation was conducted post-development and aimed to collect 35 user responses through a survey distributed to UUM students via Google Forms. The survey assessed the application's usefulness, ease of use, and overall user satisfaction. The results indicate that despite the introduction of the application, many new and lower-semester students still need help locating classrooms and often need to be made aware of available campus services and facilities. However, most users provided positive feedback regarding the application's performance, highlighting its value as a practical tool for new students. The findings affirm the usefulness of the UUM Navigate: Campus Companion in enhancing campus navigation and accessibility for students, particularly those in their early semesters.

Keywords: Mobile application development, mobile campus navigation, user experience, usability.

INTRODUCTION

In the fast-paced and fiercely competitive landscape of modern technology, mobile devices have emerged as an indispensable part of daily life, particularly for university students. The rapid evolution of mobile technology accelerated during the COVID-19 pandemic in 2020 has led to an unprecedented increase in the reliance on mobile applications. According to Xie et al. (2023), the popularity of mobile applications has witnessed sustained growth over the years. In 2022 alone, there were approximately 102 billion app downloads worldwide, generating a revenue of \$26 billion, marking a substantial 44.4% increase from the \$8 billion recorded in 2021 (Xie et al., 2023). This surge underscores the growing significance of mobile devices as essential tools for communication, information, and daily activities.

On the other hand, mobile application navigation has become a critical component in enhancing user experience, particularly in environments that require real-time location-based services, such as university campuses, shopping centres, and urban areas. As mentioned by Yahya and Wei (2024), mobile navigation applications are essential for offering personalised guidance and improving accessibility, especially in situations where users need to quickly find specific locations, such as classrooms, offices, or emergency services. This immediacy and relevance of information enhance the overall user experience and contribute to higher levels of user satisfaction and engagement (Junior, 2020).

Moreover, integrating mobile navigation with other features, such as service information and real-time updates, can significantly improve the functionality of mobile applications. Ariffin et al. (2022) emphasise that effective navigation design is central to the usability of mobile applications, as it directly impacts how easily users can access the information they need. For university students, mobile applications offer a convenient and accessible platform for managing various aspects of campus life. With the widespread use of smartphones and tablets, mobile apps have become integral to how students navigate their educational environment, access resources, and stay informed (Tileng et al., 2023). By providing clear, accurate directions and integrating additional resources like departmental information and FAQs, mobile navigation applications can be comprehensive tools that support users in various contexts, making them indispensable in today's digital landscape. In the context of this research, new students at Universiti Utara Malaysia (UUM) face critical challenges, particularly in adapting to the campus environment. Due to the confusing and unfamiliar campus layout, new students often need help locating essential academic buildings, residence halls, and emergency facilities. This challenge is exacerbated by the absence of a centralised guidance system, making it difficult for students to find their way, especially during their initial semester. Additionally, the deconstruction of information across various channels creates further confusion, as critical details about university departments, services, and briefings are scattered, leaving students needing a single, comprehensive source of information. This lack of centralised access hampers students' ability to stay informed and impacts their academic experience and overall well-being. Thus, this research aims to leverage the advantages of mobile technology by developing a mobile application titled UUM Navigate: Campus Companion.

The UUM Navigate: Campus Companion mobile application is a comprehensive tool designed to assist prospective students and new intakes at Universiti Utara Malaysia (UUM). The application enhances campus navigation by providing detailed directions to classes, residences, and emergency units, simplifying the campus exploration process. Additionally, the app offers information on departmental services and university facilities, ensuring that students have quick access to essential resources. A Frequently Asked Questions (FAQ) section is incorporated to address common queries related to campus life and university services, further aiding students in their transition to university life. To ensure inclusivity and accessibility, the application supports multiple languages, catering to the diverse student body at UUM.

Furthermore, the application encourages user feedback, enabling continuous improvement and adaptation to meet the evolving needs of students. By integrating these features into a single platform, UUM Navigate: Campus Companion aims to enhance the overall university experience, particularly for new students, by providing an easy-to-use tool for efficient campus exploration and information access.

BACKGROUND AND RELATED WORKS

The development of the UUM Navigates: Campus Companion is deeply rooted in the analysis of existing mobile applications designed to assist university students with campus navigation and access to essential information. Several existing applications from various universities and platforms offer valuable insights into the potential and limitations of developing mobile application navigation.

The development of the UUM Navigates: Campus Companion draws insights from several existing mobile applications, each with unique strengths and limitations. The UUM Student Application, released by UUM Information Technology in February 2017, provides essential administrative functions such as access to class schedules, student account statements, and attendance scanning (UUMIT, 2021). However, while valuable, it must offer comprehensive campus navigation, a gap that the UUM Navigate: Campus Companion aims to fill. Similarly, UM Touch, developed by Universiti Malaya's IT Centre, offers a centralised source of academic and university-related information, including news, events, and academic portals. Despite its strengths, UM Touch needs dedicated navigation features, limiting its usefulness for physical campus navigation (Malaya, 2024). The UUM Navigate: Campus Companion plans to integrate such centralised information while enhancing navigation capabilities.

On the other hand, Taylor's mobile application, launched in July 2017, includes a noteworthy live chat feature for personalised guidance, making it a valuable tool for prospective students (Taylor, 2022). However, it suffers from frequent crashes and slow loading times, which the UUM Navigate: Campus Companion seeks to avoid by prioritising stability and performance. On the other hand, the Pano to 360 by ThingLink application offers interactive virtual tours, 360-degree videos, and innovative features that could enhance the immersive aspect of campus navigation (ThinkLing, 2024). However, its primary focus on content creation rather than real-time navigation makes it less applicable to UUM Navigate: Campus Companion needs. As Mahabir (2020) mentioned, a platform acquired by Meta in 2020 presents advanced mapping and street-level imagery capabilities, utilising computer vision technology for precise navigation. While these features are highly relevant for enhancing the UUM Navigate: Campus Companion, the complexity of Mapillary might be excessive for a campus-focused application, which requires simplicity and ease of use. Lastly, Mapilio, launched in April 2022, uses AI to improve map accuracy through user-generated content, which could greatly benefit the UUM Navigate: Campus Companion. However, ensuring consistency and accuracy in user-generated data remains a challenge that must be addressed to maintain reliable campus navigation (Mapilio, 2024).

