

# TextureGen.AI User Manual

## SETTING UP THE TOOL

Download the fyp-implementation folder from the Avatar Texture Synthesis Github project shown in Figure 1, then open it with a Unity Editor, preferably with the 2022.3.16f1 version. Set up Stable Diffusion with ControlNet modules installed on a machine to access a page shown in Figure 2 via a script and replace the string in sdWebUIApiEndpoint with your server link in the ControlNetAPI.cs file.

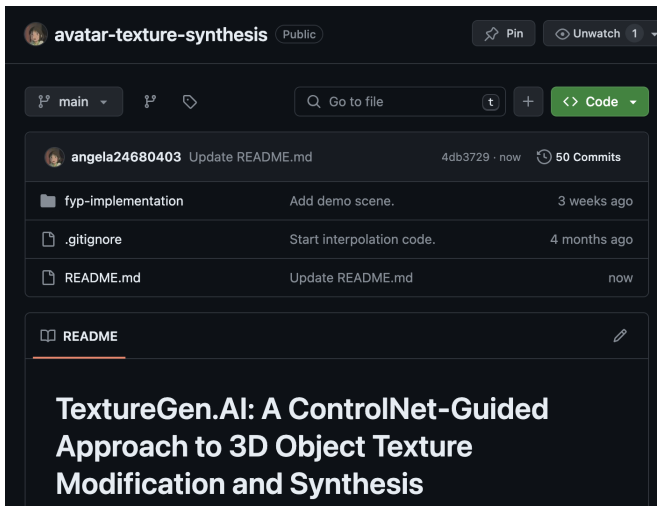


Fig. 1: The Avatar Texture Synthesis Github page.

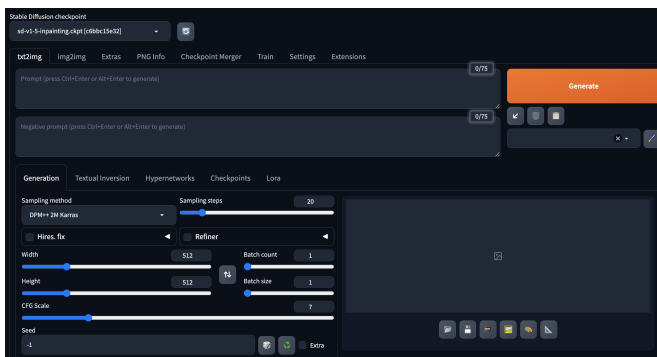


Fig. 2: The Stable Diffusion Web UI.

Open the Main scene and press play. There should be two options available like in Figure 3: Texture modification or texture synthesis. Both have almost identical features except texture modification shows the main avatar wearing its original clothes as texture and only has one button under the "Call ControlNet API" label, whereas for texture synthesis, the main avatar is wearing white texture to be painted in from scratch, and there are two buttons under the "Call ControlNet API" label. The buttons for calling ControlNet all return an output image if the call is successful, but they have different default parameters set for specific purposes.



Fig. 3: The TextureGen.AI menu.

## I. HOW TO MODIFY A TEXTURE

In the menu scene, click on "Texture Modification" which should bring you to the Texture Modification scene shown in Figure 4. Figure 5 indicates a region of the panel showing viewpoints from four cameras: the main camera shows the avatar being painted on, the depth shows the depth view, the mask avatar shows the avatar wearing a mask texture indicating regions that have not yet been painted in white, and the model avatar showing to get a viewpoint of the original texture.

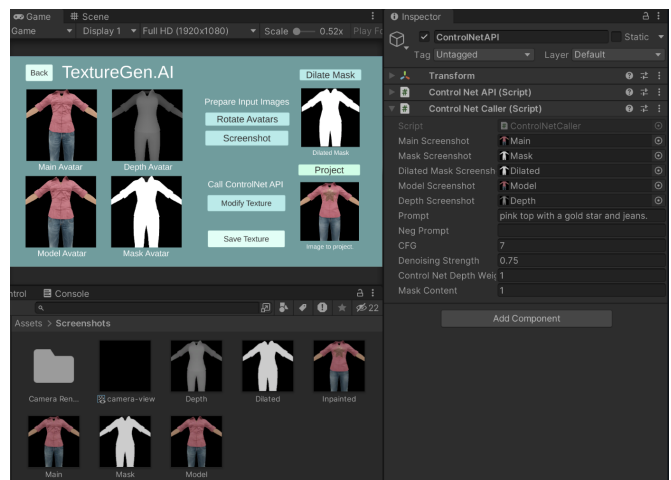


Fig. 4: The Texture Modification scene with ControlNetAPI script inspector open and the screenshot folder open under the project tab.

