Virtual Field Trips

Meshroom Set Up Tutorial

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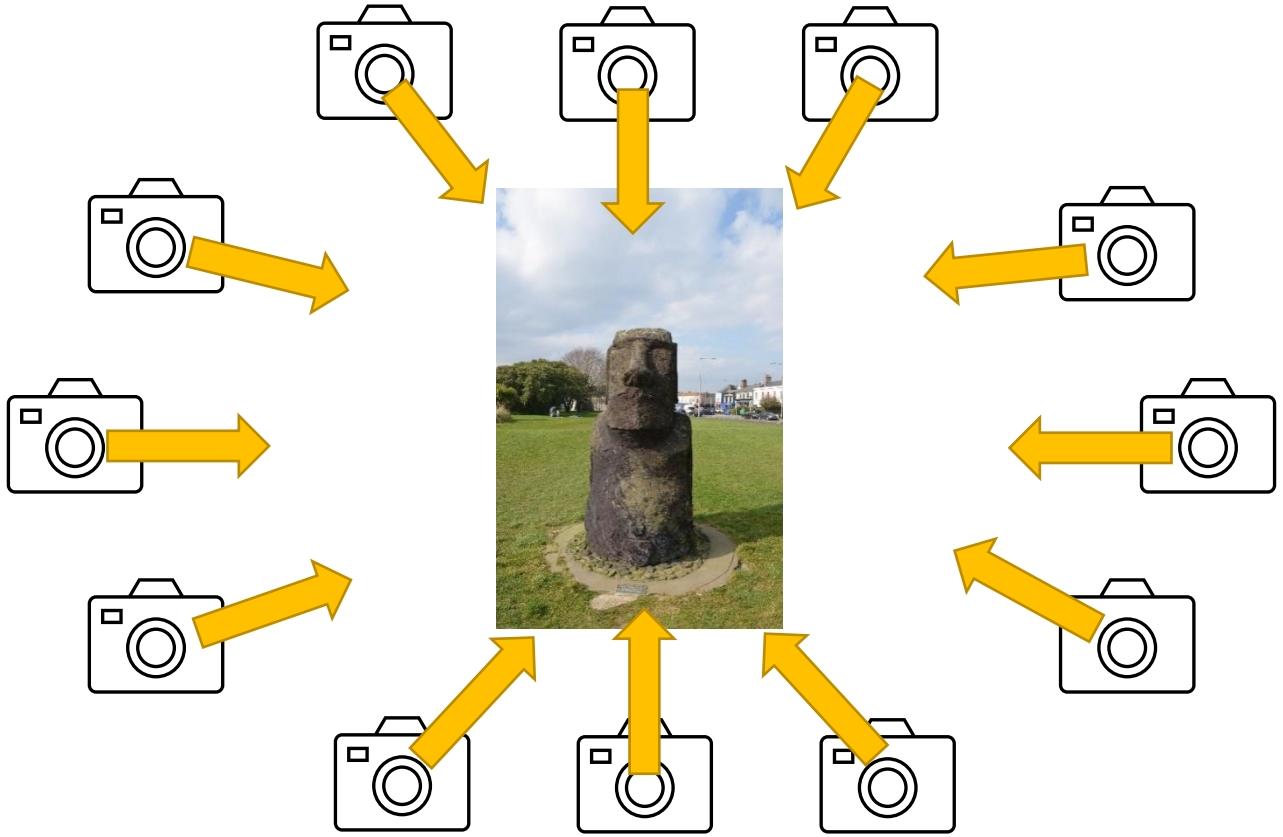
Ground Truthing: Capturing a Scene in 3D

- Select a place you have easy access to.
- The technique works best with features you can photograph from as many different angles as possible.

Image Capture

- Take pictures from all possible angles
- Take overlapping images
- Fill each image with the object
- Include the background to help the Meshroom software identify camera orientation
- The object or area should be well lit
- Ideally shoot in indirect or diffused light (a slightly cloudy day is good)
- Avoid using flash
- Avoid reflections and transparent objects
- Avoid single colored surfaces
- You can take close-ups for added detail where needed
- Moving objects don’t work
- More images are better than less. Images that don’t work can be omitted later.
- Avoid changing focal length and shallow depth of field
- Consider using manual camera settings

The quality of your images is the most important and possibly challenging part of the process as it will have dramatic effects upon the quality of the final 3D model