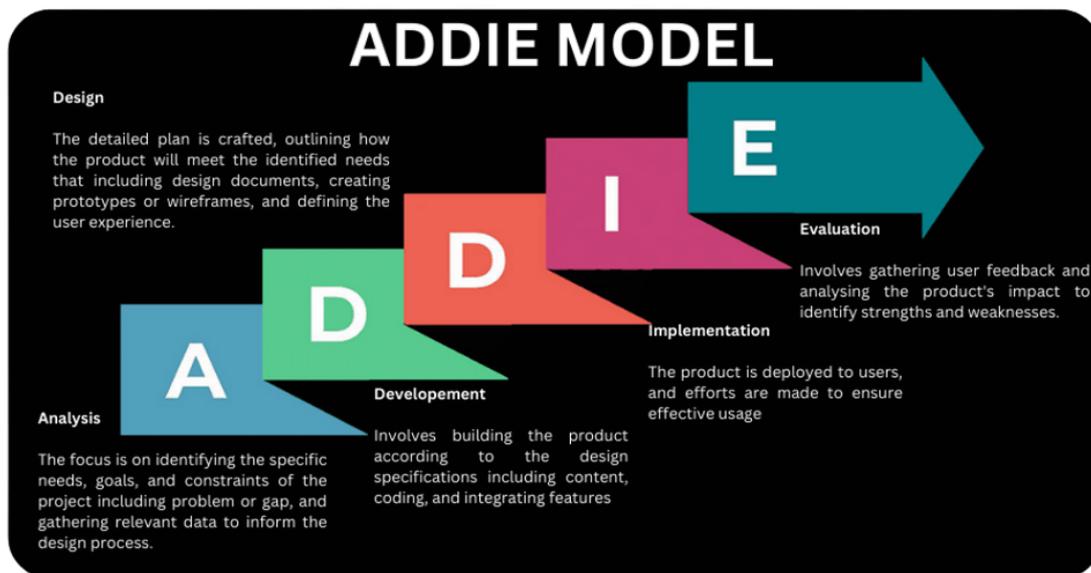
METHODOLOGY

The ADDIE model is a systematic framework used in instructional design and development, offering a structured approach to creating effective educational and training products (Dwitiyanti et al., 2020). It comprises five key phases: Analysis, Design, Development, Implementation, and Evaluation (Isnaeni et al., 2022; Rakhmawati et al., 2022). One of the key reasons for its broad adoption is its adaptability and iterative nature, which allow for continuous feedback and refinement throughout the development process (Zakaria & Nawati, 2020). The Analysis phase focuses on identifying the project's specific needs, goals, and constraints. This involves understanding the target audience, defining the problem or gap, and gathering

relevant data to inform the design process. The Design phase follows, where a detailed plan is crafted, outlining how the product will meet the identified needs. This includes developing design documents, creating prototypes or wireframes, and defining the user experience. On the other hand, the Development phase involves building the product according to the design specifications. This includes creating content, coding, and integrating features, resulting in a functioning prototype or final version. During the Implementation phase, the product is deployed to users, and efforts are made to ensure adequate usage. This includes launching the application, conducting training sessions, and providing user support. Finally, the Evaluation phase assesses the product's effectiveness and performance. This involves gathering user feedback and analysing the product's impact to identify strengths, weaknesses, and areas for improvement. By following the ADDIE model, developers can ensure a structured, iterative approach that enhances the quality and effectiveness of the final product (Murdiono et al., 2020).

Figure 1

The Phases of ADDIE Methodology



Analysis

The analysis phase marks the crucial beginning of project development, focusing on laying a solid foundation for the UUM Navigate: Campus Companion. This stage involves clearly defining the project's goals, specific objectives, potential challenges, scope, and target audience. It also emphasises understanding the significance of the application within its context. A vital aspect of this phase is conducting thorough research, including a literature review of similar applications, to gather relevant data and insights. This research helps to refine the project goals, identify best practices, and address potential issues by leveraging previous work. Additionally, requirement analysis is a critical component of this phase. It involves identifying and documenting the functional and non-functional requirements of the application. Functional requirements specify what the application must do, such as providing detailed campus navigation, while non-functional requirements address aspects like performance, security, and usability. For this research, the conditions obtained from this process are presented in Table 1 and 2 along with their respective priority level, such as (M) mandatory requirements (something the system must do),

(D) desirable requirements (something the system preferably should do), and (O) optional requirements (something the system may do).

Table 1

Functional Requirements

Requirement ID	Requirement Description	Priority
UNS_01	REGISTER SYSTEM	
UNS_01_01	Users	
UNS_01_01_01	Users can log in	M
UNS_01_01_02	Users can logout	M
UNS_01_01_03	Users can register an account by inserting their username, email address, and password.	M
UNS_01_02	Admin	
UNS_01_02_01	Admin can log in	M
UNS_01_02_02	Admin can logout	M
UNS_02	SEARCH CLASS NAVIGATION	
UNS_02_01	Users can search for the class they would like to go to.	M
UNS_02_02	Select Class or DKG category	D
UNS_02_02_01	Users can select the specific DKG in the class category.	D
UNS_02_03	Insert the name of the School or DKG	D
UNS_02_03_02	The systems will display all the related results.	M
UNS_03	SEARCH INASIS NAVIGATION	
UNS_03_01	Users can search for the residences (Inasis) they prefer.	M
UNS_03_02	Select Inasis category	D
UNS_03_02_01	Users can select the specific Inasis in residence or analysis category.	D
UNS_03_03	Insert the name of the Laluan or Inasis name	D
UNS_03_03_01	Users can insert the name of Laluan or Inasis name	D
UNS_03_03_02	The systems will show all the relevant results.	M
UNS_04	CHECK BUILDING INFORMATION	
UNS_04_01	Users can search for information on UUM buildings.	M
UNS_04_02	Select Buildings Category	D
UNS_04_02_01	Users can choose the specific UUM buildings in the buildings category	D
UNS_04_03	Insert the name of the buildings	D
UNS_04_03_01	Users can insert the related names of the buildings	D
UNS_04_03_02	The system must display an interface allowing users to choose between the related results.	M

