

INTO THE CAMPUS: CREATING AN ANDROID-BASED INTERACTIVE VIRTUAL TOUR OF LA VERDAD CHRISTIAN COLLEGE – APALIT USING UNITY 3D

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ABSTRACT

In this study, the application, Into the Campus, was used as a visual tool in advocating the virtual and 3D technology to allow its user to experience the environment of La Verdad Christian College – Apalit chapter anywhere they want. The researchers used Google Sketchup, to create the 3D objects and buildings of the school. Unity 3D was used to merge the 3D objects and create the Virtual Tour and 3D Map feature of the application which shows the different parts of the school including its facilities and rooms, and also some information about the different objects inside the campus. The respondents of the survey conducted were from La Verdad students and non-students to measure the whole usability, functionality and accuracy of the mobile application. In the final results, it was shown that in the overall responses, the application would greatly help students, applicants and their parents to be familiarized with the appearance of the school and know the different basic application process of the school even before they visit the school personally which would help them make their application process faster, and convenient. This would also help the applicants with their decision making on applying to the school.

KEYWORDS – Virtual Tour, 3D Map, Android, Mobile Application, Unity 3D

INTRODUCTION

Choosing where to attend college is a complex decision-making process for students [1]. The introduction of Virtual Tours and Interactive 3D map technology have greatly helped in creating solutions to problems that includes students having slow admission process of the school due to the unfamiliarity of the place and insufficient information about the whole process of the admission itself.

The project aimed to serve as a guide to familiarize the people including the students and their parents or guardians on what does the school looks like without spending too much time and money. It would let others experience the environment and the atmosphere of the school by showing them a detailed virtual representation of the school chapter itself. “Almost all schools have realized that they have to have a virtual presence online”. Students who visit schools, even virtually, “are better informed students, so if they decide to apply, they will actually be a much better fit.” [2].

The purpose of the project is to create an application that will be able to properly integrate the use of the advancement of technology to help the incoming students including their parents to be properly guided on the things that they must know before and after they enter La Verdad Christian College.

In the most recent statistics by Commission on Higher Education (CHED) last December 2018, only seven (7) out of 199 registered colleges and universities offer a campus map on their school website. Five (5) out of 199 of them offers Image-Stitching panoramic images of the campus, 37 out of 199 colleges have video-based Virtual Tour and Seven (7) out of 199 colleges have photo slideshow on their website.

Objectives

The general objective of the project is to make an interactive virtual tour of the campus to showcase the whole architecture of the school. Second is to minimize the inconvenience of new student applicants and parents in the application process.

For the specific objectives of the research:

- To create a 3D Representation of the different buildings and structures of LVCC Apalit using unity 3D and Google Sketchup Applications.
- To deploy the project as an android application and install it to compatible android devices.
- To Prove if the application will be able to help minimize the inconvenience of students and parents in the application process

Conceptual Framework

For the researchers to create the application, they have gathered first some information and data about the different process and policies of the school through interviews. Different photos of the school’s infrastructures and facilities were also taken for the reference during the creation of the 3D objects. Navigational Map of the campus grounds were also borrowed from the school’s engineer to serve as a guide for the 3D Map feature of the application.

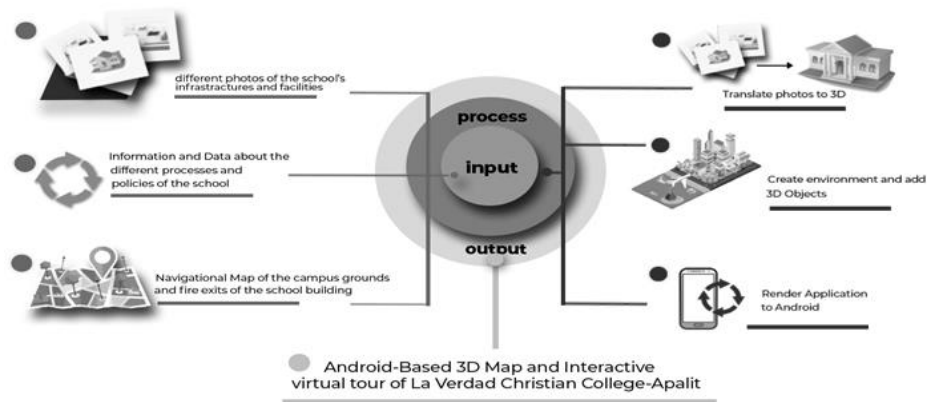


Figure 1. Conceptual Framework of the Project

Translating the photos taken into 3D object was one of the process that the developers has done to create the application. After the creation of the 3D objects, it will be imported to other application for the creation of the virtual environment. Then once the application is ready to be used, it will be rendered as an Android Package Kit to be deployed in Android devices.

