Hiking Mobile Application

Enhancing the Experience Modern Outdoor Recreation.

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***Abstract*—This paper presents a research study on developing and enhancing hiking mobile applications, focusing on features like trail search, social media integration, and comprehensive tools for hikers. The study examines how user experience affects the effectiveness and adoption of these apps and includes a comparative analysis of existing apps such as Strava, AllTrails, and Gaia GPS.The research aims to create a new, feature-rich, and user-friendly hiking mobile application that addresses current gaps and enhances the overall hiking experience. By providing insights into user preferences and behaviors and emphasizing user-centered design, the study aims to set new standards for functionality and user experience. The findings and methodologies are intended to guide future developments in mobile applications for outdoor activities, ensuring they are more intuitive, effective, and engaging for users.**

I. Introduction

The growing popularity of outdoor activities has witnessed a surge in technological advancements that aim to enrich the experiences of enthusiasts. Hiking, a beloved pastime across the globe, has particularly benefited from this integration, with mobile applications emerging as a key driver. These applications boast features designed to improve safety, navigation, and connection with the natural environment (Dickinson et al., 2017). However, despite their widespread adoption, research on the impact of these apps on hiking experiences and their effectiveness in promoting safe and environmentally responsible practices remains limited. This paper will examine the multi-faceted ways mobile apps are revolutionizing modern outdoor recreation. We will dissect the features that empower users to meticulously plan hikes, navigate unfamiliar trails with confidence, and gain invaluable real-time information about weather conditions, potential hazards, and nearby points of interest. We will also explore the role of mobile apps in fostering a sense of community among hikers, enabling them to share experiences, discover new adventures, and connect with fellow outdoor enthusiasts. Additionally, E-commerce Integration can be examined for its potential to enhance convenience. Building upon this foundation, the objective of this study is to develop a new mobile application for hikers, incorporating current advanced technologies to further enhance the experience of modern outdoor recreation. By critically analyzing the benefits and potential pitfalls of existing applications, we can design a novel app that addresses current limitations and leverages the latest advancements to create a truly transformative experience for hikers.The revisions highlight your objective of creating a new hiking app and smoothly integrate it into the overall discussion about the evolving role of mobile technology in outdoor recreation.

A. Objective

The objective of this is to study the current market requirements, design and develop a hiking mobile application for the Bragas Escape group with three main user roles (administrator, hiker, and Bragas group), and conduct a user acceptance test to evaluate its functionality.

B. Problem statement

Hikers face significant challenges in obtaining up-to-date information about upcoming trips, complicating their planning process. Additionally, Hiking mobile application lacks a dedicated platform for advertising activities, managing community events, handling trip bookings, overseeing product inventory, planning trips, and selling products. Furthermore, the current manual administrator system for recording and managing payments is inefficient and prone to errors. The aims to address these challenges by providing a centralized hub platform that integrates and resolves all these issues.

II. Literature review

A. Hiking

Hiking offers numerous benefits for physical health. It serves as a crucial activity in combating lifestyle diseases like obesity, hypertension, and diabetes [1]. Engaging in hiking programs has shown reductions in stress levels and state anxiety, promoting psychological well-being among cancer survivors [2]. Studies have highlighted the positive impacts of winter hiking interventions on increasing physical activity and improving sleep duration [3] Additionally, hiking on trails like the Appalachian Trail has been associated with improved physical condition and reduced sedentary lifestyle choices, ultimately aiding in the prevention of health issues linked to lack of exercise. Furthermore, hiking groups provide meaningful spaces for exploration of health, fostering community support and aiding in healing processes among middle-aged and older adults [4]. Overall, hiking emerges as a holistic activity that promotes physical well-being and supports overall health.

B. Mobile Application As Tool Hiking

Mobile applications have become essential tools for enhancing hiking experiences by integrating features like augmented reality, historical information, GPS-based spatial analysis, and audio-visual content [5] . Studies indicate positive user feedback on usability, with high System Usability Scale scores, and effective communication of geographic information [6]. By leveraging mobile technologies, hikers can access GeoReferenced data, historical context, and real-time spatial activity patterns, aiding navigation and enriching experiences [7]. These apps not only enhance visitor experiences but also support park management in mitigating negative impacts and optimizing visitor conditions [8]. Overall, mobile applications offer a blend of technology and nature, providing valuable tools for modern hikers seeking enriched outdoor adventures.

