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BRIGHT

Erasmus+ strategic partnership for Higher Education

BOOSTING THE SCIENTIFIC EXCELLENCE AND INNOVATION CAPACITY OF 3D PRINTING METHODS IN PANDEMIC PERIOD

O4 - BRIGHT AR e-learning webinar

Project Title	**Boosting the scientific excellence and innovation capacity of 3D printing methods in pandemic period 2020-1-RO01-KA226-HE-095517**
Output	**O4 - BRIGHT e-learning webinars on the use of 3D printing technologies in development, testing and producing of medical parts in pandemic period – AR e-learning webinar description**
Date of Delivery	**30th of November 2022**
Authors	**Michal Gallia, Martin Zelenay, Branislav Rabara**
Version	**FINAL VERSION**

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Content

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1. Introduction

This webinar uses Blender software for body part object modelling and AR model animation. In this webinar, you'll learn how to use Blender's powerful features to create detailed and realistic models of body parts, including bones, organs, and tissues. You'll also discover how to use Blender's object rotation feature to create stunning AR model animations that can be used for medical training, patient education, and more. Whether you're a student, a medical professional, or just interested in learning more about Blender, this webinar is for you. Don't miss out on this opportunity to improve your skills and explore the possibilities of AR modelling with Blender.

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2. Overview of whole process

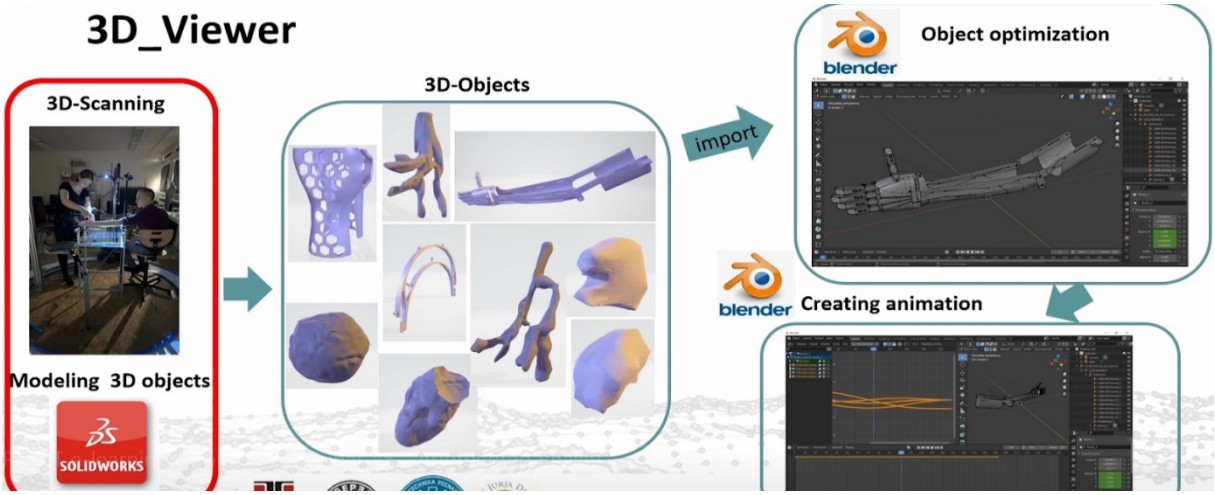

Figure 1. Steps for creating Augmented reality application

To create the 3d preview in Augmented reality we need 3d objects, we can get this through following steps shown in Figure 1:

- 3D scanning
- Or modeling of the 3D objects

Then there is a process which involves object optimization and creating animation.
In Figure 2 one may notice the scanning of a hand in detail

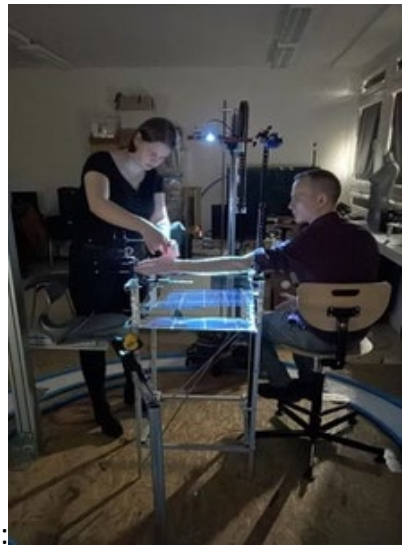

Figure 2. Scanning of a hand

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3. Building Augmented Reality animations

3.1. Introduction to Blender software

We can also model an object in software called SolidWorks or similar like shown in Fig.3