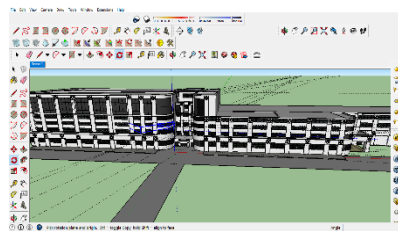


Fig 2. Creation of 3D Building

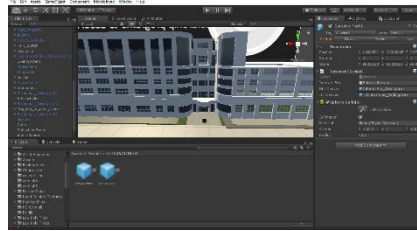


Fig 3. Importing 3D Objects to Unity

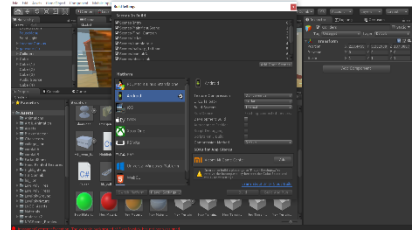


Fig.4. Rendering to APK

After some programming, testing, debugging and revisions, the application was then finalized and deployed to a compatible android device.



Fig. 5. Screenshot of the 3D Map Feature

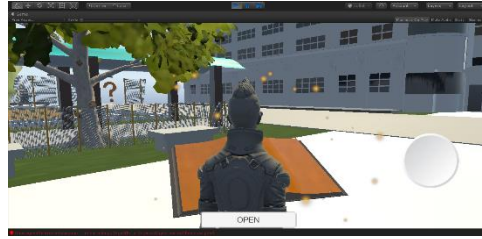


Fig. 6. Screenshot of the Virtual Tour

LITERATURE REVIEW

Usage and Importance of Interactive Maps and Virtual Tours for Schools and Universities.

The study entitled as Web Interactive Campus Map is a Web Based application created for Mindanao University of Science and Technology (MUST). The developers of the project have used the availability of Google Map API to develop the plan and the authors made use of custom overlay functions to achieve the possibility in adding additional functionalities of the campus map [3]. Abi Mandelbaum, whose company, YouVisit, creates a virtual walking tours for universities, said that about 80% of different applicants would visit no more than four college campuses around their area physically. These students have indicated that having a campus visit was a significant factor that affects their decision-making [4]. Having a virtual tour of the campus makes it stand out among other universities that don't have virtual campus tour and students may promote or share their experience in using your virtual campus tour to their friends, parents, and relatives to help in deciding if they want to enroll to that university [5].

METHODOLOGY

Development Requirements

Hardware: Unity 3D, which is the leading platform in the developments of the application requires a laptop or a desktop that has a minimum specification of two (2) Gigabytes of Random-Access Memory (RAM) and a Hard Disk Drive (HDD) with at least 500 Gigabyte of memory [7]. Listed below are the major software and its versions that have been used during the development process of the application. These software requirements include the 3D engine and the programming language used is the coding process.

Table 1. Major Software Used in the Development of the Application

Software	Specification	Description
Unity 3D	Ver. 5.6.1	A 3D Engine used by the developers to create the application
Google Sketchup	Ver. 2015	tool used to create 3D Models
Adobe Photoshop CS6	Ver. 13.0.1.3	Used for editing images and better graphic
Adobe Fuse CC	Ver. 2014	Used for creating 3D Human Character
C#	Ver 4.0	Object-Oriented scripting language used for the development

Benchmarking

For the researchers to test the application on different devices and measure the performance on each device, the proponents of the project have conducted some benchmarking on different smartphones with different price range and different specifications.

