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MANILAQUEST: AN AUGMENTED REALITY GAMIFIED NAVIGATION AND TOURISM EXPERIENCE

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ABSTRACT
This study concerns the development of a ManilaQuest, an Augmented Reality (AR)-based gamification-based navigation app that can improve tourism experiences in Manila. Tourism continues to play a vital role in the Philippines economic system, though the majority of the tourist sites have not been fully utilized due to traditional methods of navigation such as use of printed maps, brochures and conventional guided tourism. The interactive nature, dynamism of information and customized experience are not common in such approaches. ManilaQuest will tackle these issues by incorporating AR overlay, gamification, mini games, etc., to make tours more interactive and friendly to local and foreign visitors. ManilaQuest was developed with Unity 3D by incorporating Niantic Lightship ARDK for AR navigation, Google Maps API and OpenStreetMap for location rendering, an A* pathfinding algorithm for route optimization, and SQLite-handled data storage. Results indicate that ManilaQuest improves tourist experiences, with gamification features such as quests, challenges, and rewards motivating users to explore cultural landmarks. AR and AI integration provided interactive experiences beyond conventional tourism tools. Despite limitations like device compatibility, battery use, and GPS errors, ManilaQuest shows strong potential to promote cultural conservation, accessibility, and modernization of tourism in the Philippines.

Keywords:
Augmented Reality, Gamification, Artificial Intelligence, Navigation, Tourism, Unity.

INTRODUCTION

ManilaQuest uses multiple advanced technologies to establish an immersive augmented reality and gamified tourism experience through its platform. AR is an interactive experience that offers dynamic features since digital objects are displayed on top of the real world, giving the user a chance to interact with virtual objects in real-time [1]. Artificial Intelligence (AI) increases the intelligence of the system, which is able to make smart decisions to increase playability, navigation, and personalization of content [2]. Algorithms play a crucial role in optimizing the process of processing data, making the system more responsive, and helping interact with each other in a streamlined manner [3]. ManilaQuest easily guides users to explore and experience tourist destinations with high technology. Innovative platform ManilaQuest integrates its technologies to make an interactive and gamified platform that allows users to explore tourist destinations in Manila by experiencing an engaging platform [4].

ManilaQuest is an app that relies on gamification technology combined with augmented reality and real time geolocation to provide a highly immersive tourism experience. Through a mapping interface, developed using Google Maps API, users can explore three major tourist spots in the city of Manila and they can decide on the mode of transportation that they want to use, which could be walking, public transport, motorcycle, or private automobile. The system includes mini-games and other simple challenges to make the experience interesting. Players get tokens as rewards on the achievement of challenges, and they can be utilized to unlock more content or to improve their experiences.

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In ManilaQuest, an artificial intelligence (AI) voice informant called Emy will accompany the user and will present them with historical and cultural facts about the selected destinations. Emy also offers directions and tutorials, particularly in Story Mode, where players complete a guided story to unlock the story and get tokens. The system does not need cloud syncing and user login. Rather, it stores user data (such as progress and rewards) with local storage or using the device ID. This implies that when an app is restarted or when it is uninstalled, all the rewards and the tasks accomplished will be removed because the information is stored on the device.

ManilaQuest offers various advantages to tourists and tourism institutions alike. The tool transforms traditional tourism into an interactive exploration, enhancing educational learning about history and culture. The use of gamification increases user engagement, encouraging the completion of challenges, which in turn boosts visitation rates. The Augmented Reality a real-time location tracking technologies enhance the user's experience by providing precise navigation and fostering a deeper connection to the environment. The reward system further motivates users by offering continuous enjoyment and incentives, ensuring sustained participation throughout their exploration.

An existing system validates the integration between Augmented Reality (AR) and gamification functions in tourism applications because they strengthen user engagement and teaching capabilities. The system, NosfeRAtu, in which Marín et al. [5] developed as an Augmented Reality (AR) application that guides users through Orava Castle, Slovakia, using a virtual character motivated by Nosferatu. Users can follow interactive tasks that guide them through the site to discover its historical past. The Augmented Reality platform ManilaQuest applies AR technology as well as geographical positioning to enhance experiential exploration across the Manila city area. This concludes that Augmented Reality (AR)-based navigation enhances user decision- making abilities together with spatial awareness, thereby demonstrating the practicality of ManilaQuest. ManilaQuest builds from proven technology applications by incorporating successful tourism concepts that combine Augmented Reality technology with gamification elements to offer an interactive educational city exploration service.

OBJECTIVES

The primary goal of this capstone project is to develop ManilaQuest: An Augmented Reality Gamified Navigation and Tourism Experience, a mobile application designed to enhance tourist engagement, navigation, and cultural appreciation through interactive, real-time, and gamified experiences.

Specific Objectives

This section outlines the specific objectives of ManilaQuest: An Augmented Reality Gamified Navigation and Tourism Experience. These objectives focus on developing a mobile application that enhances the tourist experience through gamified Augmented Reality (AR) features. The goals include improving engagement, navigation, and cultural appreciation while providing personalized, interactive, and educational experiences.

