

Development of a virtual tour system using augmented reality in the Higher Technological Institutes of TecNM

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Abstract— Currently, ICTs (Information technology and communications) are a fundamental tool that favors universal access to education, quality teaching performance and learning, however, the contingency due to COVID 19 encourages education to take a different path through distance education, leading that non-attendance at school institutions leads to a lack of institutional identity in students. This work aims to develop a virtual reality application, showing the architectural and functional construction (workshops and laboratories) in the Technological Higher Studies of TecNM, for the induction of new students and promotion of the careers taught there. The research was developed in a descriptive exploratory methodological framework since it is necessary to describe the procedures in the construction of the modeling in the virtual design since in this way variables will be identified within the theoretical and practical context to carry out and validate the effectiveness of the project.

Key work— Mobile application, virtual reality, Information technologies

I. INTRODUCTION

The integration of new technologies in the modern world has led to programs and study plans being updated, this has caused education in recent years to take a different direction than previous generations..

Currently, it focuses mainly on technological advances that result in better use of students; however, non-attendance at school institutions has generated a lack of institutional identity and this is, above all, a social dilemma. This dilemma occurs as part of the uniqueness of each student, mainly a first-time student, with a solid identity towards their university.

It is important to remember the impact that student identity with the institution has on the learning process since if it is not present it sometimes becomes a problem of great concern for higher education institutions, which has an impact on the image, prestige . and educational quality in the short and long term in the student community, both for first-time students, active students and graduates.

This work aims to develop an application of augmented reality and virtual reality, showing the constructions of the Technological Higher Studies of TecNM, for the induction of new students and the promotion of the institution in the various campuses at the high school level and fairs. vocational, promoting interest in enrolling in the institution.

Currently, propaganda methods offer a wide variety of elements, with which a greater number of information can be disseminated. This is the case of virtual reality, since thanks to its proper implementation, it can be a Incredible sensory virtual journey since the computer generated images provided by the computer have limits creating worlds and spatial journeys in new and interesting ways.

Virtual Reality is born from simulators, which provide the user with a realistic experience in virtual form, that is, it refers to interactive applications where reality is visualized with synthetic elements (3D objects, sounds, text, etc.) in a manner consistent with the user point of view [1].

Virtual Reality allows virtual elements to be introduced into our real environment [2]. This benefit has been explored in different fields [3, 4,], continuing the challenge of seeking new concrete applications of this technology. Within this line of research we explore its use in developed scientific activities [5].

Augmented reality only requires ingenuity, a little imagination and very common tools today such as a smartphone. [6]. This allows us to exploit this unusual form of advertising, attracting the interest of a greater number of people, in our case students.

For this reason, this project presents the development process of an augmented reality and virtual reality application, taking as a model the Technological Higher Studies of TecNM, to make new students aware of it, making the experience of the student is both visually pleasing and intuitive and easy to use.

In addition to knowing a little about the history of this study house, presentation of plans, topographic study and the tools used to carry out this project..

II. METHODOLOGY

The purpose of the research is to help familiarize oneself with the situation of the problem, so it is of an exploratory-descriptive type since it is necessary to describe the procedures in the construction of the models. In this way, variables will be identified within the theoretical and practical context. As a first step, data will be collected to formulate the hypothesis, accurately determining the causes that originated the research. All this based on the agile Scrum software development methodology.

The goal is to work collaboratively, as a team, and obtain the best possible result of the project by executing short time cycles of fixed duration and delivering partial results for each of the phases that will be followed.

Subsequently, the detailed design of the animation environments and structure of the virtual reality tour will be proposed, planning the sprints for the organization, review and analysis of results during the development and execution and retrospective of the project to be able to make decisions for the implementation. and tests or, where appropriate, changes in the development of the animation based on the feedback from the system Fig. 1.

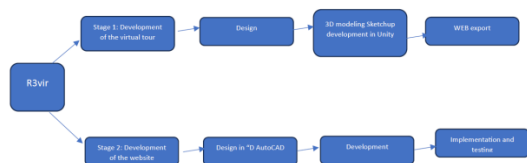


Fig. 1. Methodology and stages of the project. Own source

III. DEVELOPMENT

Virtual tours facilitate knowledge of a specific space by allowing and facilitating the approach, in addition to showing a faithful example of what could be found there, allowing the user to interact between the different spaces, finally detailing the most important elements for their consideration. (Alfonso Pardo, 2006)

The importance of the virtual tour is highlighted by the simulation of a real space, which is made up of several images incorporated into software, allowing the creation of an interactive image which can be viewed and controlled by the user.