UNS_05	CHECK FAQs	
UNS_05_01	Users can search for information about the frequently asked questions (FAQ) in UUM.	M
UNS_05_02	Select FAQs category	D
UNS_05_02_01	Users can choose the questions that are generally asked or feedback from the students.	D
UNS_05_03	Insert the keyword name of the FAQs	D
UNS_05_03_01	Users can insert the related keyword of the FAQs	D
UNS_05_03_02	The system must display an interface that shows results related to the FAQs.	M
UNS_05_03_03	Users can select and click on the specific questions from the related results.	D
UNS_05_04	Submit question	
UNS_05_04_01	Users can submit new questions to the admin.	O
UNS_06	MANAGE BUILDING INFORMATION	
UNS_06_01	Admin can insert the new building information	M
UNS_06_02	Admin can update the existing building information	M
UNS_06_03	Admin can delete the existing building information	M
UNS_06_03	Admin can view the building information	M
UNS_07	MANAGE FAQs	
UNS_07_01	Admins can view user-submitted questions	M
UNS_07_02	Admin can insert the new FAQs	M
UNS_07_03	Admin can update the existing FAQs	M
UNS_07_04	Admin can delete the existing FAQs	M

Table 2

Non-Functional Requirements

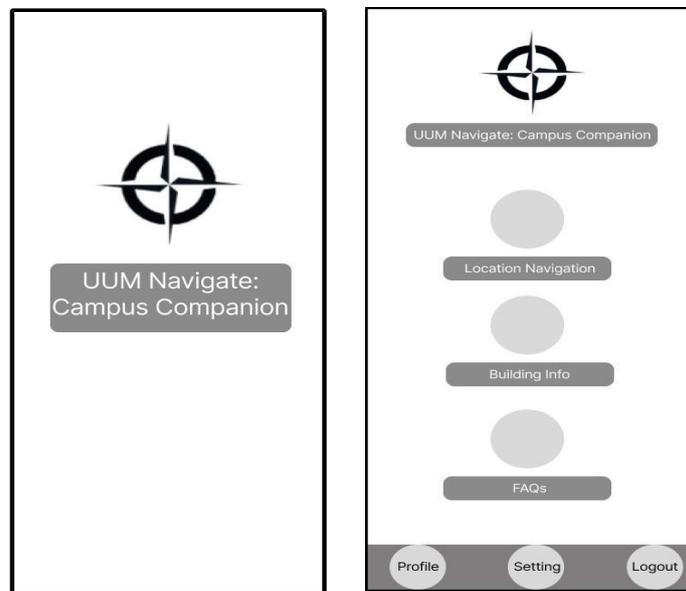
Requirement ID	Requirement Description	Priority
UNS_08	SECURITY	
UNS_08_01	The system is designed to protect user's personal and private data.	M
UNS_08_02	When users correctly enter their username and password, the system allows them to access their account.	M
UNS_09	USABILITY ISSUES	
UNS_09_01	The admin can monitor and manage users' search records.	M
UNS_09_02	Admin can check the rate and the comments that are given or inserted by users so they can improve their service.	M

Design and Development

During the Design phase, it is essential to meticulously outline the structure and functionality of the UUM Navigate: Campus Companion mobile application. This includes defining the user interface, overall architecture, and functionality in a detailed framework. The design plan must adhere to precise guidelines to ensure consistency and quality (Yang, 2023). For this research, Figma was employed to create and prototype user interfaces. Figma enables the creation of detailed UI layouts, interactive prototypes, real-time collaboration and reusable components, making it a versatile tool for creating and prototyping user interfaces (Sharma & Tiwari, 2021). Each component should be implemented carefully, and low-fidelity prototypes or wireframes should be used to visualise the application's structure and user flow. In a low-fidelity prototype, the designer should include the logo or brand of the application. In this case, the UUM Navigate: Campus Companion logo will be placed in the middle of the Loading interface before entering the Main Menu interface, as shown in Figure 2.

Figure 2

Logo and Main Menu Interface of UUM Navigate: Campus Companion



Following the Logo and Main Menu interface design for the UUM Navigate: Campus Companion, it is crucial to define the functionalities of the key buttons. The application will feature three primary buttons: Location Navigation, Building Info, and FAQs. The Location Navigation button will assist students in locating their desired classrooms within Universiti Utara Malaysia (UUM). The Building Info button will offer detailed information about various campus facilities and services. The FAQs button will address common questions and provide solutions to issues that students may encounter. Each button is designed to enhance the user experience by providing essential information and facilitating easy navigation across the campus. The three button function details are shown in Figure 3, Figure 4, and Figure 5.