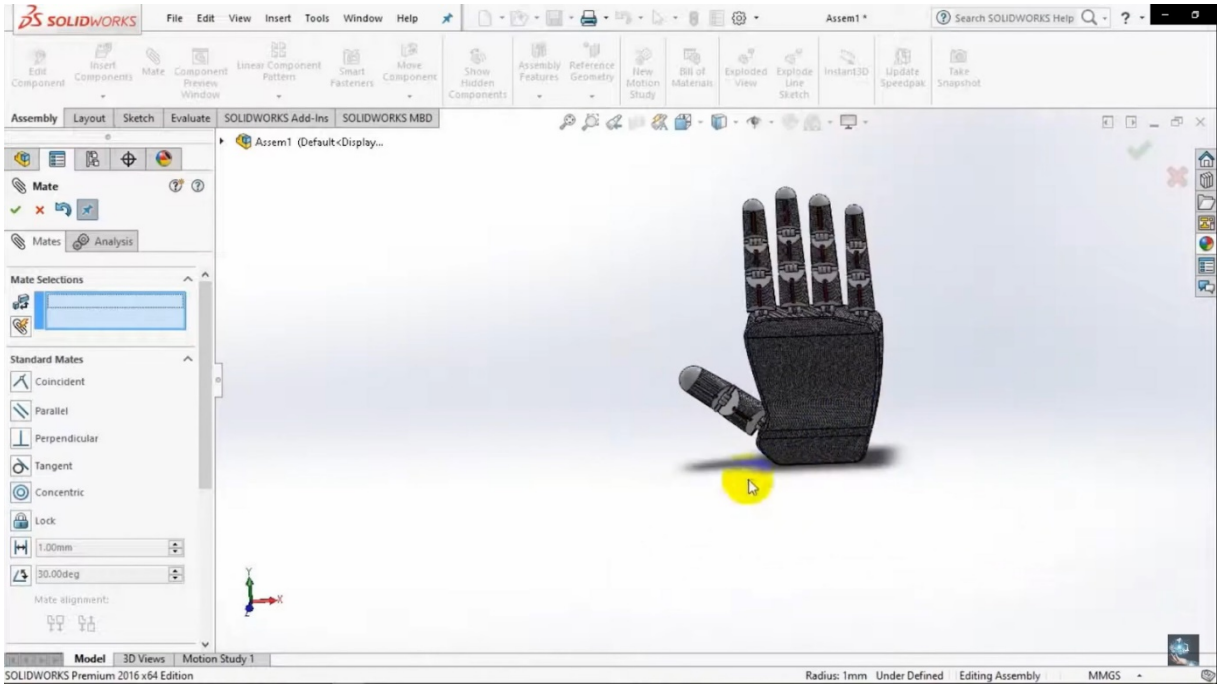

Figure 3. Designing of a part in Soldiworks

If we have the object in as a 3d object, we need to import them into program where we're going to optimize these – in our example we use Blender (see Figure 4).

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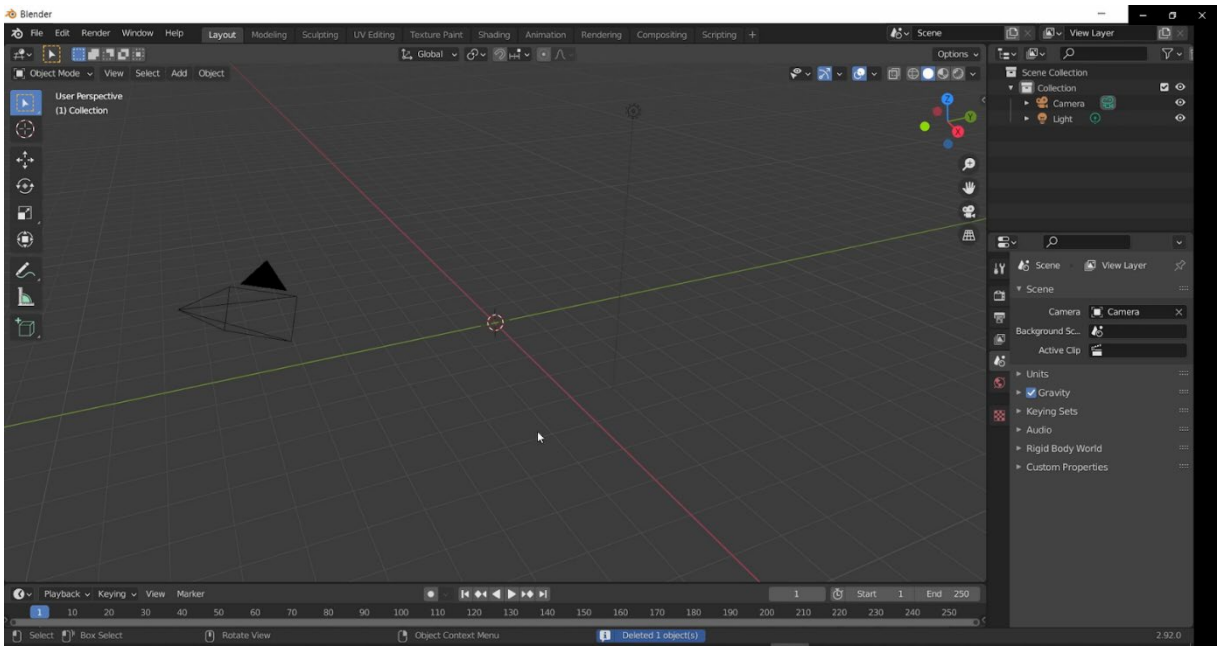