Example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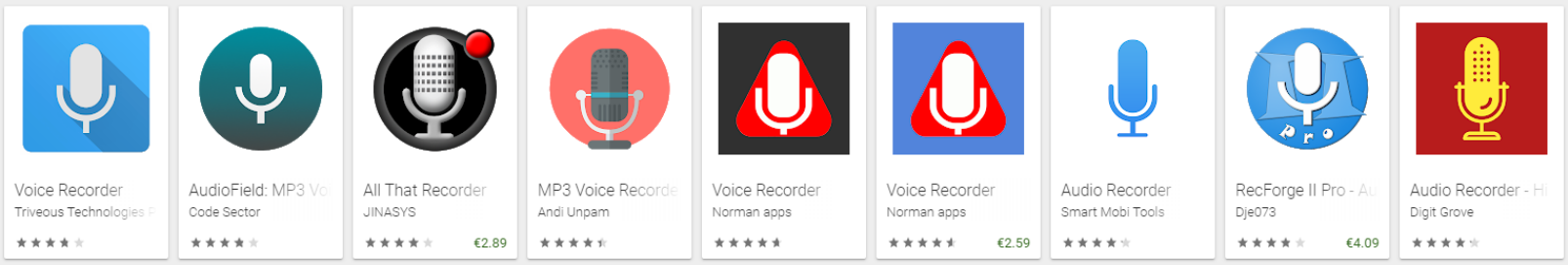
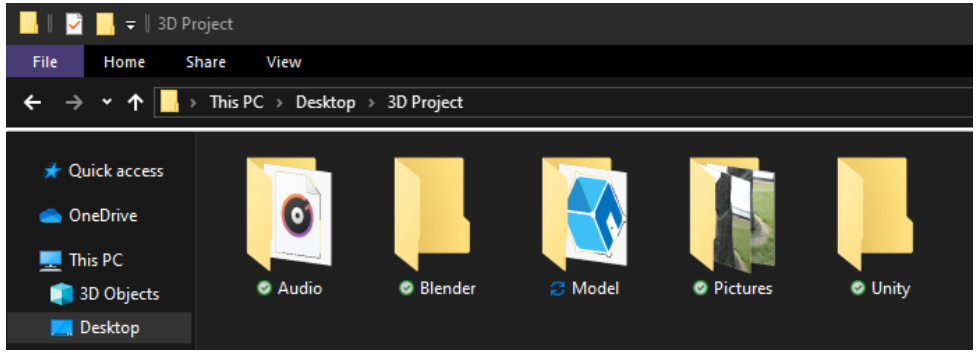
Sound capture

- Set your mobile phone or audio recording device next to the monument and record 3 minutes of ambient sound
- Find the microphone on your phone (most smartphone microphones are located near the bottom of the handset)
- Ideally you should find a flat surface and carefully place the phone down
- Some devices come with a voice recording app pre-installed, but there are also several different apps available (Smart Recorder, Tape-a-Talk, etc.)
- Hit the red record button when you want to start the recording, and then once again to stop it
- Try not to handle the device when recording and you might also need to shield it from the elements on a windy day!
- You can transfer short recordings by simply sending the audio file to yourself via email, open the email on your computer, and then download the file
- For longer recordings, you can connect your phone to your computer via a USB cable to transfer the files



Project File Structure

- Create a folder on your computer and call it “3D Project”
- Within the “3D Project” folder create subfolders
  - “Audio”
  - “Blender”
  - “Model”
  - “Pictures”
  - “Unity”