Figure 3

The Design Layout Navigation Button for UUM Navigate: Campus Companion

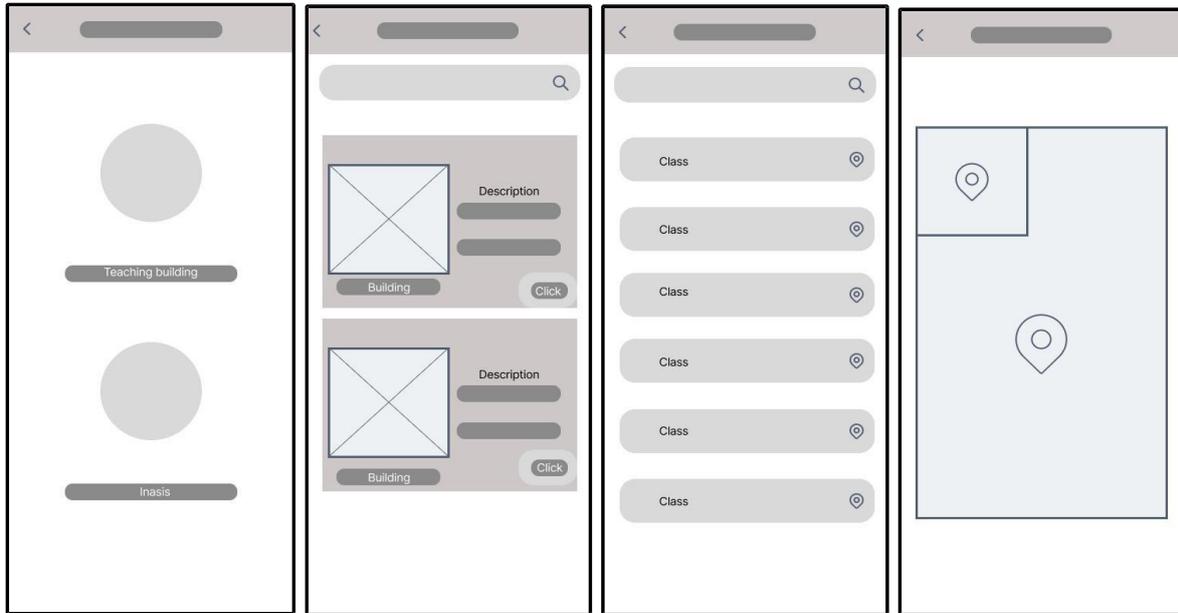


Figure 4

The Design Layout of Building Info Button for UUM Navigate: Campus Companion Mobile Application

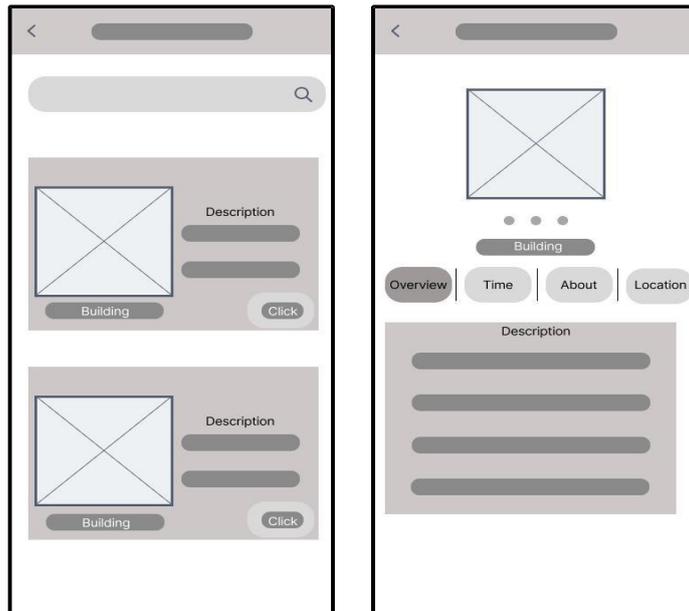
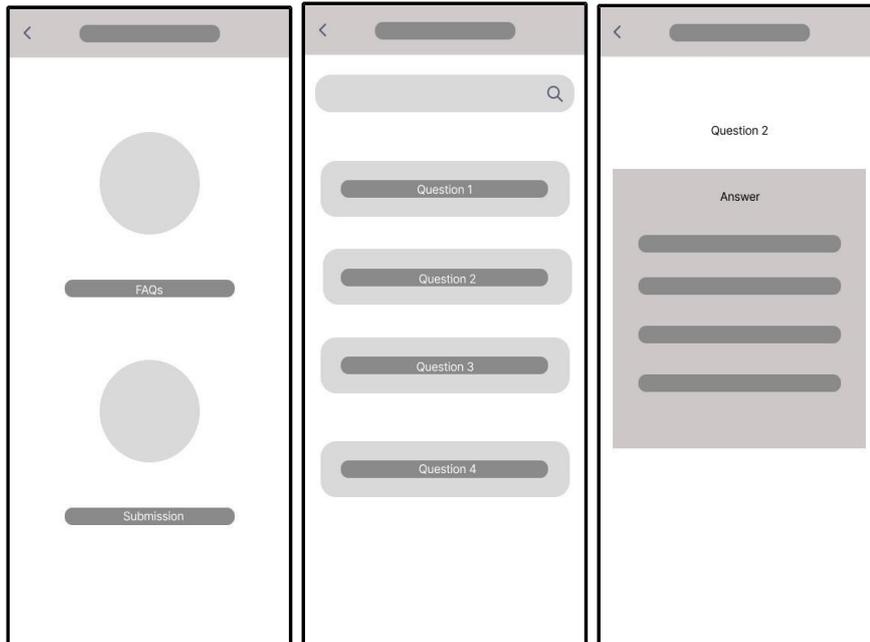


Figure 5

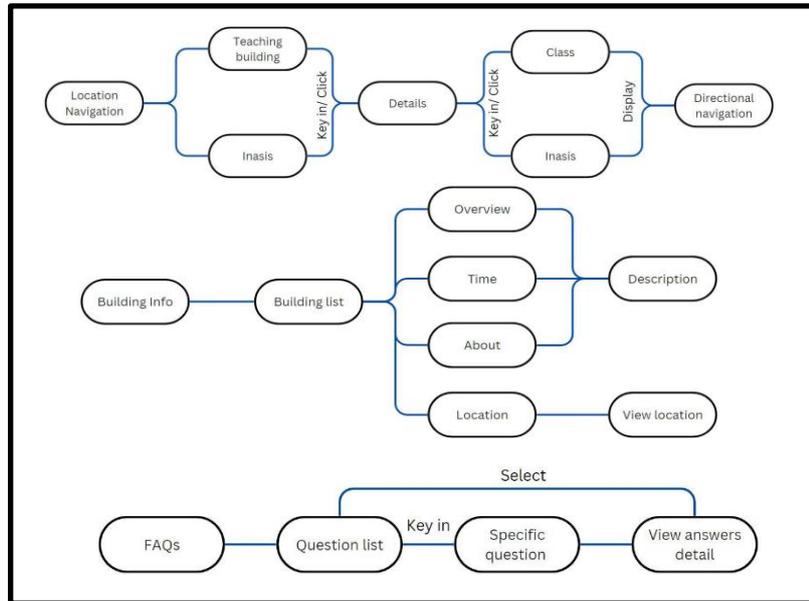
The Design Layout of FAQs Button for UUM Navigate: Campus Companion Mobile Application



As the UUM Navigate: Campus Companion mobile application incorporates three primary function buttons, which are Location Navigation, Building Info, and FAQs, there is a certain amount of interface design required to accommodate these functions effectively. To ensure a well-structured and user-friendly design, it is essential to use architectural models early in the development process. Architectural models help outline the application's overall structure and flow, providing a stable foundation upon which detailed design elements can be built (Mendhurwar & Mishra, 2021). This architectural framework defines how different app components interact and ensures that all functionalities are seamlessly integrated. It includes creating detailed wireframes and prototypes to visualise the layout and user interactions, ensuring that each button and feature is easily accessible and logically organised. By employing architectural models, developers can identify potential issues and make informed decisions during the design phase, leading to a more intuitive and efficient application that meets user needs and enhances their experience (Radusinovic & Radonjic, 2015). The details of the architecture of the button function are shown in Figure 6.