Figure 4. Importing of the 3D file in Blender

That means if we have a vertex files, we can create animation in Blender software. This is a simple process where we import the model first like shown in Figure 4:

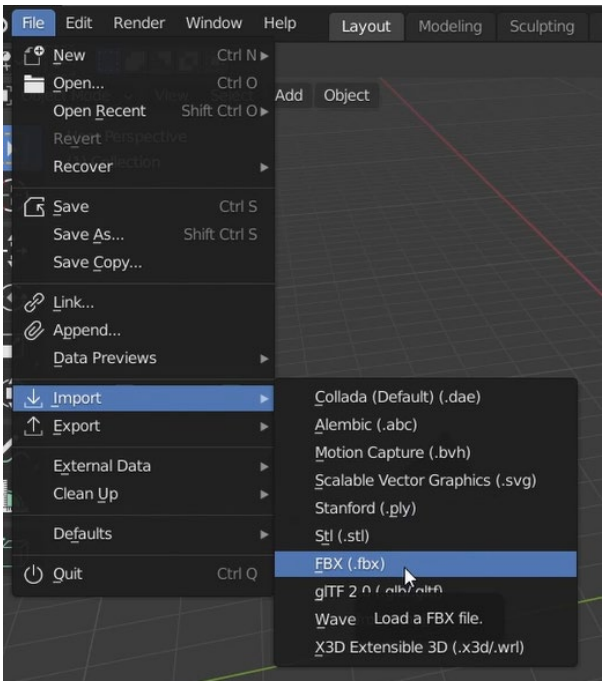

Figure 4. Importing of one file of a model in Blender

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We can change the materials or specifications of the object we will switch to view specifically color palette of this object in right bottom corner like shown in Figure 5.

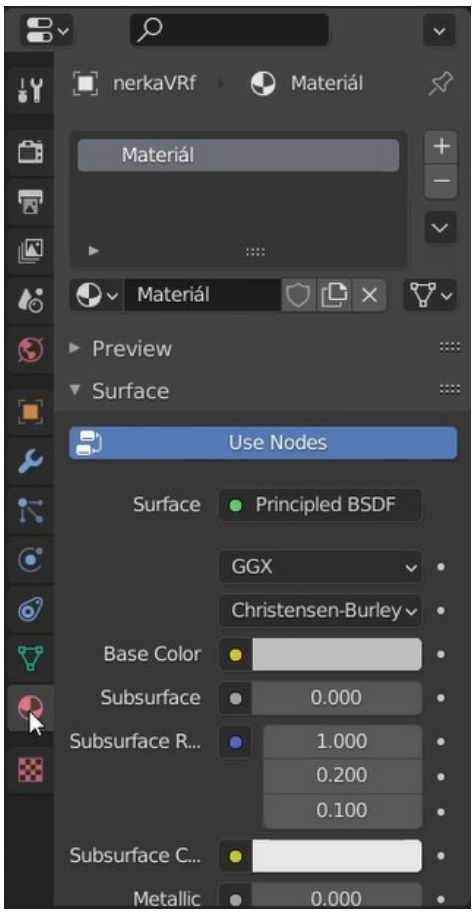

Figure 5. Colouring of the object

We have different axes in top right corner like shown in Figure 6:

Figure 6. Axes shown in Blender

From the bottom of the screen we can expand the timeline where we can create individual frame like shown in Figure 7.