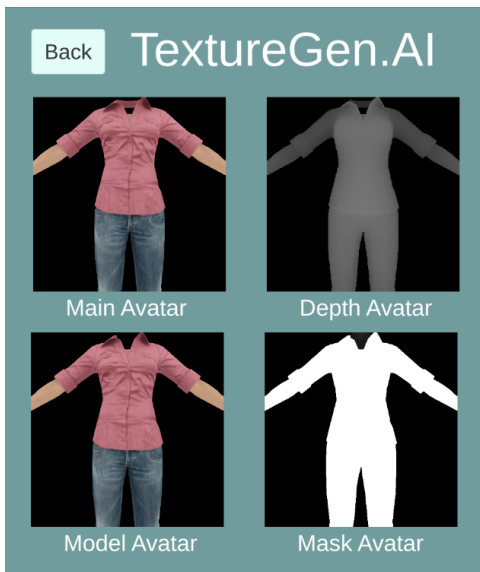


Fig. 5: Four avatar viewpoints from different types of cameras.

The main avatar mesh should have an editable texture attached as the main texture to its mesh renderer under "f001\_hipoly\_81\_bones\_opacity" shown in Figure 6. Ensure the texture is has read/write enabled when you look at the advanced settings of the editable texture shown in Figure 7. You can click on the "back" button to return to the main menu.

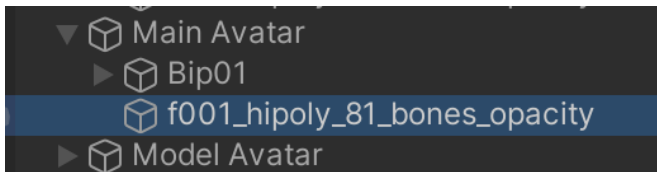


Fig. 6: Location of the main avatar mesh in the hierarchy.

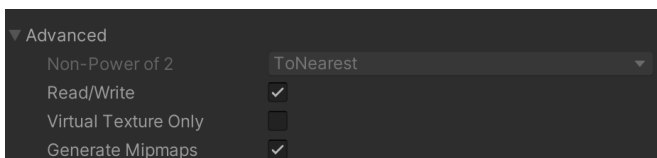


Fig. 7: The read-write setting in advanced settings in texture inspector.

Please ensure that the depth camera, found in the hierarchy shown in Figure 8, has the "far" variable set to at least 7 shown in Figure 9. Figure 10 shows the right side of the user interface. There are a series of buttons for obtaining and manipulating images of avatars to prepare parameters needed for a ControlNetAPI call. On the right side are two labelled sections, "Dilate Mask" and "Project," each with a preview image. The "Dilate Mask" image shows the result of dilating the mask screenshot which will be used as the mask image parameter for the ControlNet API. Below it, the "Project" image shows the output result of the ControlNetAPI which would need to be projected onto the main avatar from the main camera viewpoint.

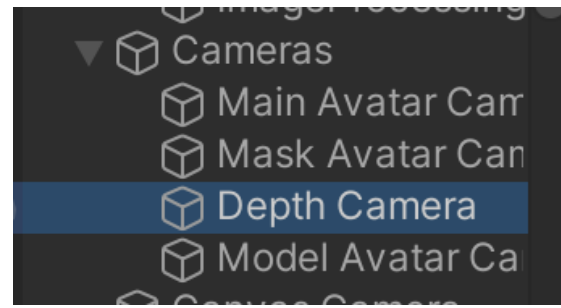


Fig. 8: Location of the depth camera in the hierarchy.