C. Social and Community Features in Hiking Apps

Hiking apps play a crucial role in enhancing user engagement and fostering a sense of community among outdoor enthusiasts by incorporating social and community features [9]. These apps aim to connect hikers, facilitate group ac- tivities, and promote social interactions through features like voice conversations, message sharing, and photo sharing [10]. Moreover, the analysis of trail networks within hiking apps can identify key points where hikers converge, creating opportunities for social interactions and community building [11]. By utilizing geolocalized data and complex network theory, hiking apps not only enhance individual hiking experiences but also contribute to understanding human mobility patterns during leisure activities, ultimately promoting social connec- tions within the hiking community [12]

D. E-Commerce Integration

E-commerce integration exerts a profound influence on mobile app functionality, substantially enhancing application success, user satisfaction, and overall performance [13]. This integration encompasses a multitude of platforms, including devices, data repositories, operating systems, marketplaces, and additional applications, which are integral for fostering effective application functionality [14]. Furthermore, the adoption of cloud computing within the sphere of mobile commerce affords significant advantages to businesses, facilitating lower operational costs and yielding higher benefits due to enhanced accessibility and operational efficiency [15]. Advances in technology have catalyzed the evolution of mobile and e-commerce applications, resulting in the creation of more sophisticated and effective solutions tailored for an array of smartphones and mobile devices. This ensures that web applications deployed on mobile platforms maintain both efficiency and security [16]. Overall, the integration of e-commerce into mobile applications not only broadens their functional capabilities but also crucially underpins their success and bolsters user satisfaction, thereby enhancing the viability of mobile applications in a competitive landscape.

E. Trail Selection And Hiker Engagement: Sustainability, And The Dynamics Of Outdoor Recreation

Tailoring the difficulty of a hiking route to match the physical condition of the hiker can indeed enhance the overall hiking experience. Research emphasizes the importance of assessing the level of effort, technique, and risk of hiking trails to provide tailored recommendations based on individual limitations [1]. Specialized training and systematic preparation are crucial for success and safety during hikes, with experienced hikers showing improved cardiorespiratory and psychological responses compared to beginners [2]. Furthermore, the quality of hiking experiences is influenced by factors such as natu- ral landscapes, tourist infrastructure, and human settlements, highlighting the significance of aesthetics and environmental elements in enhancing the overall hiking experience . By considering individual physical capabilities and matching them with suitable trail difficulties, hikers can optimize their enjoyment and satisfaction during hiking activities.

F. Impact Of User Experience In Mobile Applications

High-quality User Experience (UX) plays a crucial role in impacting user engagement in hiking mobile applications. By focusing on a user-centric approach, such as through the Engaging User Experience (ENUX) framework [17], developers can enhance the overall User Engagement (UE) by considering factors like point of engagement, period of engagement, maximum engagement, and re-engagement. Additionally, incorporating augmented reality interaction models in mobile applications for hiking trails can provide users with interactive and recreational experiences, leading to improved engagement levels [18]. Furthermore, considering user interest alongside Quality of Service (QoS) factors in a Quality of Experience (QoE) model can significantly boost user engagement by satisfying aesthetic and personal needs, as demonstrated in the QoS and user Interest based Engagement (QI-E) regression model [19]. Overall, prioritizing high-quality UX through user-centered design principles positively influences user engagement in hiking mobile applications.

G. Comparison Application

Figure 3 shows the review table for four existing hiking mobile applications: Cairn [20], AllTrails [21], Gaia [22], and Wikiloc [23]. The comparison includes features such as logging in or registering, managing user profiles and social media, and finding routes. Users can purchase hiking products, view their product and travel booking history, and access travel posters. Additional features enable trip management and booking, viewing travel calendars, and handling payments. Bragas Escape provides comprehensive management tools for trips, products, and payments, ensuring a robust and user- friendly interface.