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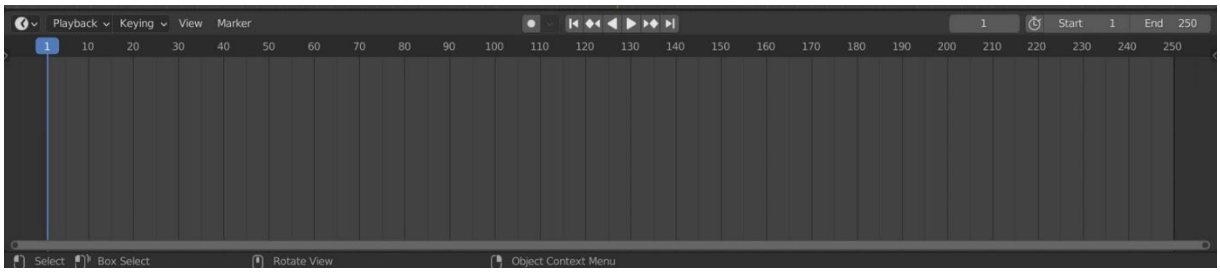

Figure 7. Individual frame created in Blender

We will set the starting and ending of the timeline like shown in Figure 8 in continuing

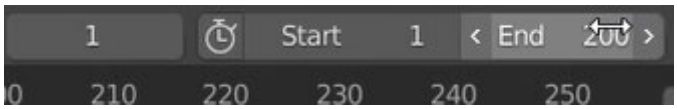

Figure 8. Starting and ending of timeline

On the first second of timeline, we will create a first frame of the rotation through axis y – by pressing the KEY button "I". Then selecting Rotation from the Edit Mode, or by pressing "R" we rotate the object through axis y like shown in Figure 9

.

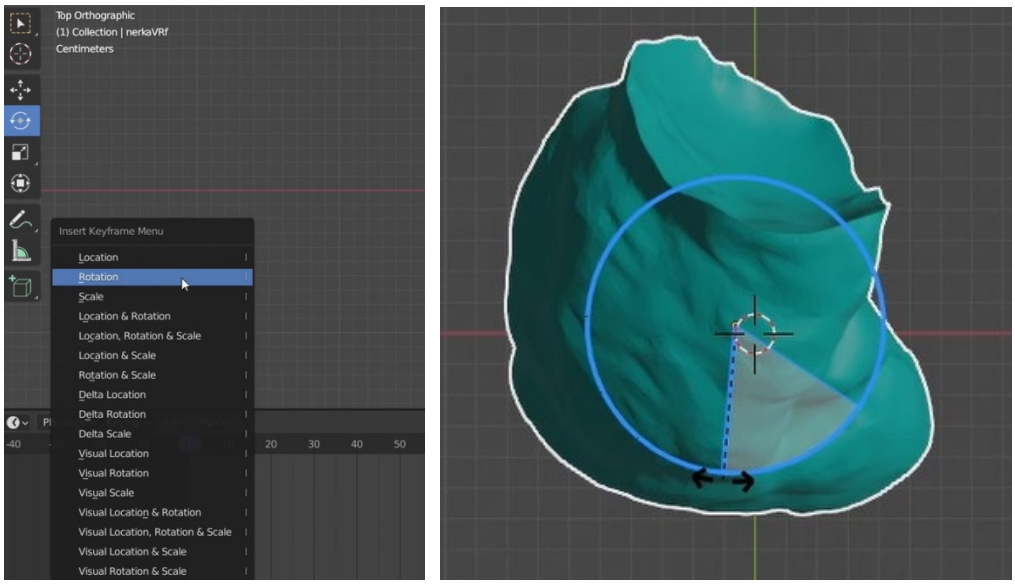

Figure 9. Rotation of the model in Blender

We will fix this position at 100. This means we will move to frame 100 with mouse and then rotate the object by pressing "R" and then pressing the KEY button "I" to fix it as shown in Figure 10.