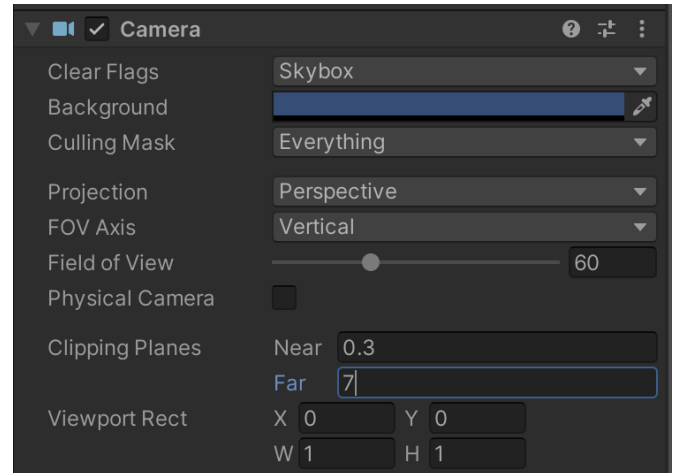


Fig. 9: The camera component in the inspector of the depth camera game object.

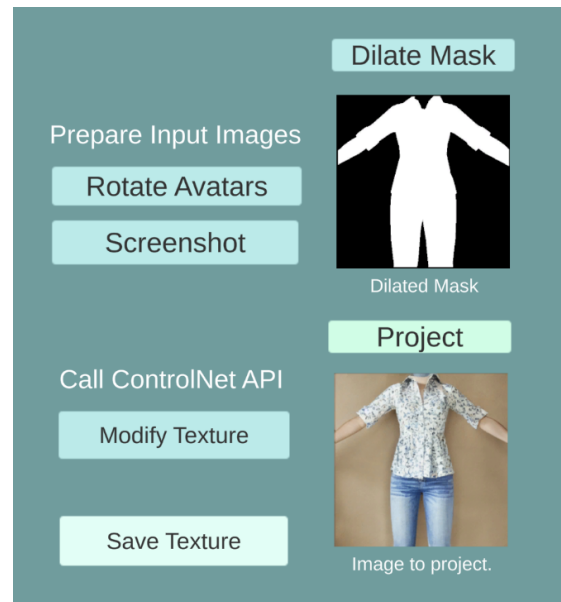


Fig. 10: Panel of buttons.

Figure 11 shows where the ControlNet Caller script is. If you click on it, you should be able to view Figure 12, where parameters shown as public variables can be edited to adjust the generative model. The screenshot images are directly linked

to the images saved after clicking the "Screenshot" button. The prompt, negative prompt, CFG, denoising strength and ControlNet depth weight, and mask content can be manually set here. Figure 13 shows the Screenshots folder under Assets in the Project tab. Ensure to keep this open to keep track of the saved images between operations. To make sure that the most updated version of the image is saved, double-click on an image to reload it before moving on to the next step.

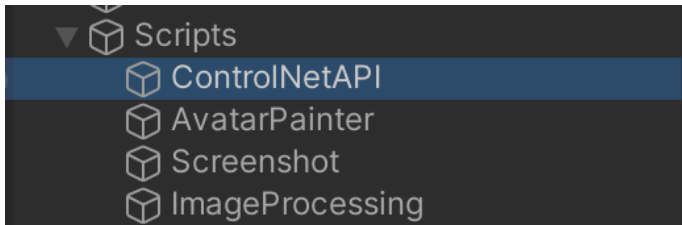


Fig. 11: The ControlNet location in the project hierarchy.

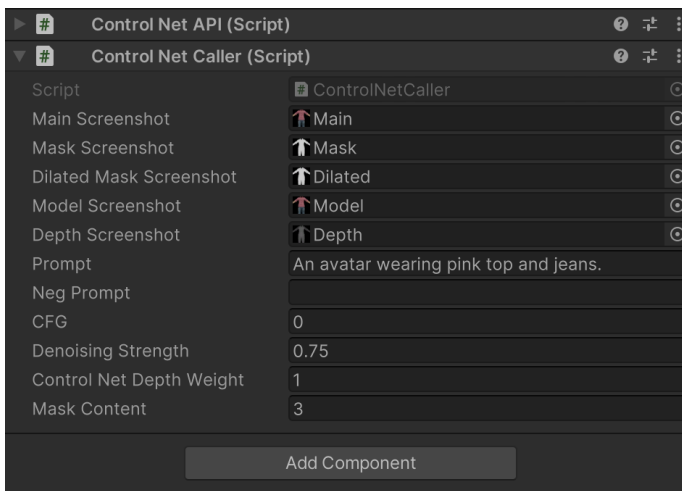


Fig. 12: The ControlNet Caller Inspector.