Figure 6

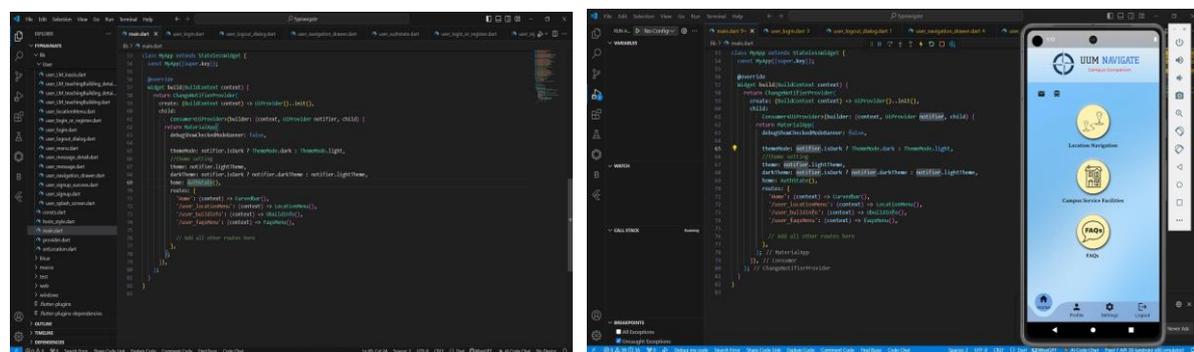
The Structure and Flow of Three Button



During the Development phase, Visual Studio Code is utilised as the primary integrated development environment (IDE) for building the UUM Navigate: Campus Companion. Visual Studio Code supports many programming languages, including HTML, CSS, Python, and Flutter. For this project, Flutter is specifically chosen for its versatility in developing cross-platform mobile applications. Flutter's framework allows developers to create a seamless and responsive user interface, enabling the efficient implementation of functionalities such as the navigation buttons that redirect users to different application sections (Flutter, 2024). By leveraging Flutter within Visual Studio Code, developers can ensure the application is visually appealing and functionally robust, providing a smooth and intuitive user experience.

Figure 7

Visual Studio Environment and Mobile Device Emulator



Visual Studio Code significantly enhances developer productivity with syntax highlighting, bracket-matching, auto-indentation, box selection, and code snippets, as illustrated in Figure 7. These tools streamline the coding process and improve efficiency. For developing the UUM Navigate: Campus Companion, Flutter is employed due to its specialisation in mobile application development. Flutter's framework is explicitly tailored for building high-performance, cross-platform mobile apps. Within Visual

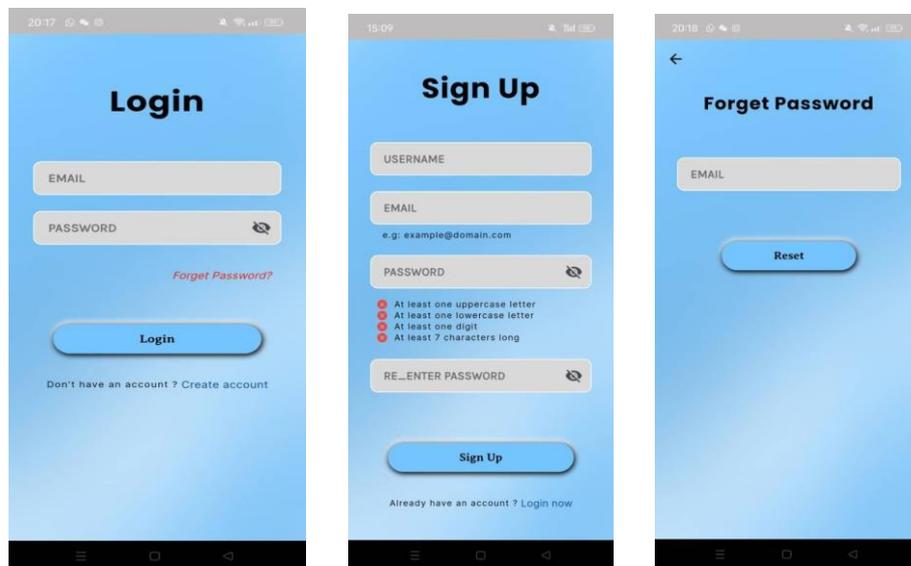
Studio Code, developers can write Flutter code, and the IDE provides an integrated mobile device emulator to visualise the application's interface and functionality instantly. This real-time preview capability lets developers see how their code translates into a working mobile app, facilitating a more iterative and responsive development process.

Implementation

In this phase, the UUM Navigate: Campus Companion prototype is finalised and deployed to an actual device like an Android platform. The launch of the application involves introducing it to users or clients, detailing its purpose, and highlighting any new features or improvements. Upon first use, the UUM Navigate: Campus Companion will present a login interface for user authentication, as shown in Figure 8. Before accessing the application, new users can select the "Create Account" button to register and set up their accounts. Existing users who have forgotten their passwords can use the "Forgot Password" option to follow the instructions for resetting their passwords, ensuring they regain access to their accounts seamlessly, as illustrated in Figure 8.

Figure 8

Login Interface, Sign-Up Interface and Forgot Password Interface



Upon successful authentication, users will be directed to the main menu interface of the application, as depicted in Figure 9. This interface prominently features three key functional buttons: "Location Navigation," "Campus Service Facilities," and "FAQs." These buttons are centrally located on the screen, providing easy access to essential features. The "Location Navigation" button allows users to find their way around the campus, while the "Campus Service Facilities" button offers detailed information about various university services. The "FAQs" button answers common questions, ensuring users have quick access to critical information and support.