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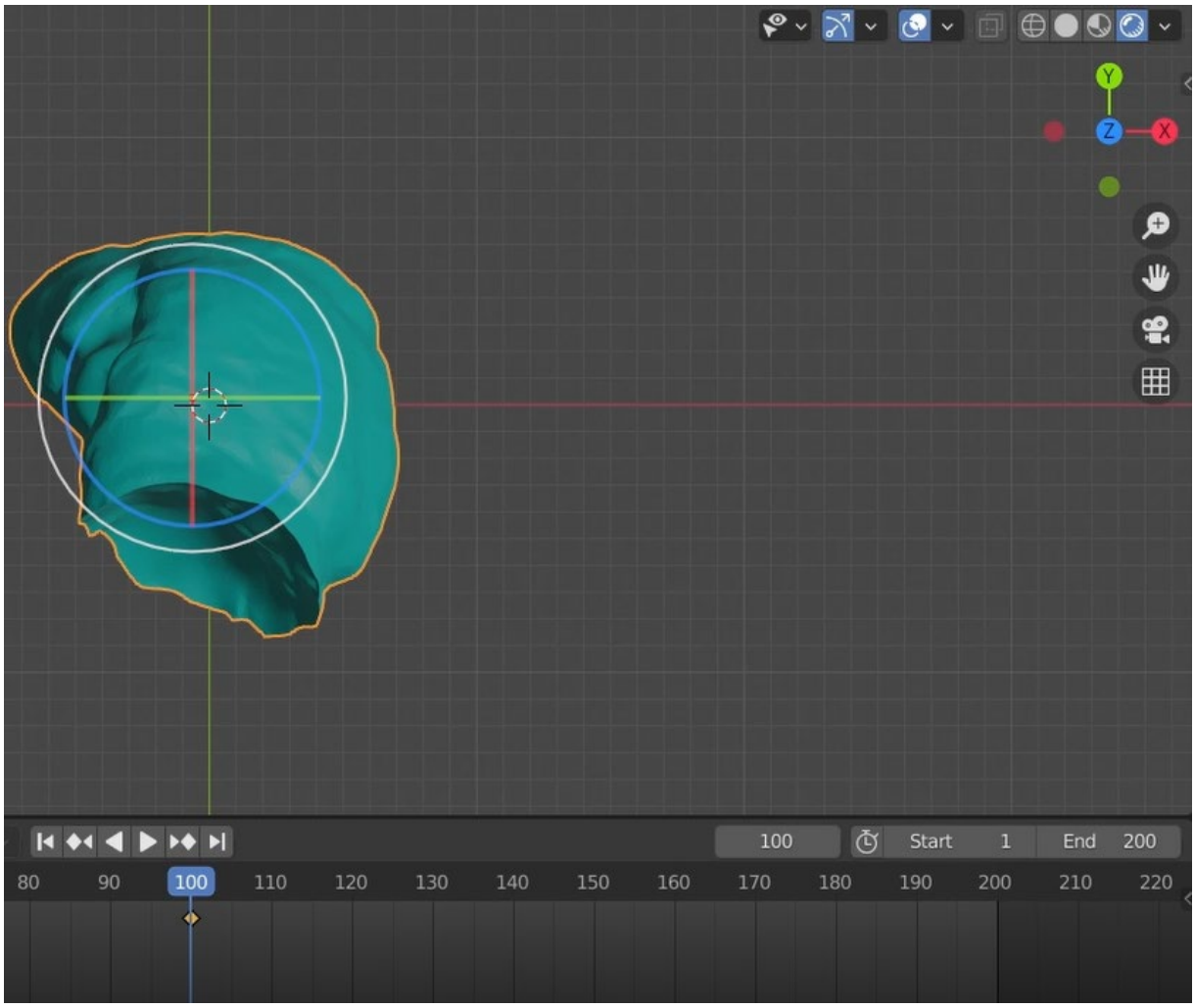

Figure 10. Fixing the position of the model in Blender

Then we will move to the frame 160 by mouse over Timeline and again rotating over axis y we rotate the object. And again, we will fix the position and by pressing “I” then moving to the last one at 200, rotating object again by “R”. We will fix the position.

If we are unsatisfied with specific frame, we can remove it With DELETE key and we can replace it, we need to rotate the object according to the axis Zed Z. And we can fix it again at this position on the timeline.

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In Figure 11 is preview of another object where we created another animation:

