Influence of the 360º Modeling in Real Estate Leasing

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Abstract
Currently we can visualize the constant use of technologies to streamline processes and physical interactions, therefore, we make use of the 360º modeling that is close to people through virtual environments that allow changing the perspective of the property leasing process since instead of The interested party and the landlord spend time on meeting and meeting activities, it is only enough to use a system that allows interaction between the digital environment and the people who interact with respect to a property lease. Based on this, Virtual Room was created, it is a work team that develops a web page that works in a 360 ° environment for the immersive tour of the properties offered by the landlord, this may publish ads referring to the properties available in order to offer them to people who want to take the desired property according to their needs. The purpose is to reduce the time of the landlord and tenant with the virtual tour, making it a safe and simple process for the exchange of information.

Keywords: Virtual Environment, 360 modelings, virtual tour, leasing, Virtual Room

1. Introduction

Right now, the technologies for the development of systems facilitate the performance of the activities of the programmers of information systems, because they allow the creation of software solutions in a short time and of high quality. Thus, we will use this technological resource to carry out the current proposals that the Virtual Room's team has found in the current context linked to the real estate sector.

The Virtual Room's team has as one of its objectives, the creation of a web application for anyone to publish, rent or share real estate spaces. In order to accomplish this goal, two aspects have been taken into account: The structure and documentary management of the project has been based on the books of PMBOK 6th Edition, Sommerville, Ian (2011). Software Engineering. Pearson (9th Edition) and Pressman, Roger (2009) Software Engineering. A Practical Approach. (7th. Edition) and for the streamlining of the process of delivering the functional software product, using the Agile Scrum methodology.

This structure is conformed by acquisition, analysis, design, development, and implementation, where each one will be detailed later. On the Scrum side, once the requirements are obtained in the analysis stage we refine them into specific tasks in the product backlog and then prioritize them according to the degree of difficulty and importance that the development team has considered, and from this process the Sprints are established (5 in total) and carry out each one and present a final product at the end of each of these.

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In this software project, 360º tours will be taken into account, which are digital solutions that allow you to create interactive virtual tour experiences of properties or places of interest. It allows exploring in depth visual environments in an interactive, simple and effective way. The tours are based on images that become panoramic views, which allow the complete vision of a space where the user experiences the sensation of a real environment, through the control of movement within the area, supported by a pointer or computer keys.

Thus, with the use of 360º modeling, the aim is to implement the virtual tour in the properties so that the users can make the visit from an electronic device without the need to go to the place where the property is offered.

The main purpose of this applied technological research is to expose the theoretical bases, methodology, and tools involved in the development of the web application based on the implementation of virtual tours with the use of 360º images that our team Virtual Room will offer to the real estate sector. In addition, it is intended to present background information that shows the evolution and benefits caused by the use of the platform.

2. Conceptual framework

2.1. Virtual Reality

Virtual Reality is a computer system used to create an artificial world, generated by a computer or by a virtual camera that allows the user to visualize, manipulate and interact with that world in real-time through a device that allows their presence in it.[1] Virtual Reality is a computer system used to create an artificial world, generated by a computer or by a virtual camera that allows the user to visualize, manipulate and interact with that world in real time through a device that allows their presence in it.[1

Virtual reality has caused a great impact on society as it allows to streamline a lot of processes and activities satisfying the end user. There are several programming languages that are more related to virtual reality which are Java, Python, C++, etc. On the other hand, in this research work we have put the idea of implementing Php with virtual reality focused on real estate leasing.

One of the most fundamental importance of Virtual Reality is its multidisciplinary use, since it can be applied in any field of reality, such as medicine, public order, architecture, aviation, etc.

2.2. PHP Language

PHP is a very popular free programming language, especially for creating websites and it is easy to fit it with HTML. This language is used to generate dynamic web pages, in other words, it can refer to those pages whose content varies according to certain situations. [2]

2.3. 360° Photography

Currently the power of the image is something that cannot be doubted, thanks to the use of photographs we know if a product interests us. In an almost immediate way we decide if we like what we see or not. Thanks to the evolution of mobile devices, photography and video programs have the opportunity to visualize and interact as never before. Adding this, the 360 photographic brings many benefits in this stage of pandemic as it facilitates interaction in the field of rental and purchase of real estate, as it can show in detail the space offered. [3]

2.4. Virtual tours

It is the way to relate and transmit to the visitors of a web page, an environment or a specific area with the objective that what is presented is a faithful example of the physical space that can be found. The virtual tours are interactive because they add the possibility that the visitor can move between the different spaces that compose it, as well as detailing the most important elements that are considered in it. This type of virtual tour interacts with the user giving him freedom of movement.