Features Product	Strava	All Trails	Gaia GPS	Wikiloc	Cairn	Bragas Escape
Login/ Register	Yes	Yes	Yes	Yes	Yes	Yes
Manage profile	Yes	Yes	Yes	Yes	Yes	Yes
Manage Sosial media	No	Yes	No	Yes	No	Yes
Search trail	Yes	Yes	Yes	Yes	Yes	Yes
Purchasing hiking product	Yes	Yes	No	No	No	Yes
View product history	Yes	Yes	No	No	No	Yes
View booking trip history	No	No	No	No	No	Yes
Make booking trip	No	No	No	No	No	Yes
View calander trip	No	No	No	No	No	Yes
Manage trip	No	No	No	No	No	Yes
Manage product	Yes	Yes	No	No	No	Yes
Manage booking trip payment	No	No	No	No	No	Yes
Manage product payment	Yes	Yes	No	No	No	Yes
Manage user account	Yes	Yes	Yes	Yes	Yes	Yes

Fig. 1. Comparison Application

III. METHODOLOGY

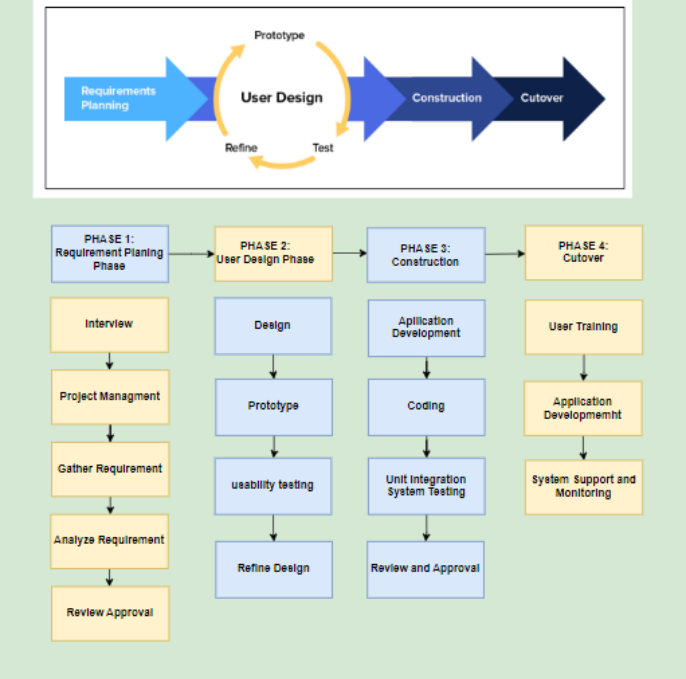

Fig. 2. Rapid Application Development model

The hiking mobile application project adopted the Rapid Application Development (RAD) model as its primary software development methodology base on figure 2. This iterative and flexible approach facilitated a dynamic progression through key phases, including requirements analysis, user design, construction, and cutover. Design tools, particularly draw.io, were instrumental in crafting detailed Unified Modeling Language (UML) diagrams and user interface drafts. This approach ensured a systematic and comprehensive development process, adhering to the principles of agility and user-centered design inherent in the RAD model. Below is Figure 1, illustrating the RAD development process for the hiking mobile application.

A. Phase 1 Requirement Planing Phase

In the initial phase of the project, the focus was on understanding the requirements, which involved thorough analysis and review to ensure clarity and alignment with the project's objectives. Effective project management strategies were implemented to organize and monitor progress. This phase required close collaboration with stakeholders to gather and analyze requirements accurately. Once the requirements were reviewed and approved, the project moved forward with a clear roadmap, ensuring all necessary resources were allocated efficiently to support the development process.

B. Phase 2 User Design Phase

In Phase 2 of the RAD (Rapid Application Development) process, known as the User Design Phase, the focus is on iterative development and user feedback to create a user-centered design. The process begins with the initial design, followed by the creation of a prototype. This prototype undergoes usability testing to gather feedback from users. Based on this feedback, the design is refined to better meet user needs and expectations. This cycle of prototyping, testing, and refining continues until the design is optimized for usability and functionality