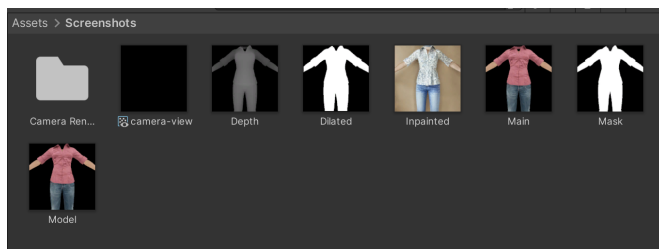


Fig. 13: The Screenshots folder.

The steps for texture modification are:

- 1) **Screenshot:** Click "Screenshot" to screenshot all avatars from a front camera pose, then verify the images are saved by looking at the console, and the Screenshots folder (double click on screenshot images to ensure they have been updated).
- 2) **Dilate Mask:** Dilate your mask by clicking "Dilate". This might take a couple of seconds.

- 3) Edit the prompt variable in the ControlNetAPI inspector to describe the modifications you want to make on the texture.
- 4) **Check SD and ControlNet Input Parameters:** Click "Modify Texture" to make your ControlNetAPI Call. When you click it, you will get a message on the console saying "Sending Img2Img Request". If you get a successful response, you will get the message "Saved Inpainted.png", otherwise you will get a time-out error. Please ensure that the resulting image is refreshed under the Screenshots folder as well as the preview image by the "Image to Project." label.
- 5) **Call API:** Since the API call outputs images from different seeds each time, you can click "Modify Texture" repeatedly until you get a desired image to project.
- 6) **Re-generate Image:** Since the API call outputs images from different seeds each time, you can click "Modify Texture" repeatedly until you get a desired image to project.
- 7) **Project API Response Image:** Click on the "Project" button. If you are running on Mac, you will see a rainbow ball appear. This function will take at least 40 seconds to run. Once it is complete you should see the image projected onto the main avatar.
- 8) **Rotate and Repeat:** If you want more modifications on the avatar, click "Rotate" to find another pose angle, then follow step 1 again to make another projection.
- 9) **Save Texture:** Click the "Save Texture" button if you want to save the current texture. It should appear under the Assets\Textures\Saved folder.

## II. HOW TO SYNTHESISE A TEXTURE

The Texture Synthesis page looks almost identical to the Texture Modification page, except the main avatar has a white base material attached rather than an existing skin texture, allowing texture to be synthesised from scratch. Another difference is that under the "Call ControlNet API" label are two buttons rather than just one. This is because there are two types of models being used for firstly, creating a new design based on text, and secondly creating a new view fill given the context of projection from the previous pose. Please ensure that the depth camera, found in the hierarchy shown in Figure 8, has the "far" variable set to 6 instead of 7 shown in Figure 9.

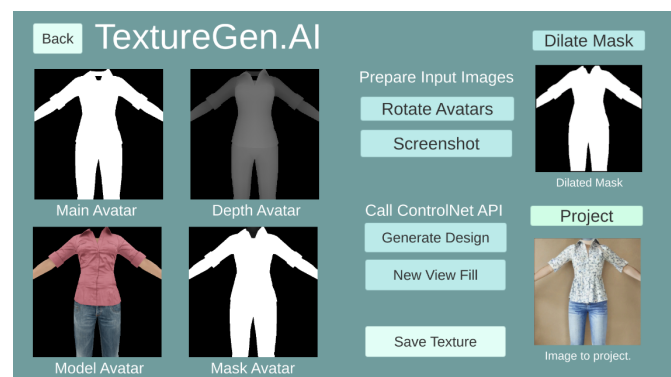


Fig. 14: UI page for Texture Synthesis.