Figure 1. A simple tour of a property.

In sectors related to the sale of real estate, this tool is very useful in times of pandemic because there would be no physical contact, but if, virtual space that the lessor wants to show customers. Another of the benefits that it brings with it, is the time since the lessor and the client will not spend it in meeting for a physical tour of the establishment or apartment, but by this virtual means speeding up then this process, since the client can access the service from his computer, or mobile at any time of the day.

2.5. Panoramic Images

It has changed the way we see things through the internet, unlike the classic or traditional photos that only capture a flat image, panoramas allow you to see the whole scene in its 360 degrees and the feeling of being present in the place, besides being able to interact in it.

A photographic image is undoubtedly the most A photographic image is undoubtedly the most used media on the Internet to publicize any product or environment. For it to fulfill the respective function, it is necessary that the shot, the framing, as well as the possible retouching is done in a professional manner.

3. Methodology

3.1. Type of research

The research work will be subject to the application of knowledge and use of tools that allow the best development of the procedures or processes of the system, for these reasons it is considered as Applied Research.

Applied research is called practical or empirical research, since it is characterized because it seeks the application and use of previously acquired knowledge, while others are acquired, and then implement and systematize the practice based on research. The use of this knowledge and the results of the research make known in a rigorous, organized, and systematic way the solution to the problems of reality. [3]

3.2. SCRUM Methodology

SCRUM is an iterative and incremental framework for project development and is structured in work cycles called Sprints. These are iterations of 1 to 4 weeks, and follow one after the other. At the beginning of each Sprint, the cross-functional team selects items (customer requirements) from a prioritized list. They commit to complete the items by the end of the Sprint. During the Sprint, the chosen items cannot be changed. At the end of the Sprint, the team reviews it with the project stakeholders, and shows them what they have built. [4]
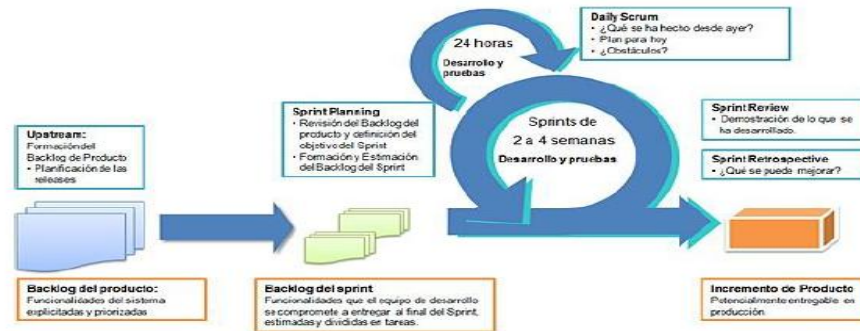
Figure 2 Scrum Lifecycle

3.3. Methodological proposal

The method for the development stage or the strategy proposed in this research, based on the concepts of applied research, result in logical steps based on the general theory of systems where the inputs, processes and outputs are recognized, which aims to explain, ensure and control the proper development of a system, the strategy of the methodology was organized as follows:
1. Collection of requirements
2. Requirements refinement
3. Design and development of the web platform for real estate rental ads.
4. Installation of support extensions.
5. Photo capture.
6. Creation of panoramic images.
7. Insert 360º tour in the web platform.
8. Functional tests for the web platform.
9. Launch of the Virtual Room platform.

1. Collection of requirements:

A requirement is a condition or need of a user to solve a problem or achieve a goal. These are born from the needs of customers to raise their own working model through a web portal, they become attributes, features, capabilities, qualities that the portal needs to meet to have value and utility for the user.
As a result of the collection of requirements, each of the components of the platform offered by Virtual Room is obtained, in addition to the information required in the 360º tour, estimates of development time, form and structure of the project, graphic visualization and size of the tour and thus each of the

precise aspects for the construction of a web platform supported by the implementation of the 360º tour in the real estate.