Table 2. Android Smartphone used in Benchmarking and its Specifications

Brand Name	Oppo A37f	Samsung J5	Oppo A3s	Oppo F5
Price Range	PHP 3.5K – 4K	PHP 3.5K – 4K	PHP 7K - 8K	PHP 7K – 10K
Android Version	5.0 Lollipop	5.1 Lollipop	8.1 Oreo	7.1 Nougat
Chipset	Qualcomm Snapdragon 410	Qualcomm Snapdragon 410	Qualcomm Snapdragon 450	MediaTek Helio P23
CPU	Quad Core	Quad Core	Octa-Core	Octa-Core

GPU	Adreno 306	Adreno 306	Adreno 506	Mali G71
Brand Name	Asus A007	Samsung S8	Xiaomi Pocophone F1	Xiaomi Mi Mix 3
Price Range	PHP 7K	PHP 30K above	PHP 14K - 16K	PHP 30K above
Android Version	6.0 Marshmallow	8.1 Oreo	9.0 Pie	9.0 Pie
Chipset	Qualcomm Snapdragon 410	Qualcomm Snapdragon 835	Qualcomm Snapdragon 845	Qualcomm Snapdragon 845
CPU	Quad Core	Octa-Core	Octa-Core	Octa-Core
GPU	Adreno 306	Adreno 540	Adreno 630	Adreno 630

Table 3. Benchmark Results According to Different Scenes of the Application

Scenes	Brand	<i>Oppo A37f</i>	<i>Samsung J5</i>	<i>Oppo A3s</i>	<i>Oppo F5</i>
3D Map		Laggy, Playable	Playable	Smooth	Smooth
Façade (Virtual Tour)		Laggy, Playable	Laggy, Playable	Smooth	Smooth
Canteen		Smooth	Smooth	Smooth	Smooth
Hallways		Smooth	Smooth	Smooth	Smooth
Registrar		Smooth	Smooth	Smooth	Smooth
Rooms		Smooth	Smooth	Smooth	Smooth

Scenes	Brand	<i>Asus A007</i>	<i>Samsung S8</i>	<i>Xiaomi Pocophone F1</i>	<i>Xiaomi Mi Mix 3</i>
3D Map		Laggy, Playable	Smooth	Smooth	Smooth
Façade (Virtual Tour)		Laggy, Playable	Smooth	Smooth	Smooth
Canteen		Smooth	Smooth	Smooth	Smooth
Hallways		Smooth	Smooth	Smooth	Smooth
Registrar		Smooth	Smooth	Smooth	Smooth
Rooms		Smooth	Smooth	Smooth	Smooth

During the benchmarking process, smartphones that has an operating system of android 4.0 and below does allow the application to be installed. However, when the user starts the application, it only shows black screen and the whole application won't load. Also, even if the smartphone has high-end specs, and can run the application smoothly if it has low available memory, the application will crash during the loading of the virtual tour. But freeing up more space will fix the issue. The most recent render of the application will take up to 408 Megabytes of memory upon installation and will need at least 100 MB more memory for it to extract the resources during its loading phase in different scenes of the App.

RESULTS

The proponents of the project surveyed to evaluate the usability, accuracy, and functionality of the mobile application and used ISO/IEC 9126 to measure and evaluate to the overall software quality. Purposive Sampling was used to obtain good quality sample and information from random people.

The respondents are composed of 30 students from La Verdad, 16 students from other schools, nine non-students, 4 LVCC Alumni and one parent. The results of the survey responses are illustrated below.

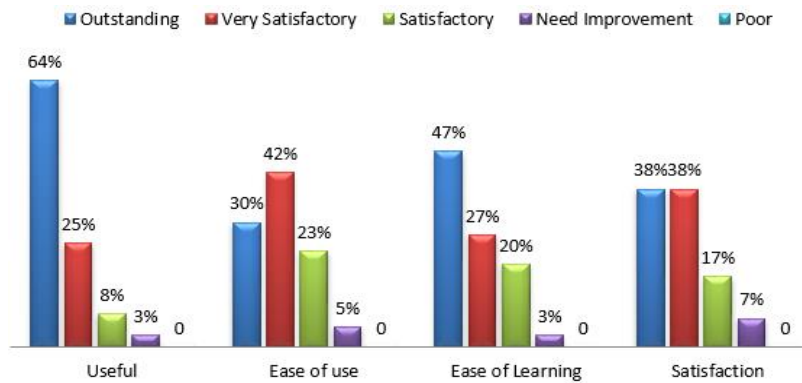


Figure 2. Percentage of the Responses According to the Application’s Usefulness, Ease of Use & Learning, and Overall Satisfaction

