

# 3D MODELING OF BUILDING 26 FACULTY OF SCIENCE AND TECHNOLOGY SUAN SUNANDHA RAJABHAT UNIVERSITY WITH SPATIAL METAVERSE SPACE

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## ABSTRACT

The purposes of this study were to introduction about Building 26 Faculty of Science and Technology Suan Sunandha Rajabhat University by development to 3D Modeling in the form of Spatial Metaverse space for general public staff and University students take advantage of the visit Using by Blender program to create a 3D model of the 26th building, the Science Center building. both inside and outside the building including various objects and using Spatial.io to view a replica of the 26th building at the Science Center Building. All floors of the building are accessible and are recommended for IT classrooms. And from testing the 3D modeling to the evaluation by bringing the 3D model to the test by experts. and assessed the overall satisfaction of the general public with the 3D modeling from 5 experts at a high level and the overall picture of 30 general people at a high level. Therefore, it was concluded that the 3D model of Building 26, Faculty of Science and Technology is in good use.

**Keywords:** Metaverse, 3D Model, Spatial

## INTRODUCTION

The Metaverse is a cutting-edge technology that encompasses four dimensions - media, the real world, interaction, and social. Despite being a relatively new concept, it has the potential to revolutionize the way humans interact with the world around them. However, its development requires significant investment. It is important to understand and prepare for its arrival in order to fully grasp its potential impact on our lives. The Metaverse offers a range of benefits, but also poses potential negative consequences. Therefore, it is crucial to carefully consider the ramifications of its implementation. In the current scenario of the COVID-19 pandemic, there has been a significant increase in the number of infected individuals, leading to a need for social distancing and restrictions on access to various locations. This has resulted in difficulties, including limitations on the number of individuals permitted in educational institutions.[1]

The Suan Sunandha Rajabhat University, like many other institutions, has been impacted by the COVID- 19 pandemic. This has led to even more restricted access to educational opportunities, both in terms of physical attendance and direct contact to staff officers. The need for increased protection and caution in regards to the handling of various objects in order to prevent the spread of the disease is a major concern. To address this issue, a solution has

been proposed that utilizes 3D modeling technology to provide virtual tours of the Science Center Building (Building 26) of the Faculty of Science and Technology within the Metaverse. This virtual space allows for exploration of office spaces and classrooms for each department within the building, and has the potential to mitigate the gathering of students in the physical building, thereby reducing potential transmission of the virus. [2]

## **OBJECTIVE**

1. To familiarize individuals with the layout of classrooms and the layout of office rooms of faculty staff within the 26th building, a virtual tour utilizing 3D modeling technology within the Metaverse has been proposed. This solution aims to aid in navigation and reduce the need for physical congregation within the building.

2. To provide virtual access to the interior of the building through the Metaverse, the proposal aims to decrease the number of students congregating in the physical space and entering the study area.

## **METHODOLOGY**

1. Develop a plan for the project.
2. Conduct a survey of the surrounding buildings and the interior of the targeted building.
3. Utilize 3D modeling technology to create a virtual representation of the building.
4. Publish the 3D model and associated objects on a designated website.
5. Conduct a trial and evaluation of the effectiveness of the virtual representation in assisting first-year students with navigation and familiarization of the campus.

### **Work plan**

#### ***Sub-Section 1***

Research and study of the Spatial.io website and its features: This task will involve researching and understanding the capabilities and limitations of the Spatial.io platform, as well as identifying any potential issues that may need to be addressed.

#### ***Sub-Section 2***

Building survey and data collection: This task will involve conducting a thorough survey of the Science Center Building (Building 26) at Suan Sunandha Rajabhat University, including taking indoor and outdoor photos, and collecting data on the layout and features of the building.

#### ***Sub-Section 3***

3D Model creation using Blender: This task will involve using the Blender program to create a 3D model of the Science Center Building, including the placement of objects and details within the building.

#### ***Sub-Section 4***

Posting of the 3D model on the website: This task will involve uploading the completed 3D model to the Spatial.io website, making it accessible to students and staff.

### ***Sub-Section 5***

Trial and evaluation: This task will involve conducting a trial of the 3D model with a small group of students and staff, and evaluating its effectiveness in helping them navigate and familiarize themselves with the Science Center Building. This step would also help in identifying any changes or improvement that needs to be made.

#### **1. Work plan**

Divide the work responsibilities into several parts, such as researching the Spatial.io website, studying building objects using the Blender program, gathering data through indoor and outdoor photography, and detailing objects within the building.

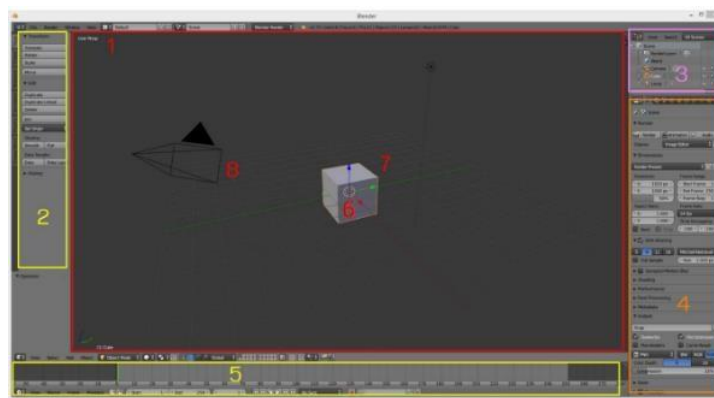
#### **2. Building survey**

This includes entering the building to explore the building area, taking measurements, creating a draft building plan, documenting details, and storing those details within the building. Additionally, utilizing the iPhone 13 and Fujifilm X-A3 cameras to capture detailed images of objects within the building.