These collections are taken through the resources established by the data collection techniques:

☐ Interview from the product owner to the customer.

☐ Brainstorming.

☐ Virtual meeting (Video call).

☐ Questionnaires.

Figure 3: Product Backlog Format

2. Requirements refinement

In this section, the scrum planning is carried out in order to perform the prioritization, estimation, and iteration which each PBI of the product backlog defined in step one belongs. In these estimations, the use of the planning poker is used to generate dynamically in the refinement process.

Figure 4: Sprint Backlog Format

3. Design and development of the web platform for real estate leasing advertisements

The results of the previous steps are taken as a reference and we proceed to design the web platform.

In an initial process the panoramic image enters a static format process where it is defined according to the following forms:

☐ Spherical

☐ Cylindrical

☐ Cubic

Figure 5. Virtual tour in Virtual ROOM

So far we will use the spherical type because it adapts to the extensions that we will use in the development of the platform. After applying the format, we place the "hot spot" which are the points of links to another panorama, see figure5 and figure 6, these interactive elements invite the user to go through the place.

Figure 6. Hotspots. Represented by white arrows.

tour as the design and attraction that is used as add-ons both in the tour within a window or in full screen that is defined by users within the options provided by the software tools. In the long run, these add-ons can be designed and implemented by the same user if allowed by the application.

4. Support extension installations

To achieve the results obtained in step 1, extensions that support Virtual Room must be installed for the correct visualization and implementation of the 360º tour. Although when the platform that virtual Room uses is installed for the first time, we obtain a powerful content manager with many possibilities, sometimes "we need something more". The most common extensions for the implementation of 360º tours are:

☐ Panoramic Image Viewer Plugin

- □ Panoramic Image Viewer Module
- □ Panorama 360° HD Full screen viewer
- □ Panorama Viewer FX
- □ Krpano Module
- □ A-Frame
- □ Google Street view
- □ VTEM Overview

Figure 7. Google Street View App

5. Photo Capture:

The photographs are captured sequentially to join them to a panoramic view of greater extension. The points that will be linked to each photograph are strategically established.
This will be done with the use of the Google Street View application that adapts to our needs to obtain photographs with 360º format and then use them in step 7.
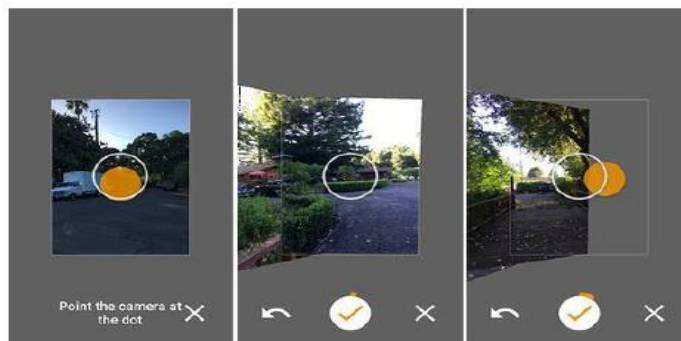
Figure 7. Sequential photographs with Google Street View

6. Panoramic Image Creation:

It basically consists of obtaining extensive views that cover a greater coverage of 360 degrees around, the procedure is to acquire a series of photographs consecutively one after another, with reference to the next in order to recognize a guide or a pattern, from here you get the images of a panorama as the result of the individual photographs, from this point many possibilities of assembly, baking and customization arise. The use of the Panoramic Image Viewer Module will be as an emergency tool in case there is any

problem when collecting photographs in Google Street View, since this tool as explained, is to join the static photos, "sews" them, turning them into an image in 360º format.

Figure 8 Panoramic Image Viewer Module
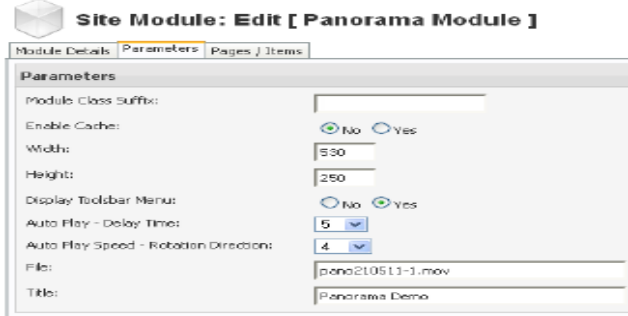
7. Insert 360º tour in the web platform:

The 360º tours that are used, depend on the format that the most common formats for the tours are images, HTML or some special format provided by a specific tool.