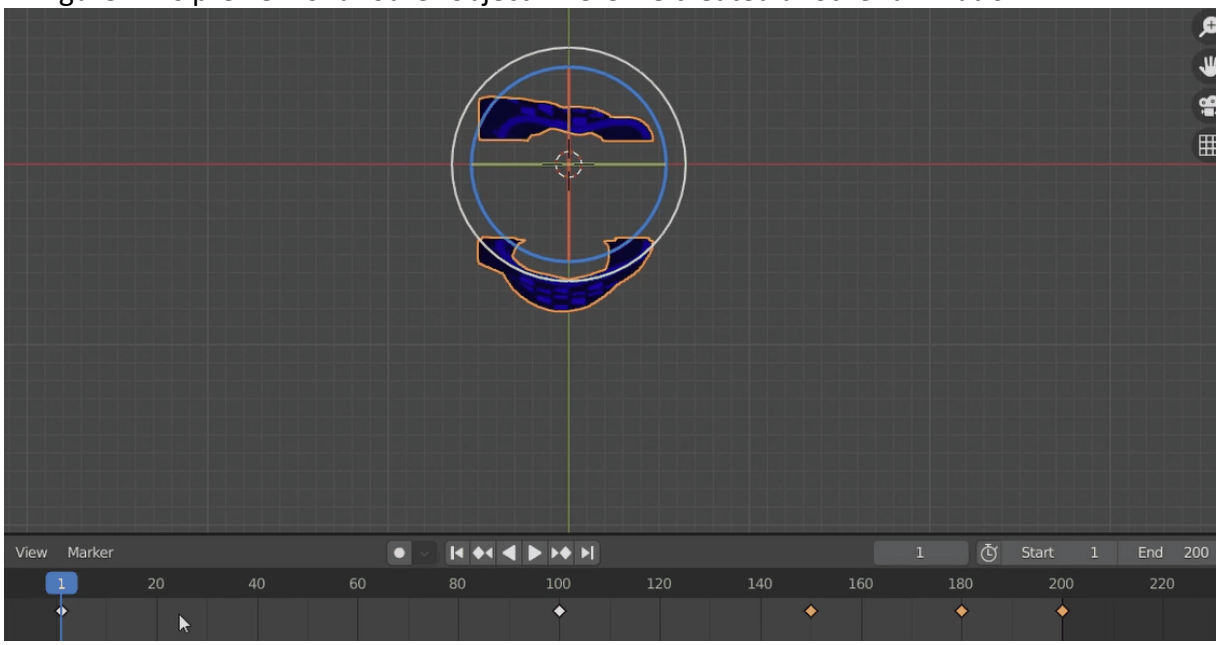

Figure 11. Preview of the another object with animation

We can also create more complex animations.

Once we have the objects created, we need to save them and export them into Glb file for Android, like shown in Figure 12.

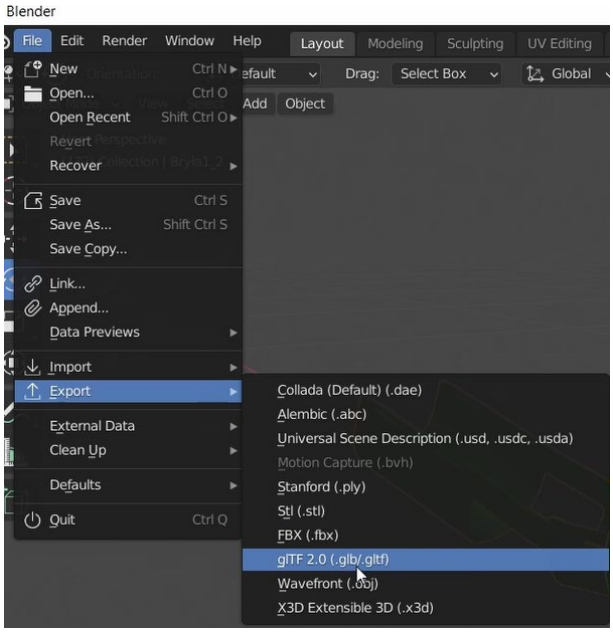

Figure 12. Exporting of the model for Android

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It is possible also to use the USDZ format, which is for IO OS, we can find the online core value converter for such like shown in Figure 13.