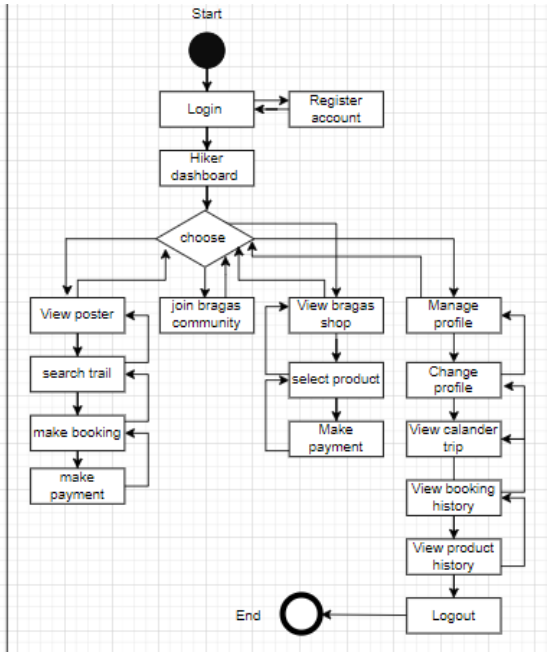

Fig. 3. Process Flow For Hiker

Figure 3 illustrates the process flow for a hiker. In this flow, the hiker can start by logging in or registering if they do not have an account. After that, the hiker can choose to navigate to four main interfaces: view posters, join the Bragas community, view the Bragas shop, or manage their profile. Finally, the hiker can log out from the interface.

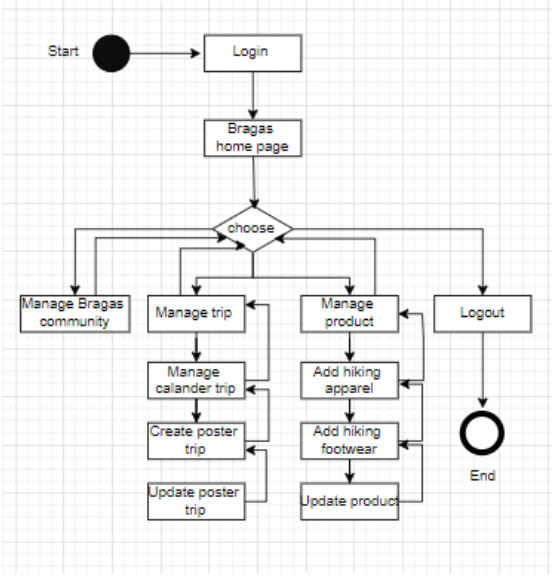

Fig. 4. Process Flow For Bragas Group

Figure 4 illustrates the process flow for a Bragas group. In this flow, the Bragas group can start by logging into their account. After that, they can choose to navigate to four main interfaces: manage Bragas community, manage trips, manage products or log out from the interface.

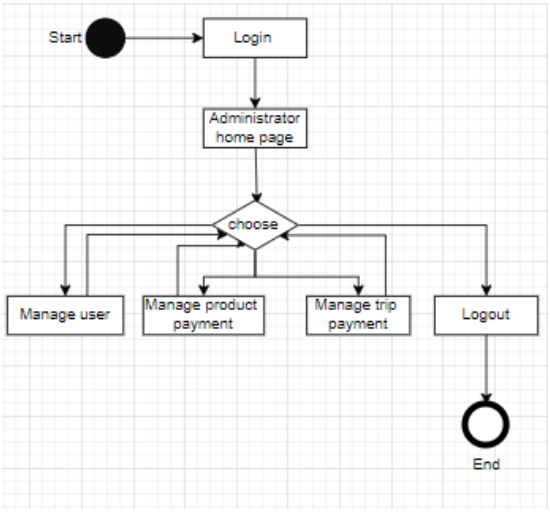

Fig. 5. Process Flow For Administrator

Figure 5 illustrates the process flow for a administrator. In this flow, the administrator can start by logging into their account. After that, they can choose to navigate to four main interfaces: manage user, manage product payment, manage trip payment or log out from the interface.

C. Phase 3 Construction Phase

In Phase 3 of the RAD (Rapid Application Development) model, known as the Construction Phase, during the construction phase, the Bragas Escape Hiking Mobile Application is actively developed, with user feedback and improved prototypes guiding its evolution. Development efforts prioritize continuous integration and modularity, enabling regular testing to promptly identify and rectify errors. User feedback is incorporated into each iteration to ensure the system closely aligns with the users' evolving expectations. The system is developed using Flutter for the front-end and Firebase for the backend, serving as the database to store all the data in the system.