Figure 9

Main Menu Interface



When the "Location Navigation" button is clicked, the application will display a sub-menu (Figure 10) featuring options for "Lecture Room" and "Dormitory (Inasis)." Within this sub-menu, users can choose between finding their classroom or dormitory. The interface provides clear instructions for users to locate their desired destination, ensuring a seamless navigation experience, as illustrated in Figure 10. When the "Campus Service Facilities" button is clicked, a comprehensive list of UUM's service facilities will be presented (Figure 11). Users can select any facility from this list to view detailed information, including an overview, operating hours, contact phone number, and location details (Figure 11). This feature ensures that users have easy access to essential information about the various services available on campus. When the "FAQs" button is clicked, the FAQs submenu (Figure 12) will appear, featuring two options: "FAQs" and "Feedback." Selecting the "FAQs" option will display a list of common questions related to UUM, allowing users to choose a question and view its corresponding answer. Additionally, clicking the "Feedback" button will present a text box where users can enter their comments or concerns regarding their experiences at UUM (Figure 12). This setup facilitates easy access to information and allows users to provide valuable feedback.

Figure 10

The Instruction flow of the "Location Navigation" Function

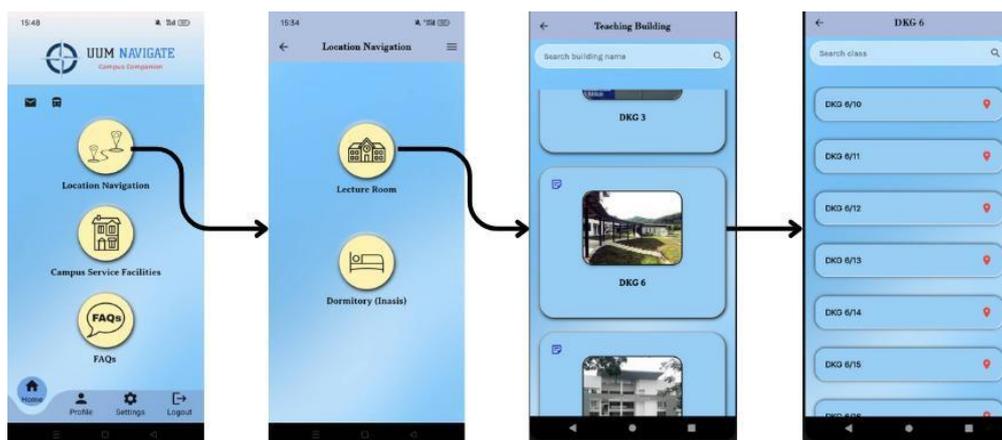


Figure 11

The Instruction Flow of the "Campus Service Facilities" Function

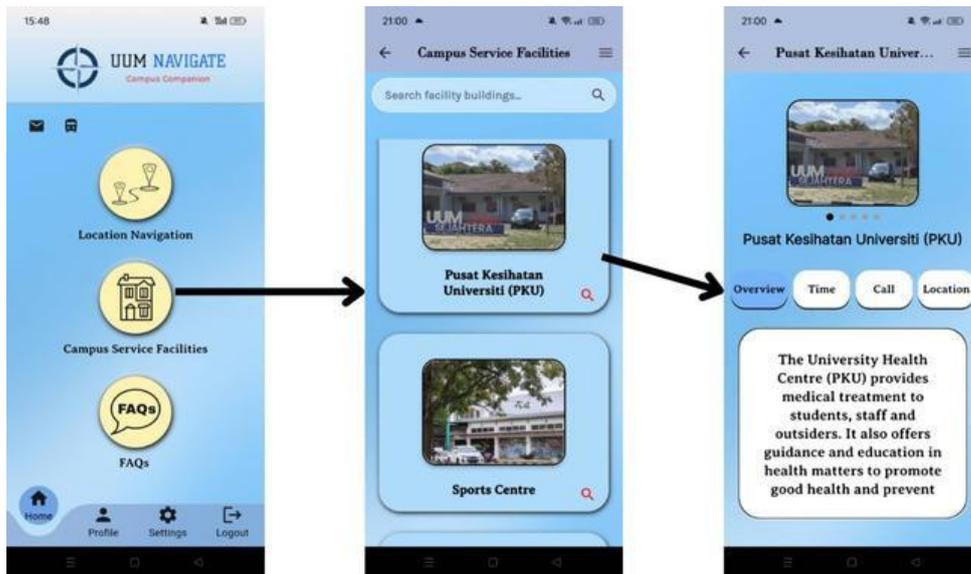
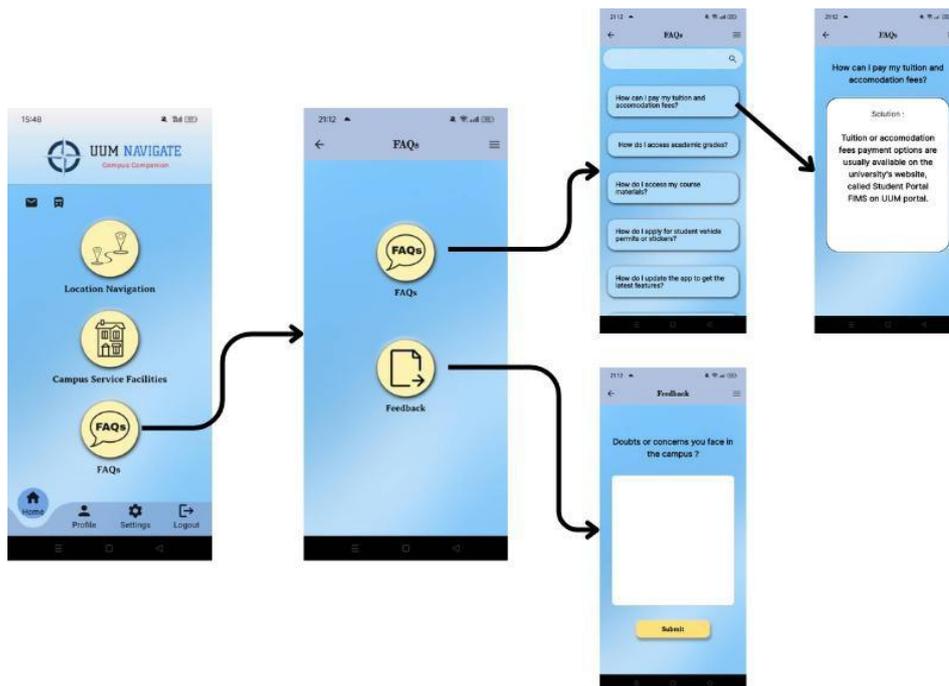