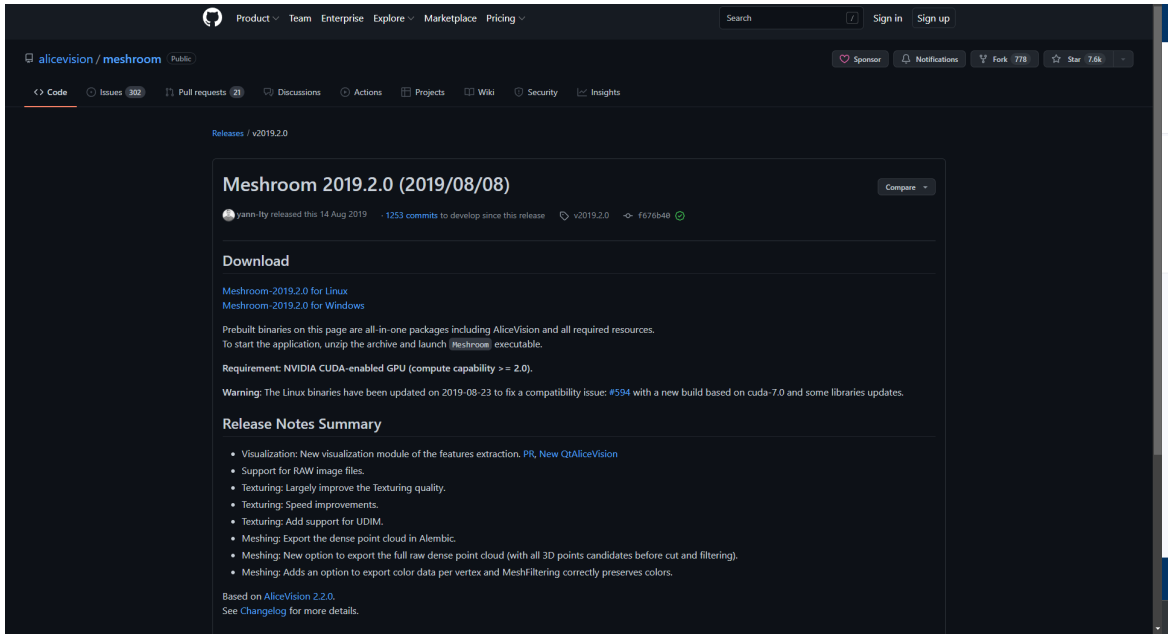


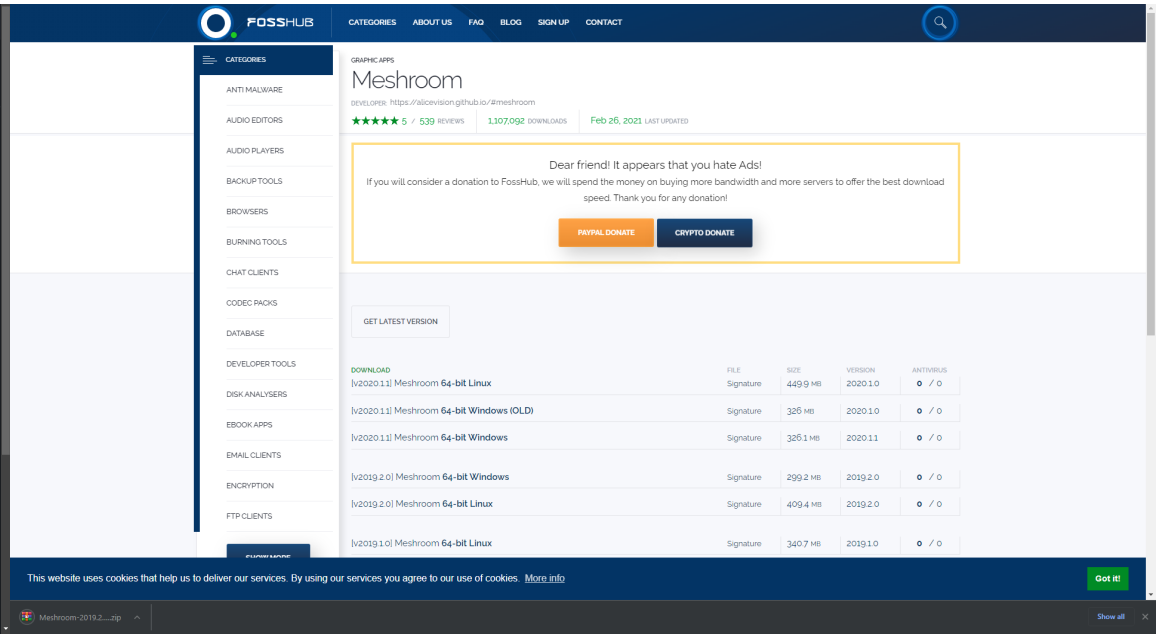
- Copy the pictures from your camera over to the “Pictures” folder
- Copy the audio from your recording device over to the “Audio” folder
- You are now ready to start meshing your media together

Software requirements: Information Only

For this tutorial you will need the following software installed:

- Meshroom [Windows / Linux] (https://alicevision.org/#meshroom)
- https://github.com/alicevision/meshroom/releases
- Meshroom 2019.2.0 (2019/08/08)





Hardware requirements

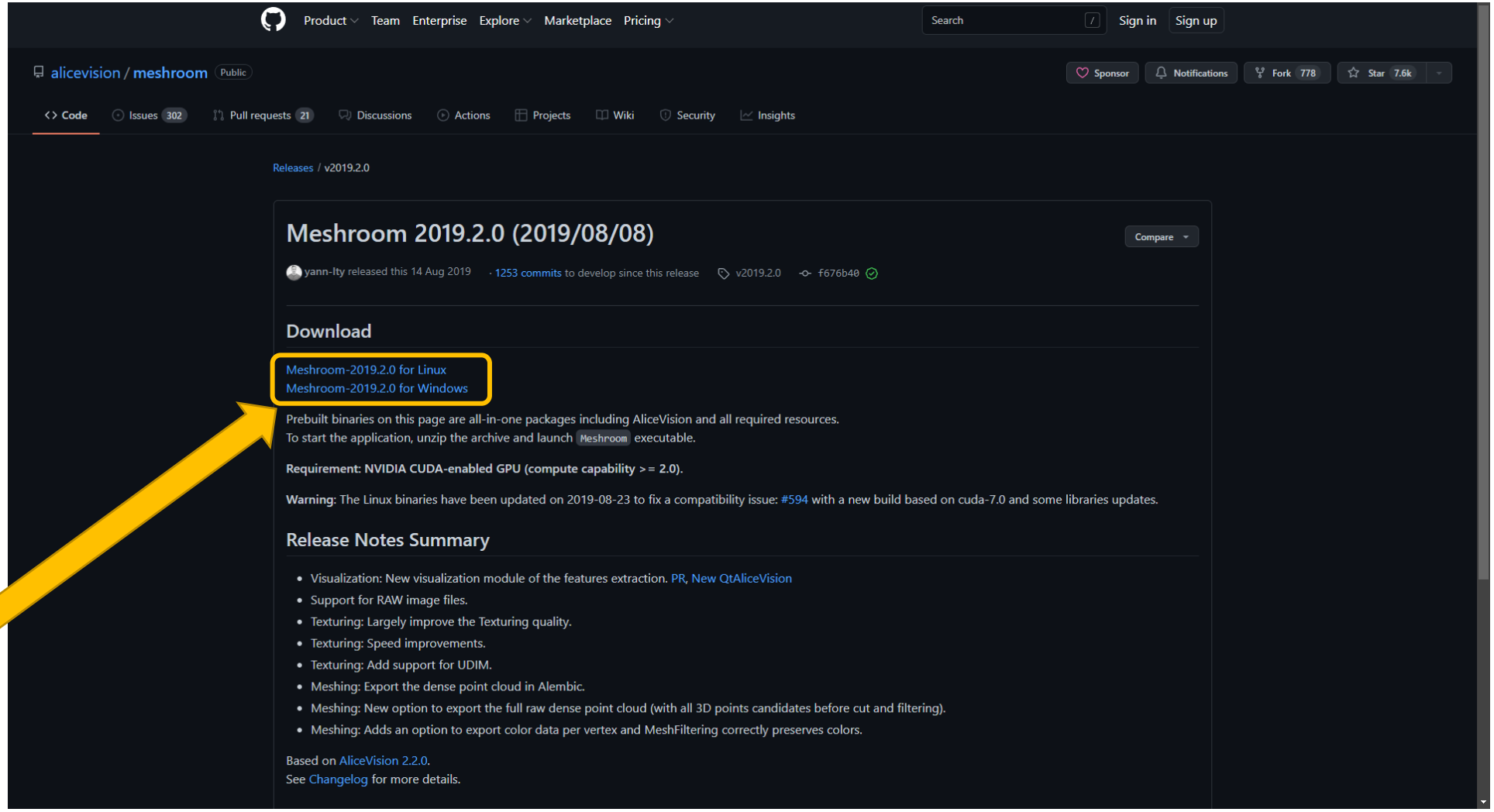
You must ensure that your PC meets the following minimum requirements to run the required software.