Currently, virtual tours become a relevant tool to attract and show users in an interesting way, the different environments, perceiving in them multiple details of their usefulness, where these technologies cover various sectors: industry, education, hospitality, commerce, services. , among others, to provide greater comfort to its users.

When using tools to create virtual reality systems such as utiy, which is a multi-platform 2D and 3D graphics engine, which is transforming the video game industry, it can well be used for other uses since it can develop virtual tours for various devices without changing the platform.

This means that simulation is an imitation or reproduction of an event, situation or phenomenon that is presented in a simplified way, that is, variations with respect to reality from

which its variables and/or characteristics can be manipulated, with this in mind. Basically we can say that simulations must build a simulation space with the general, large and important aspects of the purpose for which the simulation is developed, leaving aside small details that can be considered accessories or decoration.

According to the aforementioned, it can be said that the reproduction of a computer simulation using virtual simulators such as Unity and vuforia provides us with an abstraction of reality, which is represented through a virtual system, which can be manipulated according to the needs of what is wanted.

Considering now these virtual simulations that allow and open space for knowledge and learning, the fact is highlighted that a person will only understand when said person is willing to assimilate it. Therefore, advancing in our reasoning we can show how students who access a tool of this type voluntarily will be willing to understand, appreciate and remember a topic or in this case a virtual tour since it will provide information to make correct use of the tool. the facilities of the Technological Higher Studies of TecNM, and their time relating to the material offered, in order to enrich themselves with opportunities that they suddenly did not know existed.

IV. DISCUSSION AND RESULTS

The design and implementation of the virtual tour application consisted of the visualization of the architectural plan, in order to create the view and the three-dimensional models corresponding to the institution's facilities. The Virtual Reality system developed is a desktop application made for the Microsoft Windows operating system using Sketch-Up 3D models as well as the system itself were made with the Blender 3D Unity tool and vuforia.

As part of the first phase of the 3D development, the decision was made to carry it out in the Sketch-Up software, due to its variety of tools and reference material, from the 2D strokes, that is, through the import of the plan in to this software. For the 3D modeling, it began by placing a square plane, with measurements in meters, after which a survey was carried out simulating the terrain of the perimeter area of the facilities, as well as the structures, Fig. 2.

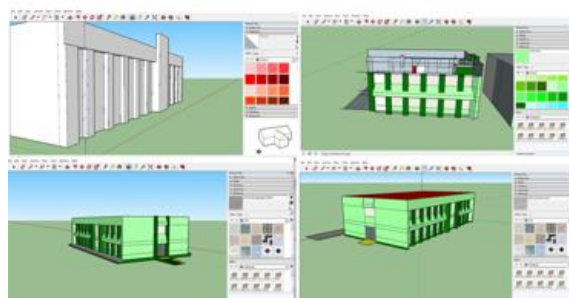


Fig. 2. Design of the virtual tour in the TecNM made in sketch-Up. Own source

Subsequently, the project is exported in format (.fbx) to be able to work on it in Unity 3 D, measurement adjustments are made by expanding the design so that it is visible on the

screen and within the plan in Unity [8]. The aspects of the 3D scenario in the Virtual Tour are detailed in Unity, such as virtual tours until a desired design is obtained [9-14] Fig. 3.

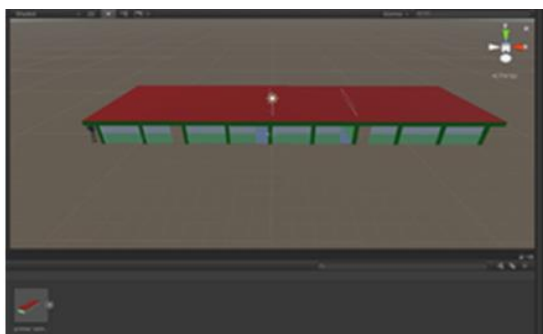


Fig. 3. Design of the virtual tour in the TESCH imported into vuforia. Own source.

To carry out this work, we have started from a set of plans. Figure 3 presents a view of the set and in the following four, groups of two plans of the different components are presented. In this work, the design plans of the engine elements have been used as the target image, so that, with the VUFORIA software activated, the plans themselves will be used to evoke the 3D image or the reproduction of movement in Virtual Reality.