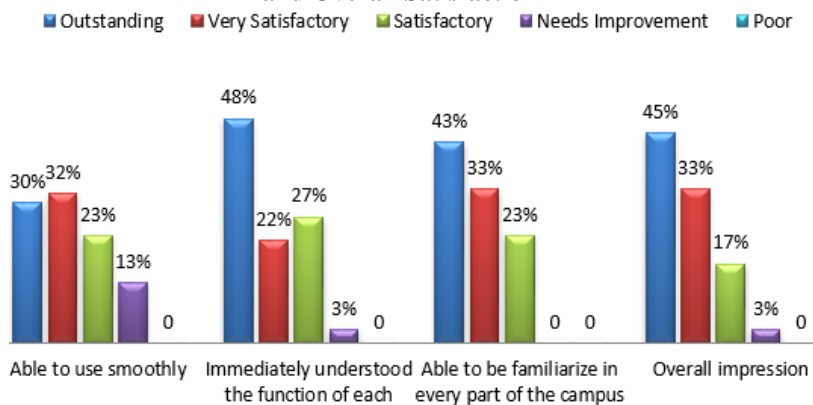


Figure 3. Percentage of the Responses According to the Smoothness, User-Friendliness, and Impression

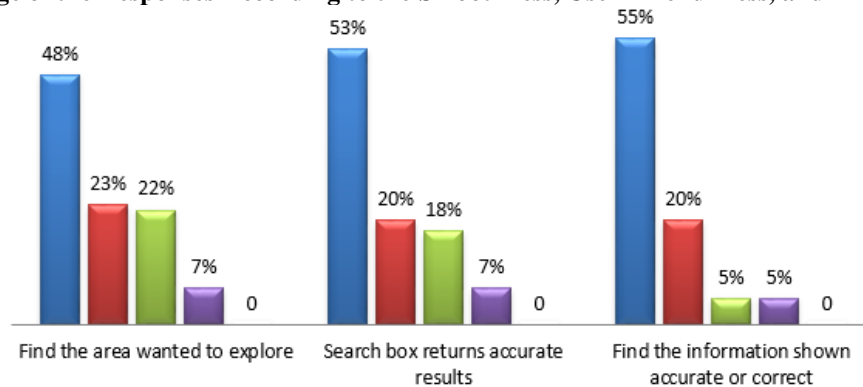


Figure 4. Percentage of the Responses According to the Reliability and Accuracy

CONCLUSIONS AND RECOMMENDATIONS

During the deployment of *Into the Campus application* to other devices, the users have encountered some problems, but with the efforts of the proponents to minimize the errors and lapses, these issues were handled successfully. With the help of the participants in the survey and advisers of the program, the proponents got the results and concluded the following

- The application would greatly help ease the inconvenience of the applicant during the application process.
- The application will be helpful in the decision-making of the incoming students.
- The visitors will become more informed and oriented about what should they know before entering the campus.

- The users will gain bits of wisdom of some things about La Verdad Christian College.
- The application will be able to advertise the school in the future for it to be known in greater parts of the country.

Some of the recommendations from the panels includes the addition of the mini map in the Virtual Tour part of the application, improvement of the collision detection, make the main character wear a uniform in the Virtual Tour, panning in the 3D Map and flexibility of the App to be deployed in iOS for Apple devices. These recommendations are for the future development of the project that will greatly improve the performance and the potential of the mobile application.

ACKNOWLEDGEMENT

We would like to express our deepest gratitude first to GOD, for giving us strength and understanding in making this capstone project possible. To Bro. Eliseo F. Soriano, Founding Chairman, and Dr. Daniel S. Razon, President of La Verdad Christian College, for giving us the opportunity to be scholars of the institution. To Dr. Luzviminda E. Cruz, the School Administrator thank you very much for allowing us to conduct this research study in the school. To Mr. Romack Natividad, BSIS Program Head, for supporting us to be successful on our capstone project. To Ms. Sharene Labung and Ms. Jennifer Aguilar, our capstone Advisers for patiently guiding us and giving us enough knowledge and information during the creation of this project.

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