- Windows 7 SP1+, 8, 10, 64-bit versions only
- 64-bit dual core 2Ghz CPU with SSE2 support
- 4 GB RAM
- 1280×768 display
- Mouse or trackpad
- NVIDIA CUDA-enabled GPU with 1 GB RAM; OpenGL 3.3; compute capability >= 2.0; DX10 (shader model 4.0) capabilities

Download Meshroom:

https://github.com/alicevision/meshroom/releases/tag/v2019.2.0

1. Navigate to the Meshroom Website



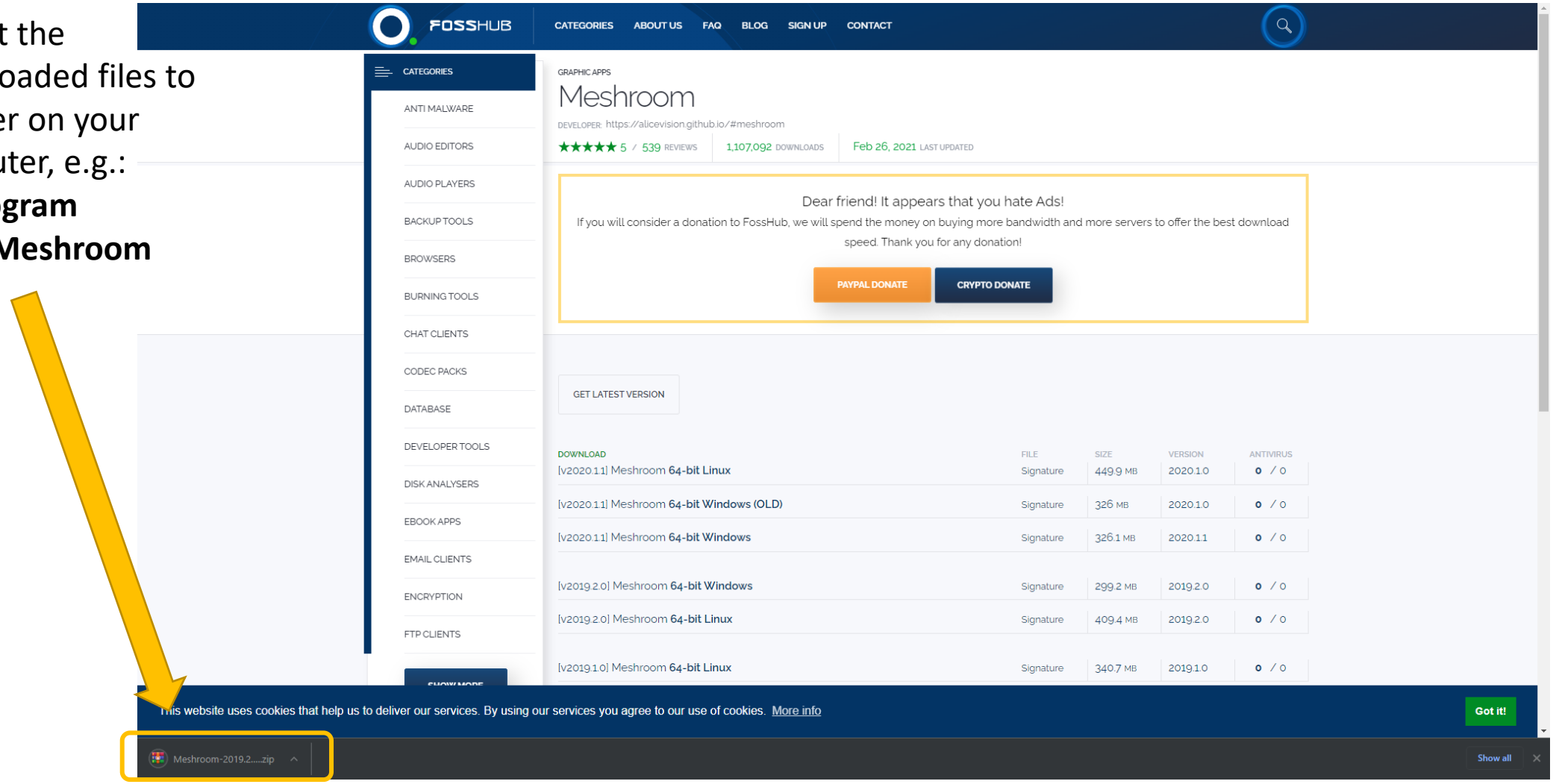
2. Click to download the latest release for Windows.