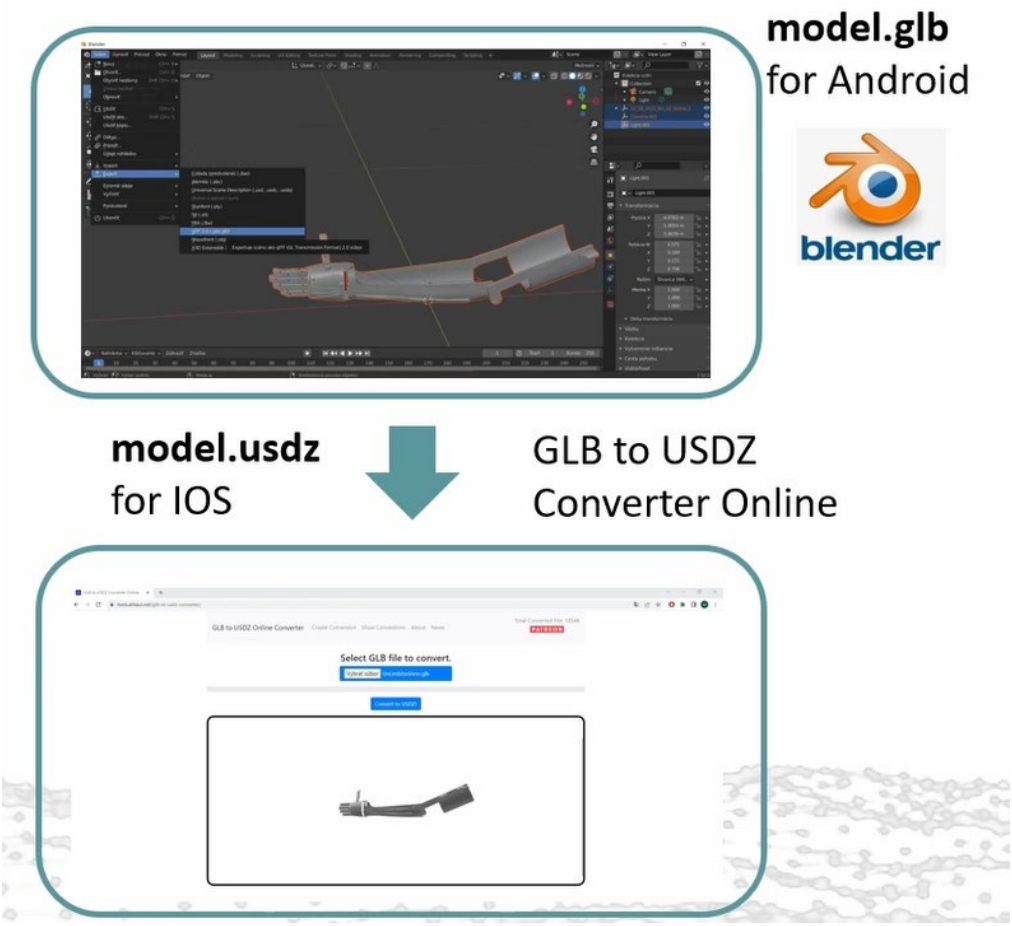

Figure 13. Model created for IOS

In Figure 14 is given the preview of online converter to create USDZ file.

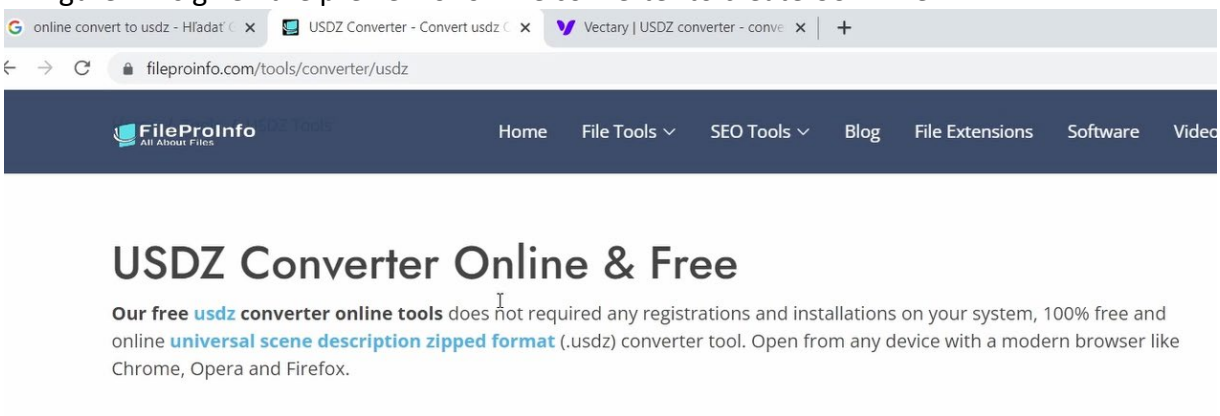

Figure 14. Preview of the online converter for IOS

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3.2. Creating website to display AR models

Once we have the individual models, we use the web interface WEB APP – 3D Viewer, which is used to create preview of the 3D models using the HTML code.

At www.modelviewer.dev we have the documentation and examples. This documentation is right iterated to the specific model viewer. And we can utilize the editor https://modelviewer.dev/editor/ where we can test our code, there are some examples from where we can get an inspiration (see Figure 15).

Figure 15. Examples of models

Once we have the code, we need to publish it. Either this could be own web server or it could be a code sandbox where we will publish our code. It's free it only requires registration at https://codesandbox.io/ There we can start a website. In Figure 16 in our example we can see specific environment where we have index, which is a main site.