Figure 12

The Instruction flow of the "FAQs" Function



EVALUATION OF UUM NAVIGATE: CAMPUS COMPANION

The evaluation phase consists of two stages: formative evaluation and summative evaluation. Formative evaluation is an ongoing assessment conducted during the development of the UUM

Navigate: Campus Companion application to ensure both quality and progress. This evaluation employs a qualitative approach, specifically through face-to-face interviews with experts. The assessment focuses on three key aspects: interface design, usability, and functionality. Experts provide feedback on each of these areas, helping to identify the strengths and weaknesses of the application. This feedback is crucial for refining the user interface and enhancing the user experience. It serves as a basis for making improvements and ensuring the application meets the needs and expectations of its users. On the other hand, the summative evaluation occurs after the UUM Navigate: Campus Companion's development and aims to gather empirical data based on user responses (Vittorini et al., 2021). This phase employs a quantitative approach, utilising Google Forms to distribute questionnaires among Universiti Utara Malaysia (UUM) students, who are the target users. This evaluation assesses the application's usefulness, ease of use, and overall user satisfaction. Each question in the Google Form is rated on a 5-point Likert scale, a standard method for measuring opinions, attitudes, and behaviours. This structured feedback provides valuable insights into the application's effectiveness and identifies areas for potential improvement.

The Respondent's Demographic Information

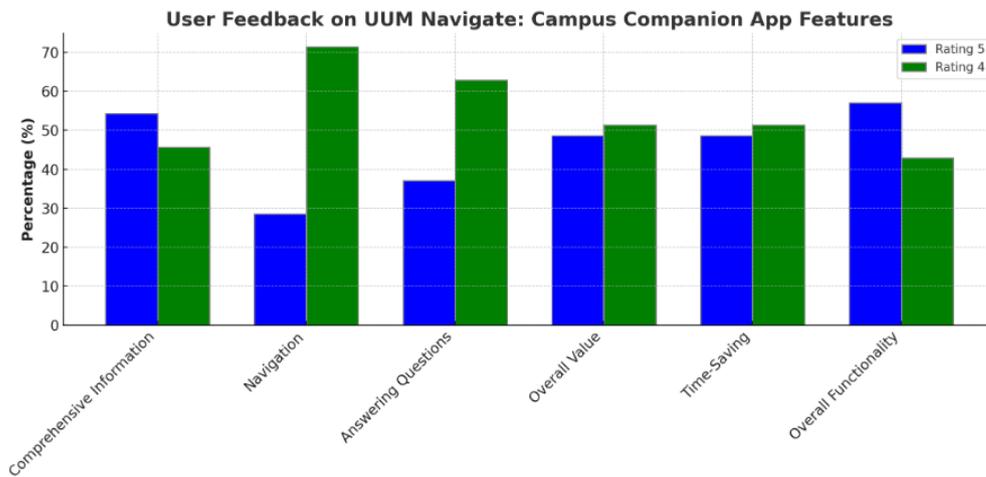
The survey collected 35 responses from diverse Universiti Utara Malaysia (UUM) undergraduates, providing a well-rounded student body perspective. The gender distribution was nearly balanced, with 51.4% male and 48.6% female participants. Respondents were predominantly aged 20 to 23, with 48.6% between 20 and 21 and 51.4% between 22 and 23, reflecting the typical age range of university students. The semester distribution showed that 40% of respondents were in their fourth semester, 42.9% in their second semester, and smaller groups in their first and sixth semesters, indicating a focus on mid-level students. Notably, 57.1% of participants reported difficulties locating classrooms and accessing campus resources, highlighting a significant need for improved navigation support and information dissemination within the UUM campus.

Result of Usefulness, Ease of Use and Overall User Satisfaction of UUM Navigate: Campus Companion

The UUM Navigate: Campus Companion evaluation emphasises usefulness, ease of use, and overall user satisfaction, as these criteria are critical for determining the application's effectiveness and success. The following series of inquiries evaluated the application's perceived usefulness in offering thorough details about UUM's service facilities, facilitating campus navigation, and answering frequently asked questions about university life, overall value, time saving and overall satisfaction.

Figure 13

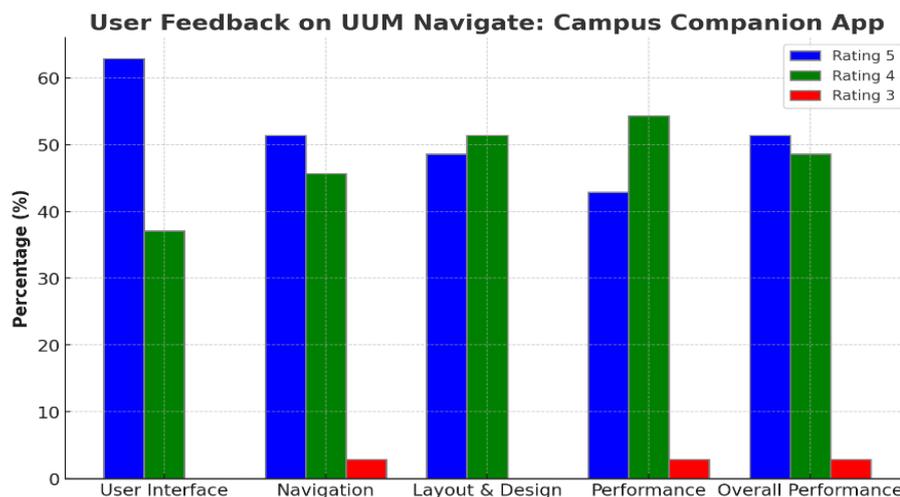
User Feedback of UUM Navigate: Campus Companion Features (Usefulness)