Download Meshroom: https://alicevision.github.io/#meshroom

Download Meshroom:

https://github.com/alicevision/meshroom/releases/tag/v2019.2.0

Extract the downloaded files to a folder on your computer, e.g.: **C:\Program Files\Meshroom**



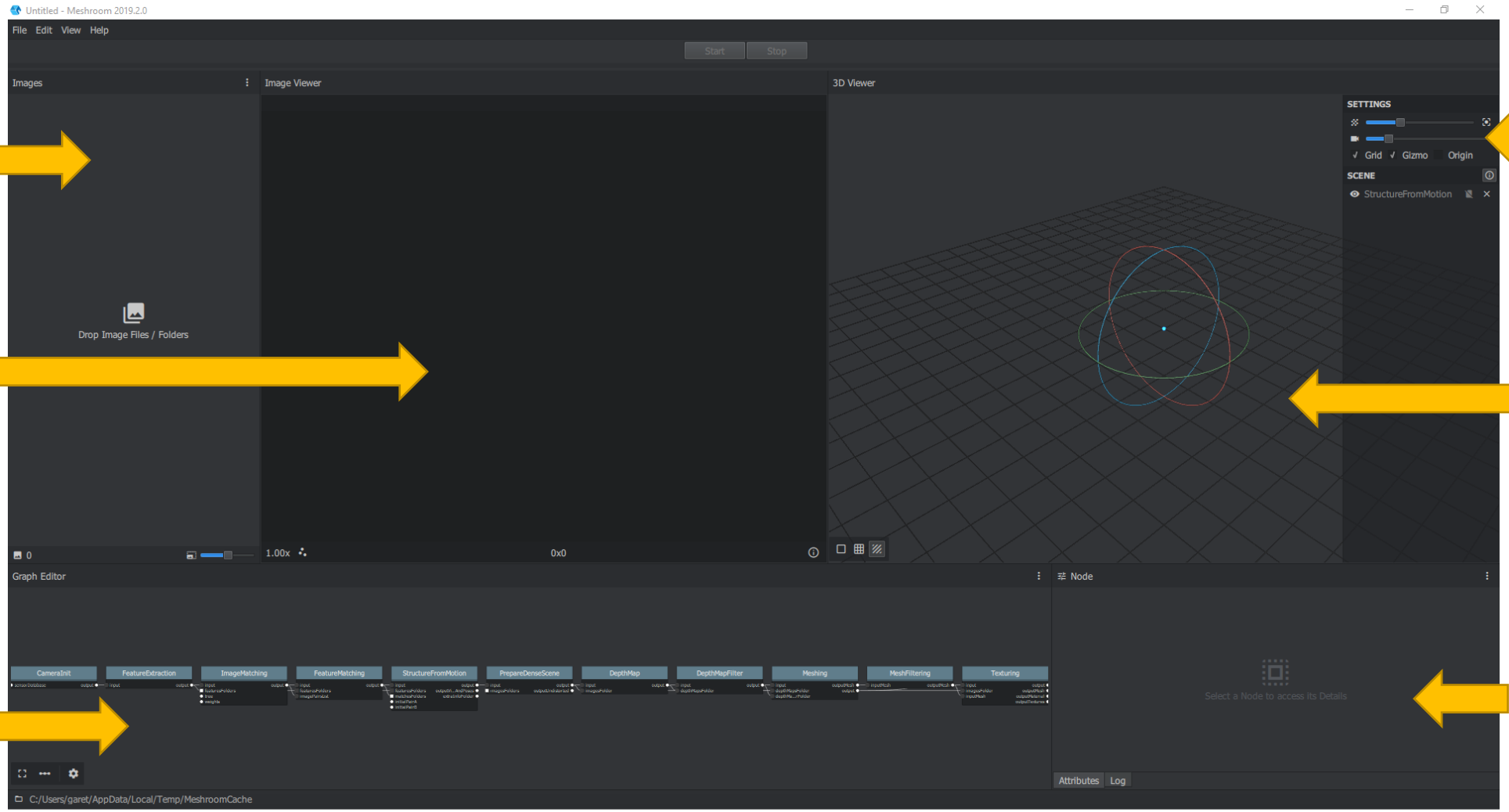
Open the .exe from the same folder

Using Meshroom – The Basics (User Interface)

Images – this is where you drag and drop images for processing

Image Viewer – selected images appe here

Graph Editor – this is where the 3D reconstruction process is visualized and modified