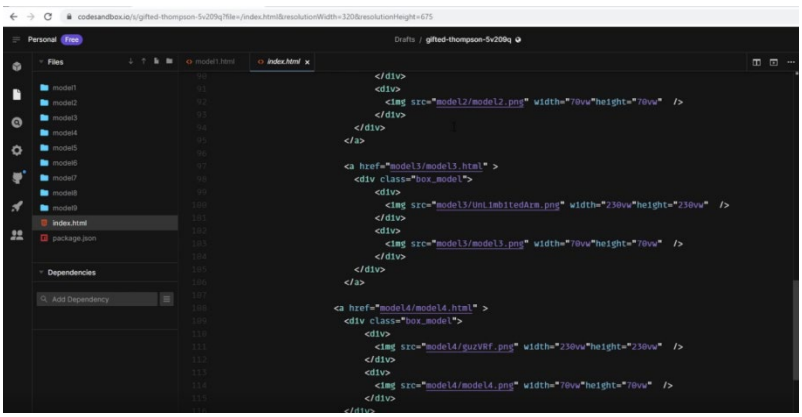

Figure 16. Environment with index of the model

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Through this we can redirect to other imported sub models. As one may notice from the screenshot given in Figure 17, it contains the models. For example, here we can click on the first object model1.html:

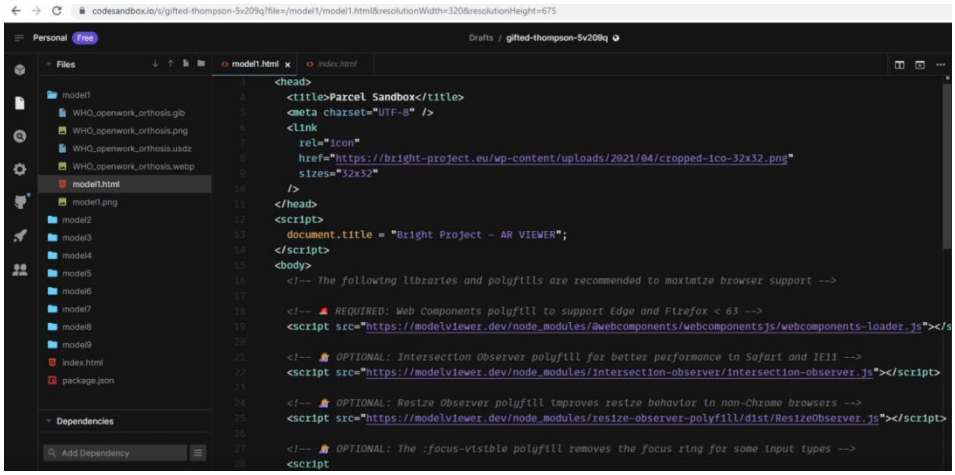

Figure 17. Imported models

The sub site of the first object contains individual code as well.

The site will generate from 3Dmodel html code a model displayed in augmented reality, either Android or iOS. Which we can click, we can rotate it and interact with like shown in Figure 18.

Figure 18. Model visualized in AR

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4. Conclusions

Webinars have become an essential tool for teaching and learning during the COVID-19 pandemic. In particular, the use of webinars for Blender software tutorial on body objects AR modelling has proven to be incredibly valuable in supporting students and institutions, especially hospitals, in their fight against COVID-19. Firstly, the use of webinars allows for remote learning, which is particularly important during the pandemic when many schools and institutions have had to close or limit their operations. By providing tutorials on Blender software for body objects AR modelling through webinars, students and professionals can continue to learn and develop their skills without having to physically attend classes or workshops.

This has been particularly helpful for institutions like hospitals, which have had to prioritize patient care during the pandemic and may not have the resources to provide on-site training. Furthermore, the use of webinars for Blender software tutorial on body objects AR modelling is particularly important for medical professionals during the pandemic because it allows them to learn about AR technology, which can be used to enhance their work. For example, AR technology can be used to create 3D models of patient anatomy, which can help doctors and surgeons plan procedures and visualize complex structures. Even as the pandemic subsides, webinars are likely to remain an important tool for teaching and learning. Webinars provide a flexible and accessible way for people to learn, regardless of their location. They also allow for the recording and sharing of educational content, which can be used to create an archive of learning resources that can be accessed at any time. This makes webinars a powerful tool for teaching and learning, even in non-pandemic situations.

In conclusion, the use of webinars for Blender software tutorial on body objects AR modelling has been incredibly important during the COVID-19 pandemic. By providing remote learning opportunities, webinars have supported students and institutions in their fight against COVID-19. Even as the pandemic subsides, webinars are likely to remain an important tool for teaching and learning, and should be considered a good practice example for future educational initiatives.

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