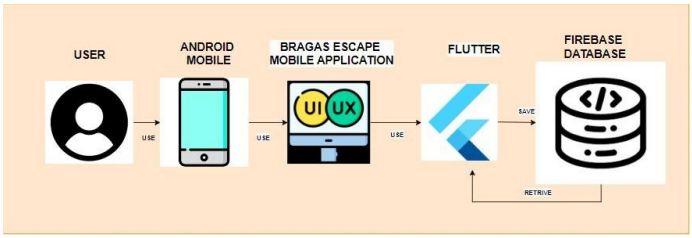

Fig. 6. System Architecture

Figure 6 show the system architecture of the Bragas escape hiking mobile application is designed to deliver a seamless and efficient user experience. The application is built using Flutter, a versatile and powerful framework for cross-platform mobile development, ensuring compatibility and consistency across both iOS and Android devices. The backend infrastructure leverages Firebase, a robust and scalable database solution, to manage and store user data, application data, and real-time updates. This combination of Flutter and Firebase allows for rapid development and deployment, real-time data synchronization, and a secure environment for user information. By utilizing these technologies, the mobile application provides a reliable and responsive platform that enhances the overall hiking experience, offering features such as trail search, social media integration, and comprehensive tools to support hikers on their journeys. The integration of these technologies ensures that the system is both scalable and adaptable, ready to meet the growing needs of its user base.

D. Phase 4 Cutover Phase

In Phase 4 of the RAD (Rapid Application Development) model, known as the Cutover Phase, the focus is on final preparations and transitioning the system to the users. This phase includes user training to ensure that all users are comfortable and proficient with the new system. Following training, the application is deployed into the production environment. Finally, system support and monitoring are established to provide ongoing assistance and ensure the system operates smoothly. This phase ensures that the transition is seamless and that any issues that arise post-deployment are quickly addressed.

IV. Prototype Development

Prototype development involves creating an initial version of a product to test and refine its features and functionality before final production.

A. Prototype Design

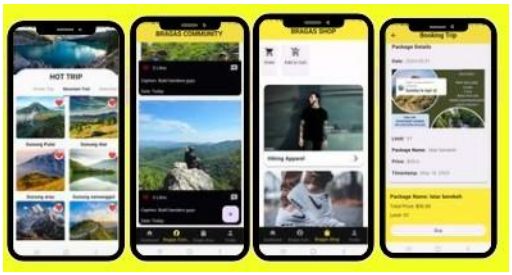

Fig. 7. Hiker Dashboard

Figure 7 illustrates the hiker dashboard, which provides an overview of the system. The dashboard offers various functionalities, including booking trips, purchasing hiking products, searching for trails, managing profiles, and joining the Bragas community.

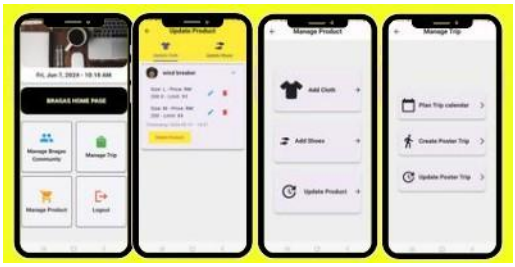

Fig. 8. Bragas Home Page

Figure 8 illustrates the Bragas home page, which provides an overview of the system. The Bragas home page offers various functionalities, including managing trips, managing products, and managing the Bragas community

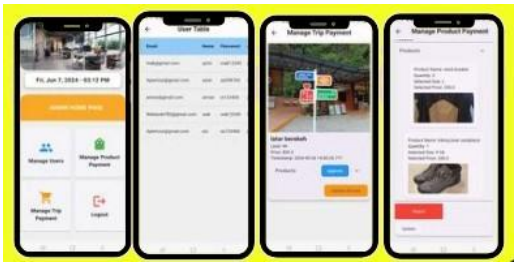

Fig. 9. Administrator Home Page

Figure 9 illustrates the Administrator home page, which provides an overview of the system. The administrator home page offers various functionalities, including managing product payments, managing trip booking payments, and managing users.

V. Conclusion and Recommendation

A. Conclusion

The project successfully achieved its objectives through research, observations, and collaboration, resulting in enhanced efficiency and the automation of manual processes. It provided valuable experience in software development and skills enhancement. Its success exemplifies effective project management and serves as a model for enhancing the Bragas Escape hiking mobile application. Additionally, the project has received approval from both the client and the supervisor, further validating its effectiveness and alignment with the desired outcomes.

B. Recommendation

The system has met its objectives but can be improved with these enhancements in the future:

1) Implementing real-time GPS tracking ensures accurate navigation
2) Integrating live weather updates helps hikers prepare for changing conditions,
3) Implementing an SOS button enables hikers to quickly alert emergency.

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