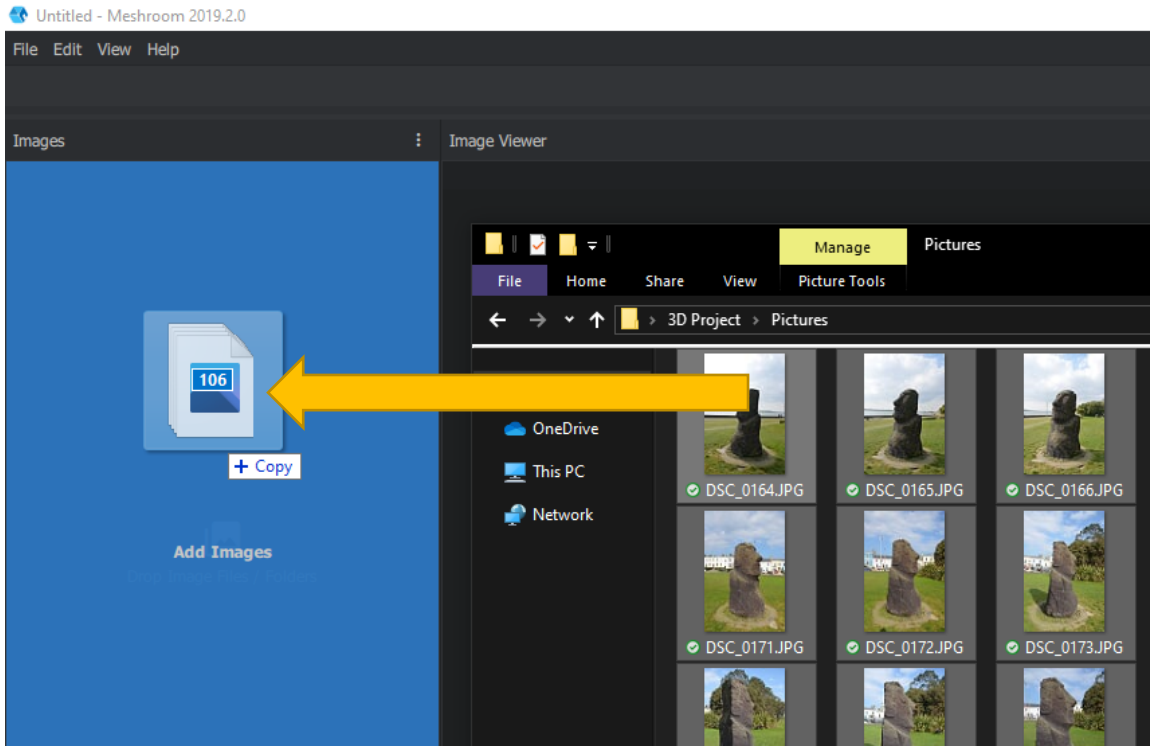
Settings – these are the controls for viewing the 3D model

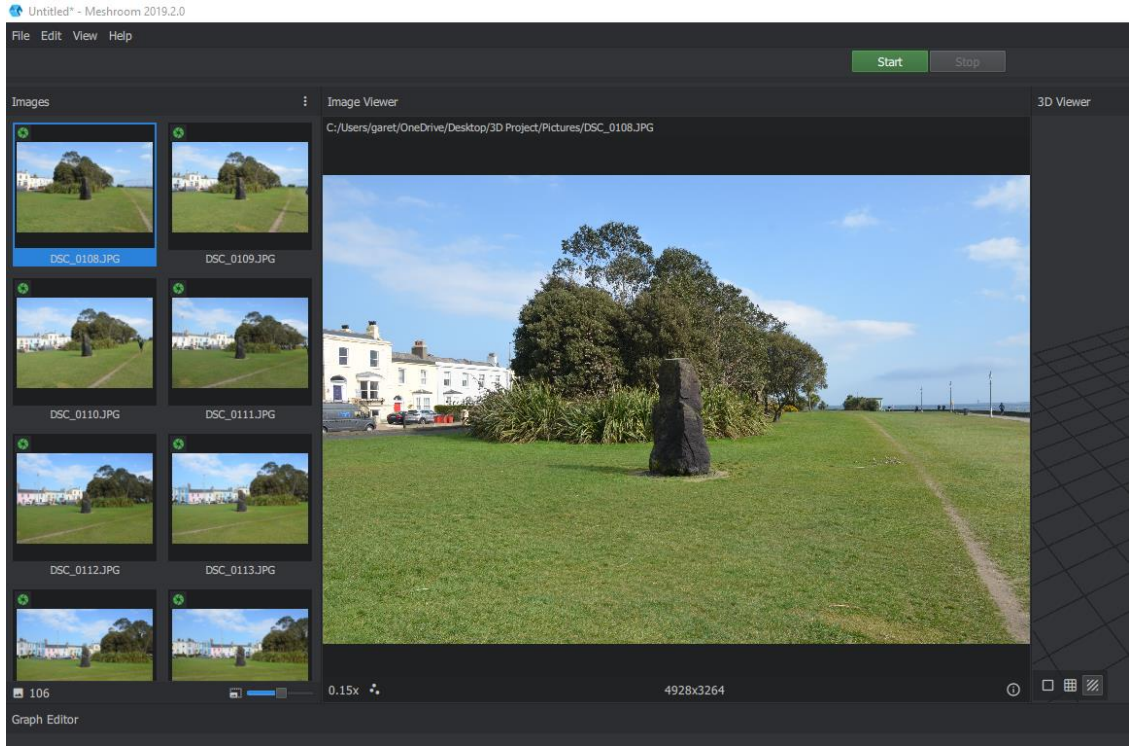
3D Viewer – where the 3D model will appear

Node – Displays user configurable properties of a selected node in the Graph Editor.