The evaluation of the UUM Navigate: Campus Companion reveals vital positive feedback across various features (Usefulness). The comprehensive information feature received high ratings, with 45.7% of respondents giving it a 4 and 54.3% a 5, indicating its effectiveness in providing detailed information about UUM's facilities and services. The navigation feature was rated favourably by 71.4% of respondents, who gave it a 4, and 28.6%, who rated it a 5, suggesting it significantly aids users in locating buildings and navigating the campus. Regarding answering questions about university life, 62.9% of respondents rated the feature a 4 and 37.1% a 5, highlighting its reliability as a source of information. The app's overall value was also highly rated, with 51.4% giving it a 4 and 48.6% a 5, reflecting its positive impact on students' campus experience. Additionally, the app's time-saving capability was appreciated, with 51.4% of respondents rating it a 4 and 48.6% a 5, demonstrating its efficiency in providing quick access to necessary information. Overall, the app received the highest ratings for its functionality and performance, with 42.9% of respondents rating it a 4 and 57.1% a 5, indicating high user satisfaction and that the app meets or exceeds expectations.

Figure 14

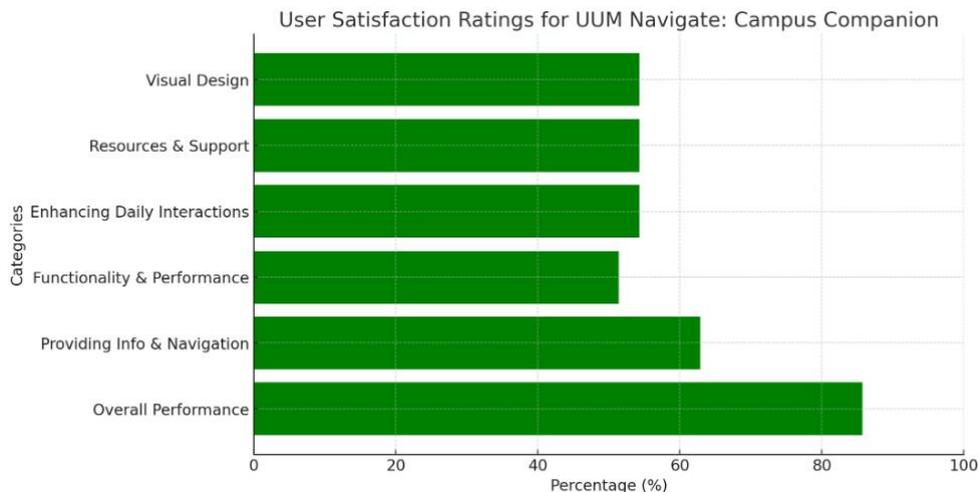
User Feedback of UUM Navigate: Campus Companion Features (Ease of Use)



On the other hand, in the second criterion, ease of use, the result also showed positive feedback from the respondents regarding response time, consistency, design layout, and interface intuitiveness. As shown in Figure 14, the user interface of the UUM Navigates: Campus Companion received positive feedback, with 62.9% of respondents rating it a 5 and 37.1% rating it a 4, indicating that users find the interface intuitive and easy to use. The app's navigation feature was well-received, with 51.4% of respondents giving it a 5, 45.7% giving it a 4, and only 2.9% rating it a 3, suggesting that users can navigate the app's sections easily. The layout and design also contributed to user satisfaction, with 51.4% of respondents assigning a 4 and 48.6% assigning a 5, showing that the app effectively helps users find information quickly. Despite minor delays, the app's performance was generally viewed as responsive, with 54.3% rating it a 4 and 42.9% rating it a 5. Finally, the app's overall performance was considered consistent and reliable, with 51.4% of respondents rating it a 5, 48.6% rating it a 4, and only 2.9% giving it a 3, demonstrating users' confidence and satisfaction with the application's dependability and ease of use.

Figure 15

User Feedback of UUM Navigate: Campus Companion Features (User Satisfaction)



In the last criterion, user satisfaction, feedback was obtained regarding the application's overall functionality, compatibility with different devices, and the tendency of users to suggest it to others. Additionally, respondents evaluated the application's influence on their experience at the university and the overall quality of the resources and support offered. Figure 15 shows that UUM Navigate: Campus Companion indicates high user satisfaction across various app performance aspects. A significant 85.7% of respondents rated the app's overall performance a 5, reflecting intense satisfaction with its effectiveness. Regarding providing information and assisting with navigation within UUM, 62.9% rated this aspect a 5, with only a tiny fraction rating it a 3, showing that the app generally meets user expectations. The functionality and performance of the app received high approval, with 51.4% giving it a 5, indicating users' confidence in recommending the app to others. The app's impact on enhancing daily interactions and tasks at UUM was also positively received, with 54.3% rating it a 5. Additionally, 54.3% of users found the app's resources and support for UUM queries sufficient and beneficial. The app's visual design was appreciated, with 54.3% giving it a 4, indicating that its aesthetics contribute positively to the user experience. The data suggests that users are delighted with the app's performance, functionality, and design.

CONCLUSION AND FUTURE WORK

In conclusion, the UUM Navigate: Campus Companion is a thoughtfully designed mobile application explicitly tailored for Universiti Utara Malaysia (UUM) students, particularly new intakes and first-semester students. The app's primary objective is to provide essential information and navigation assistance within the UUM campus, including directional routes to classes, details about critical departments such as Student Affairs, and solutions for navigating challenging situations. By consolidating these features into a single, user-friendly platform, the application significantly enhances the university experience for UUM students, making campus life more manageable and less stressful. The UUM Navigate: Campus Companion is a practical tool for immediate navigation and resource access and represents a significant advancement in leveraging technology to improve student services. Its interactive features, including FAQs, extend its functionality as an ongoing resource for students throughout their time at the university. The app's implementation demonstrates how digital solutions can be innovatively integrated into campus services, offering a model that can be adapted and expanded to meet evolving needs.

Future work on the UUM Navigate: Campus Companion could focus on expanding its features, such as incorporating real-time updates, enhancing user engagement through personalised content, and integrating more interactive elements like virtual campus tours. Additionally, gathering continuous feedback from users will be crucial in refining the app's functionality and ensuring it remains responsive to the changing needs of UUM students. By doing so, the app can further solidify its role as an indispensable tool for navigating university life and improving the overall student experience.

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