1) Design and develop a gamified Augmented Reality (AR) tourism app that improves engagement, navigation, and user experience compared to traditional methods.
2) Implement real-time geolocation and AI-driven recommendations to enhance accessibility and provide personalized tour experiences.
3) Integrate gamification mechanics such as quests, challenges, and rewards to encourage cultural exploration.
4) Evaluate the effectiveness of the proposed system through user testing, measuring engagement levels, navigation efficiency, and learning outcomes.
5) Compare ManilaQuest with traditional tourism methods to assess its impact on visitor participation, cultural appreciation, and overall user experience.

METHODOLOGY

This section shows the methodology, which indicates the systematic approach and processes that is being utilized to develop and implement ManilaQuest. It covers the specific tools, techniques, and strategies applied to accomplish the project's objectives.

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Figure 1: Agile Development Model

Agile methodology is highly dynamic and iterative project management model to enable software development, customer feedback, collaboration, and constant improvement of the process. Within Agile, projects are divided into small manageable units known as sprints; and accomplished upon completion following a few iterations-advancement of progression through analyses and modifications at each step throughout the development process.
It enables flexibility and rapid substitution with change as the development process is underway, and so was the reason why ManilaQuest came about in the Agile approach. Response to user feedback by incremental improvement and additional features that ensure the overall AR tourism experience is improved to better suit user requirements.

Planning Phase
This phase involves identifying the objectives, scope, feasibility, and requirements of the system. For ManilaQuest, this included analyzing the needs of tourists and tourism institutions, determining the features such as AR navigation, realtime geolocation, and gamification, and setting the timeline and resources for development.

Design Phase
This phase deals with system architecture and UI real design for intuitive and friendly user apps. Wireframes and prototypes are made to represent the expected behavior or appearance of the app. In this design, the introduction of AR into user experience in any interaction would have to guarantee that features to support interactive maps and gamified interfaces would be included.

Development Phase
This phase deals with turning the specifications into an application through coding and integration of various parts. For ManilaQuest, we developed some of the key features such as AR navigation, realtime geolocation, and gamified elements with the help of Unity.

Testing Phase
This phase is for identifying and resolving some issues to ensure that the software meets the quality standards of the system. In this phase, the proponents tested the draft system further to determine how functional the UI/UX and also the walkthrough is.

Deployment Phase
This phase is dedicated to the launch of the finished application to the users. For ManilaQuest, deployment ensured compatibility and performance across multiple devices, making the app accessible to both local and foreign tourists.

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Review Phase
This phase is intended only for assessing the development process and outcomes to identify areas of improvement. In the case of ManilaQuest, the review prioritized the refining of features, enhancing performance, and planning for future updates.

RESULTS AND DISCUSSION

To test ManilaQuest: An Augmented Reality Gamified, the questionnaire was used to gather feedback on 64 respondents Sea Travel and Tourism. It was tested on five quality metrics which include Functionality, Usability, Reliability, Performance Efficiency and Satisfaction (User Experience). The scores were assessed with the use of the 4-point Likert scale (1 = Strongly Disagree to 4 = Strongly Agree). The gathered information was tabulated and processed with the help of descriptive statistics, that is, the calculation of the mean and standard deviation. These statistical tools enabled the proponents to summarize the answers of the participants and evaluate the overall performance of ManilaQuest about the parts of the ISO/IEC 25010 quality characteristics.

Generally, the system scored high in all the five criteria, with Usability and Functionality scoring the highest implying that the system is not only easy to operate but it also offers the right historical information. User Experience (satisfaction) and Performance Efficiency were also rated highly, which implies that the users found the app interesting, rich, and pleasant to use but can be improved to achieve higher levels of reliability but can be relied upon only under perfect conditions. These findings affirm that ManilaQuest is effective in achieving its objective of being an AR gamified navigation and tourism app, which accurately portrays cultural content whilst making it a easy and interactive smart adventure.

Criteria	Average Mean	Interpretation
Functionality	3.72	Agree
Usability	3.88	Strongly Agree
Reliability	3.64	Agree
Performance Efficiency	3.67	Agree
Satisfaction	3.71	Agree

Table 1. User Evaluation Survey Summary

ACKNOWLEDGEMENT

We are thankful to the faculty and personnel of the College of Computer Studies at Universidad de Manila to have guided and supported us all through the development of ManilaQuest: An Augmented Reality Game-Based Navigation and Tourism Experience. We also wish to thank the bodies and local institutions who gladly liaised with us and supplied us with valuable information that was very critical in our study. We would like to extend our heartfelt gratitude to our classmates and respondents who showed their useful feedback and helped to improve our research. Lastly, we would like to give our gratitude to our families who have been very encouraging throughout the project and lastly, to Almighty God whose wisdom and blessings brought this project to be.

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CONCLUSION

Overall, the proposed research was aimed at creating ManilaQuest an AR based gamified navigation and tourism application that would allow people to enjoy an interactive and interesting cultural experience of the city of Manila. The system was built in a structured way based on the Agile approach that divided the project into smaller steps to enable it to remain continuously improved and adaptable over time. The proponents were able to design a system that encourages cultural appreciation yet remains usable, reliable, and entertained by the user once they integrated augmented reality and gamification elements coupled with navigation in real time. The potential users were surveys and questionnaires used to collect data, which offers a good knowledge that informed improvements in the system, and literature reviews were used to collect academic- and tech-driven support to the study. The design phase involved the design of the systems, integration of AR, testing, and evaluation of the system to ascertain that the application reaches its targets of improving tourist experiences and providing or showing accurate historical contents in a new manner.

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