Using Meshroom – The Basics (select images)

- To import your photos, open the “3D Project” folder from the desktop and navigate to the “Pictures” folder
- Select all the picture you want to use in Meshroom then drag and drop them to the “Images” window in Meshroom

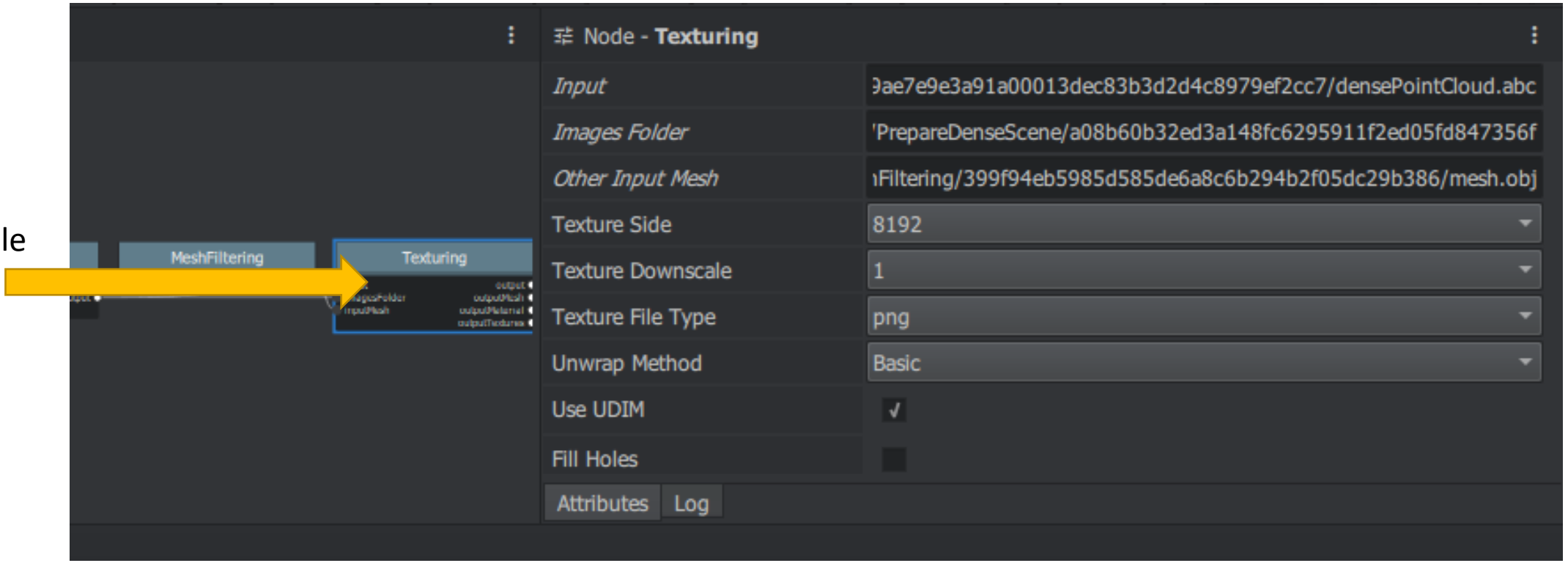




Using Meshroom – The Basics (set up)