#### **3. 3D Model creation Blender**

**Figure 1**

Blender program window



1. The Viewport is a window that displays a 3D representation of the work being performed. It serves as a space for drafting and sketching.

2. The Toolbox is a set of tools that are utilized in the process of creating 3D models.

3. The Outliner is a tool that allows for organization and management of the various objects present in the work.

4. The Properties Panel is a feature that displays the properties and characteristics of the various objects and elements of the work being done. It is used to manage and make adjustments to various aspects of the work, such as image processing, scene creation, background settings, properties of selected objects, color and texture adjustments, and virtual physics. All of these controls are located within this panel.

5. The Time Line feature allows for the creation of animations in the program.

6. The Cursor serves as a reference point for creating new elements within the program.
7. The Cube is an object upon initialization generated by the program.
8. The Camera function enables the capturing of images of objects within the program. [3]

### **3.1 Create a 3D model of the building for each floor**

3.1.1 Use Object Mode to adjust the shape, size and position of the objects according to the detailed building plan. Apply textures and materials to the objects to make them appear realistic. Use the Lighting and Camera tools to create the desired lighting and camera angle for the final render. Test and evaluate the final model for accuracy and realism.

### **3.2 Add objects and position**

Create lighting and shading effects in the model using Blender's lighting and rendering tools.

- 3.2.1 Add objects and position.
- 3.2.2 Molding objects into various shapes.
- 3.2.3 Adding structure details to objects.
- 3.2.4 Customizing object components.
- 3.2.5 Applying colors and textures.

Create lighting and shading effects in the model using Blender's lighting and rendering tools. Sculpt Mode. In Sculpt Mode, various tools can be used to shape the object, such as brushes, clay, crease, and smooth. These tools can be used to add details, create textures, and adjust the shape of the object as desired. Once the object is sculpted and shaped to the desired form, it can be returned to Object Mode and further adjusted using the various tools and options available in Object Mode.

The next step is to make the object more precise and realistic. Additionally, the use of the sculpting tools, such as the Brush tool and the Grab tool, can also be used to further refine the object's shape and details. This process of sculpting and adding details to the object is crucial in creating a high-quality and realistic 3D model of the building.

Once the Extrude command is used, it is possible to adjust the shape and size of the object by manipulating the vertices, edges, and faces. This allows for further customization and refinement of the object's shape and details. Additionally, the use of other modeling tools, such as the Loop Cut and Slide tool, can also be used to enhance the object's overall structure and appearance. Overall, the use of the Extrude command and other modeling tools is important in creating a highly detailed and accurate 3D model of the building.

In the Texture Properties, users can adjust the settings such as the type of texture, the image or video used for the texture, and the mapping coordinates. This process of adding materials and textures to the model helps to make the model look more realistic and detailed. Additionally, users can also use the UV unwrapping tool to adjust the placement and scaling of the textures on the model. This is an important step in achieving a high-quality 3D model of the building.

### **3.3 Exporting model file**

Once the modeling process is completed, the next step is to export the file to a format that can be easily uploaded to the Spatial.io website. This is done by going to the menu bar, selecting "File,"

then "Export," and choosing the "glTF 2.0" option, which will have the extension of either ".glb" or ".gltf." This format is compatible with the Spatial.io website, allowing for seamless integration and display of the 3D model on the website.

#### **4. Model upload**

Finally, the completed 3D model with textures and materials applied is imported into the Spatial.io website for use in virtual interior design. The exported .glb file is inserted into the program, allowing users to interact with and manipulate the building and its components in a virtual space. The ability to easily make changes and adjustments in a virtual environment greatly streamlines the design process and allows for more efficient use of resources.

#### **5. Trial and evaluation of 3D model**

Upon completion of the 3D model development, it will undergo testing with a general user group. In order to gauge the satisfaction of 30 individuals, the researcher has crafted a survey instrument for evaluation.

### **RESULTS**

The results indicated that 7 male respondents constituted 30% of the total sample, while 21 female respondents accounted for 70%. The majority of participants were female. The trial and survey data showed that the users were generally satisfied with the 3D model, as 24 out of 30 trial users, equating to 80%, expressed satisfaction.

### **CONCLUSION AND FUTURE WORK**

The 3D model of Building 26 at Suan Sunandha Rajabhat University's Faculty of Science and Technology enhances accessibility and expedites building tours. It also minimizes travel expenses for students and reduces on-campus foot traffic in response to the COVID-19 pandemic situation. Prospective students of Suan Sunandha Rajabhat University's Faculty of Science and Technology can familiarize themselves with key building locations, such as the Dean's Office and classrooms, prior to arriving on campus, using the 3D model of Building 26. With a mobile device and internet access, users are able to virtually tour these important locations, leading to increased satisfaction. In future iterations, the 3D model of the faculty may see further development with the addition of objects within the building for a more immersive experience. The aim is to enhance realism by adjusting objects and colors. The ultimate goal is to provide users with a virtual walk-through experience of Building 26 at Suan Sunandha Rajabhat University's Faculty of Science and Technology.

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