To insert this result obtained in the step 4 and 5 of the design and development of the web platform for rental advertisements of the installation of the support extensions, we proceed to go to the backend, in the section of modules or components depending on the extension we use, we proceed to open the one we have chosen to work with and it will ask for the location of the image or HTML address, as well as the parameters of where in the page we want the tour and parameters such as the size of it. See figure 9.

Figure 9. Sequential photographs with Google Street view

In case you want to do it separately, you can directly embed the code through the "custom HTML" tool that A-Frame brings by default, which facilitates the work with respect to the virtual tour and that the Virtual Room team will use it when implementing new 360 images.

8. Functional tests for the web platform:

This final phase corresponds to all the desktop tests performed in order to detect and repair faults focusing on points such as:
☐ Functionality.
☐ Speed
☐ Security
☐ Access
☐ Database
☐ Compliance with requirements
☐ Visual aspects.

9. Launch of the Virtual Room platform:

It consists of the creation and delivery of the user manual in order to explain what the project contains (functionalities). This manual contains screenshots of the system that Virtual Room is offering to the user.

4. Results

The virtual room web application that has comprised several stages for its realization that has as a final result the web platform of real estate rental ads with 360º virtual tour.

In these stages the schedule of activities of the project was carried out. For the development stage had two fundamental parts: Backend and frontend, resulting in the 360º virtual tour platform. With the 360º tour and the platform created, it was determined to use different extensions such as Google Street view, KrPano, jquery libraries and custom HTML in order to show the tour in a simple way from a new way of presentation of the real estate leasing business, delivering as a final result a platform that combines technological tools for the 360º virtual tour through panoramic images and / or merged.

In addition, it will be taken into account that in the development stage some requirements have been prioritized and not all tasks have been developed and it will be necessary to finish those incomplete sections of the project, as in the case of the help section, privacy, terms and conditions. In addition, it will be taken into account that some security in the messaging tray, terms and conditions, etc. will need to be completed.

Figure 10. VirtualROOM. Description View. Department

Departamento · 92m² · 2 Dormitorios · 1 Estacionamiento

Impecable, Ascensor directo, vista a calle, ambientes iluminados, 1 cochera , Miraflores, Lima

92 m²   92 m²   1 Baño   1 Estacionamiento   2 Dormitorios   1 Medio baño   15 Antigüedad

Publicado hace 7 días

Miraflores en Calle Tranquila, Cerca a Reducto y 28 Julio, Súper Céntrico

Departamento en 5to piso, impecable, todo los ambiente con vista y luz natural.
Ubicado en una calle tranquila, cerca a Reducto y 28 de Julio
Contáctenos: 9.4.0.2.6.1.8.5.1 (si no ve nuestro tel. déjenos el suyo en el formulario)

2 Habitaciones
Ver más

Figure 11. Assignment of controls and information points.

5. Conclusions

The implementation of Virtual Room guarantees a great saving of time and effort at the moment of carrying out the process of real estate visitation since it is possible to develop it virtually and at any time of the day making this system useful and very easy to use. 360° modeling is a very important tool as it allows the user to create virtual content of landscapes, places through a combination of photographs converting them from simple images to panoramic images. Websites focused on the 360 tour impress the customers as they get the desired effect at the time of seeing the accommodation through a virtual tour where they interact with the system.

The implementation of this technology on a website dedicated to the sale or rental of real estate, drives to stand out from the competition as it offers an adequate service to the situation that is being experienced caused by the pandemic of Covid-19.

6. Evaluation

The experience of having worked with the Virtual Room team has been very satisfactory, and at the end you are convinced that you have taken advantage of your time and knowledge doubly. Another aspect to take into account is that, through the evolution of the project, you can see how an idea gradually takes shape until you finally get the gratification of being able to witness the final materialization of that initial thought.

In this experience gained in this project the team had the opportunity to learn from mistakes in interaction, collaboration, planning, and development and took corrective action in order to improve as a team.

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