Augmented Reality favored the process of reconstructing the three-dimensional route, that is, the opposite direction to that developed with VR: from the Trihedral System to the Isometric System.

As a final step, the Unity 3D editor will open and a new project will be created. You will come across an empty scene and a main camera where the 3D models will be imported and we will search for them within the editor. If the “All Models” option in the “Project” window is selected, all resources with an extension will appear. fbx or .obj that are associated with the project.

Subsequently, an Empty or empty GameObject is created, which does not have any properties, but will serve as a container to organize all the models. Fig. 4.

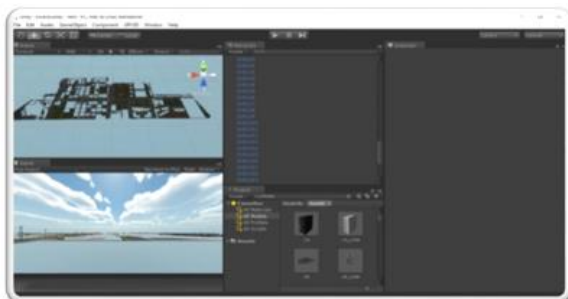


Fig. 4. Creation of an Empty or empty GameObject. Own source

Subsequently, the material that was created is selected, and its properties are verified in the inspector. A drop-down menu

will appear with a series of options, from which I choose “RenderFX/Skybox” in this six spaces will appear to which the textures that make up the sky must be attached, in the shape of a cube, with its faces Back, Front, Left, Right, Up and Down. Once correctly placed, the material will be ready. Now in the toolbar look for the Edit option and select “Render Settings”. In the properties inspector on the right, search for “Skybox Material” and select the created material.

Next, the models corresponding to the buildings are introduced into the scene in the same way as with the ground, taking into account the place where each one should go, and making them coincide on the plan. Fig. 5.

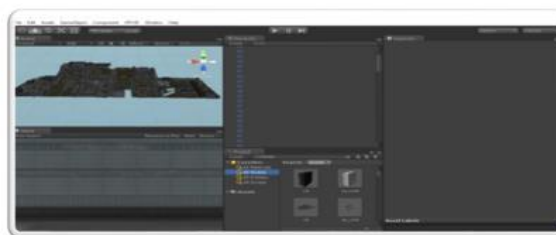


Fig. 5. Scene of the optimized models. Own source

From the campus scene it is possible to access the menu scene by interacting with terminals located in front of each faculty. Each menu corresponds to the building to which the terminal to which the user has connected belongs. To change the scene, the Application .Load Level function is used whose parameter is a String that contains the name of the scene you want to access.

Since there is not enough material for the entire campus, it has been decided to develop only the terminal belonging to the IT faculty.

It is important to mention that all the scenes that are part of the application must be selected, these are the campus scene, the main menu scene, the 3D model viewer, and finally, the 360-degree texture viewer.

The target platform will be Windows, as a desktop application. The selection order matters, since the application will always start in the scene whose index is 0. Fig. 6.

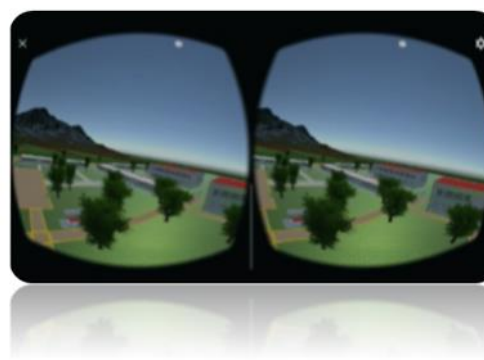


Fig. 6. Virtual view of the tour in Unity. Own source

V. CONCLUSIONS

Software development techniques and methodologies are a practical and proven basis for the development of projects of various kinds, where they have well-defined and repeatable processes.

The result was favorable in the pilot tests carried out where the students responded positively to each variable after exploring the virtual tour, that is, they rated the strategy as having a good design, a positive user experience and their interest.

This is evident in the evolution of supply and demand in this year of 2023, there is an increase in the demand for students in the courses in, considering that previous years it is in a more critical state; With the results of the strategy evaluation we can confirm that it is due to the strengthening of promotion strategies through the implementation of the virtual tour.

Software development techniques and methodologies are a practical and proven basis for the development of projects of various kinds, where they have well-defined and repeatable processes.

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