The steps for texture synthesis are:

- 1) **Screenshot:** Click "Screenshot" to screenshot all avatars from a front camera pose, then verify the images are saved by looking at the console, and the Screenshots folder (double click on screenshot images to ensure they have been updated).
- 2) **Dilate Mask:** Dilate your mask by clicking "Dilate". This might take a couple of seconds.
- 3) **Check SD and ControlNet Input Parameters:** Edit the prompt variable in the ControlNetAPI inspector to describe the modifications you want to make on the texture. Feel free to also modify other public parameters to your liking.
- 4) **Call API:** If you are generating the first image from the front camera position, click "Generate Design" to make your ControlNetAPI Call, otherwise click "New View Fill". When you click it, you will get a message on the console saying "Sending Txt2Img Request" or "Sending Img2Img Request". If you get a successful response, you will get the message "Saved Inpainted.png", otherwise you will get a time-out error. Please ensure that the resulting image is refreshed under the Screenshots folder as well as the preview image by the "Image to Project." label.
- 5) **Re-generate Image:** Since the API call outputs images from different seeds each time, you can click "Generate Design" or "New View Fill" repeatedly until you get a desired image to project.
- 6) **Project API Response Image:** Click on the "Project" button. If you are running on Mac, you will see a rainbow ball appear. This function will take at least 40 seconds to run. Once it is complete you should see the image projected onto the main avatar.
- 7) **Rotate and Repeat:** Click "Rotate" once to change the pose angle by 45 degrees, then follow step 1 again to make another projection with new view fill outputs.
- 8) **Save Texture:** Click the "Save Texture" button if you want to save the current texture. It should appear under the Assets\Textures\Saved folder.

Figure 15 shows an example of how the main avatar looks after projection, Figure 16 shows the view of avatars after rotating them, and Figure 17 shows the result of the new view fill shown in the preview under the "Project" button.

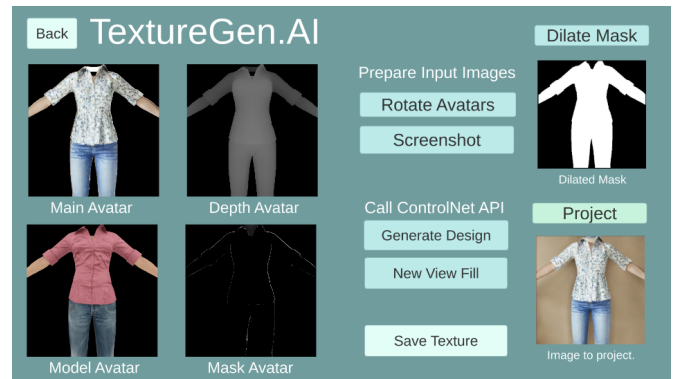


Fig. 15: UI page after projecting the front view on the main avatar.

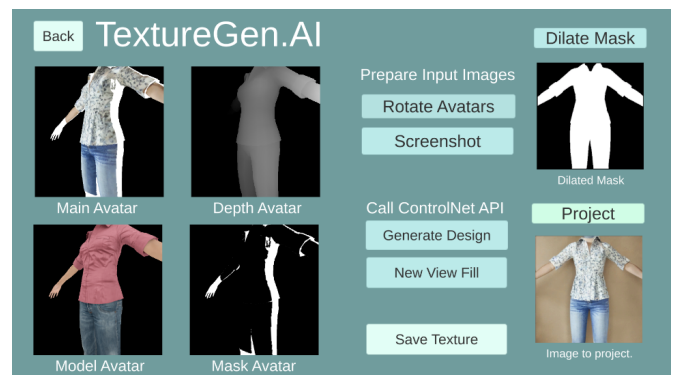


Fig. 16: UI page after rotating the avatars.

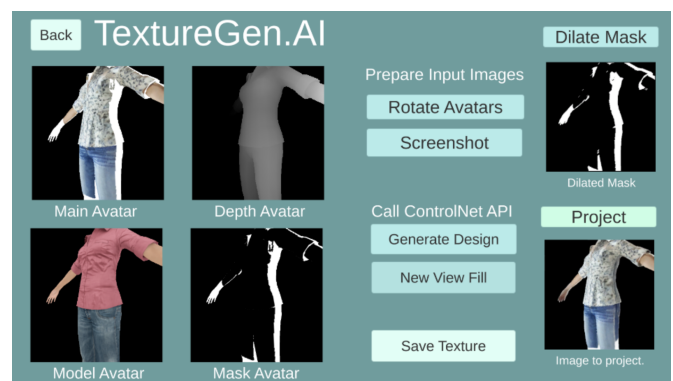


Fig. 17: UI page after generating a new view to project.