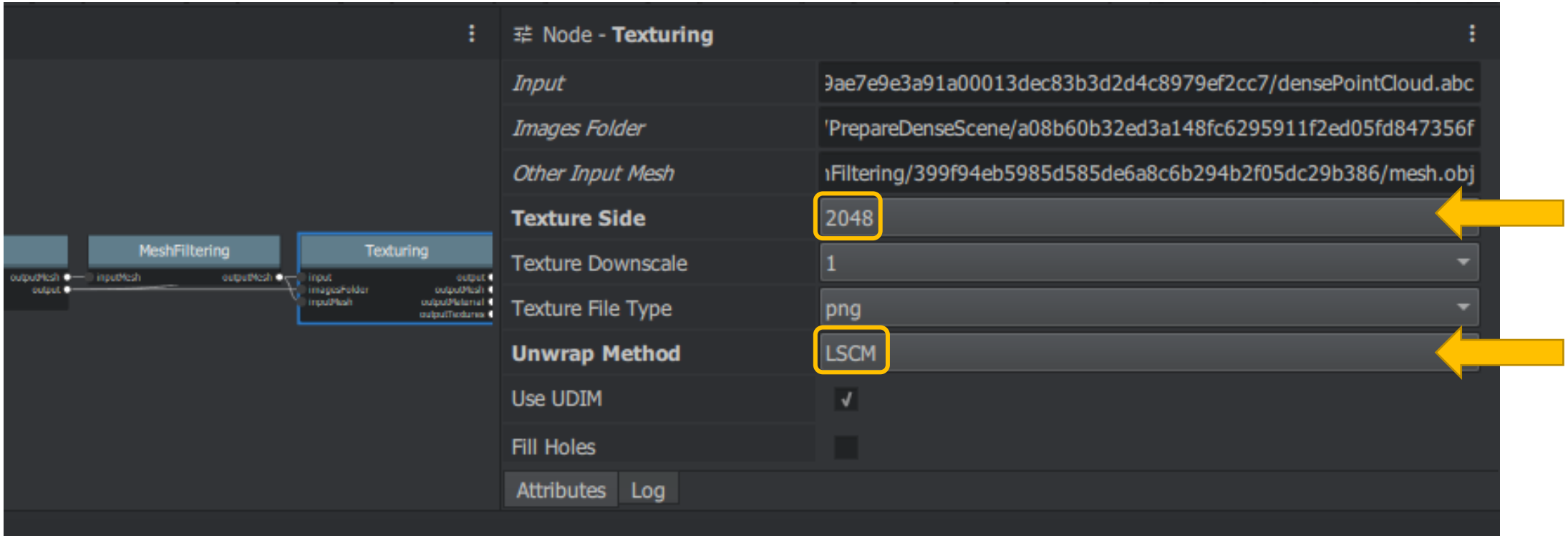
- In the “Graph Editor” window select the “Texturing” module
- The “Node” window will now change to show advanced editing functions for the “Texturing” function

“Texturing” module in the “Graph Editor” window



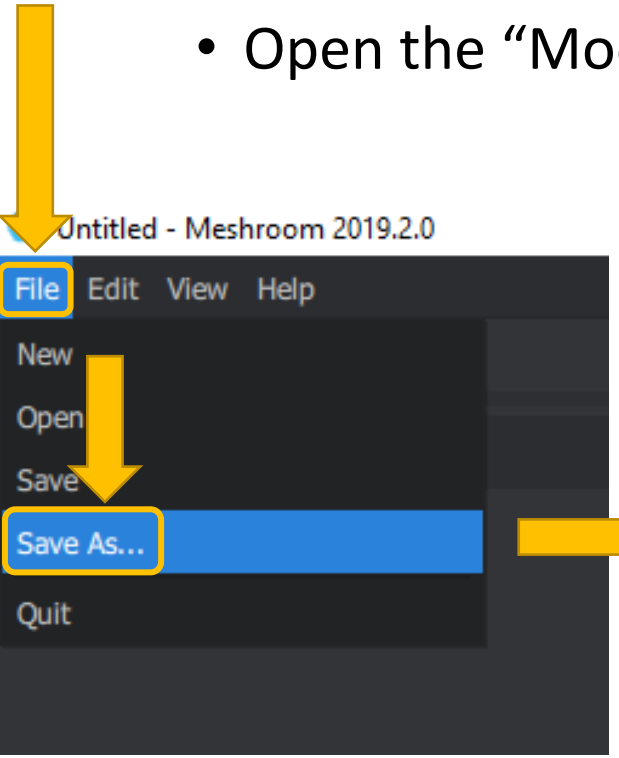
Using Meshroom – The Basics (set up)

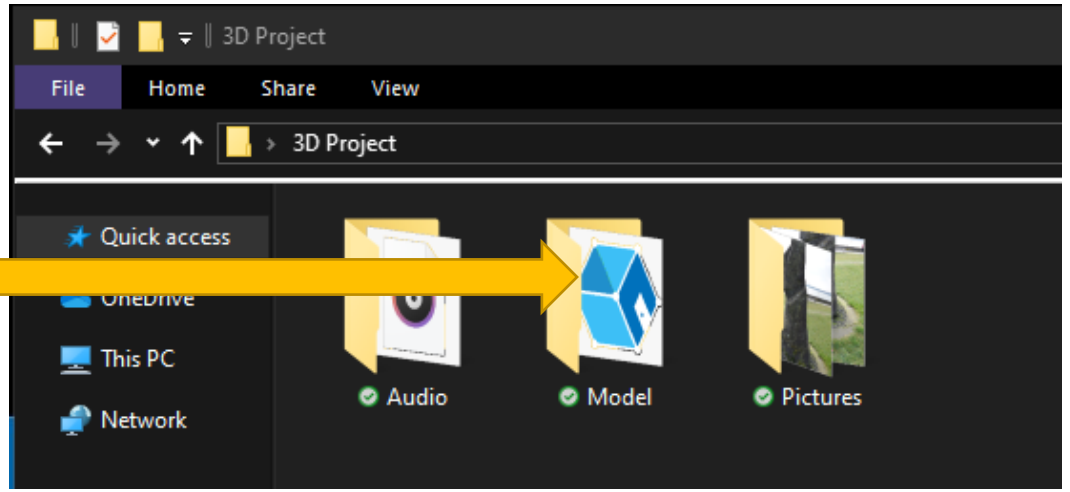
- Reduce the Texture Side parameter to “4096” or less to output a less detailed but more performant texture for interactive visualisation - using “2048” is a good starting value to try
- Set the Unwrap Method to “LSCM” - this is important to ensure that a single texture is created for the 3D model

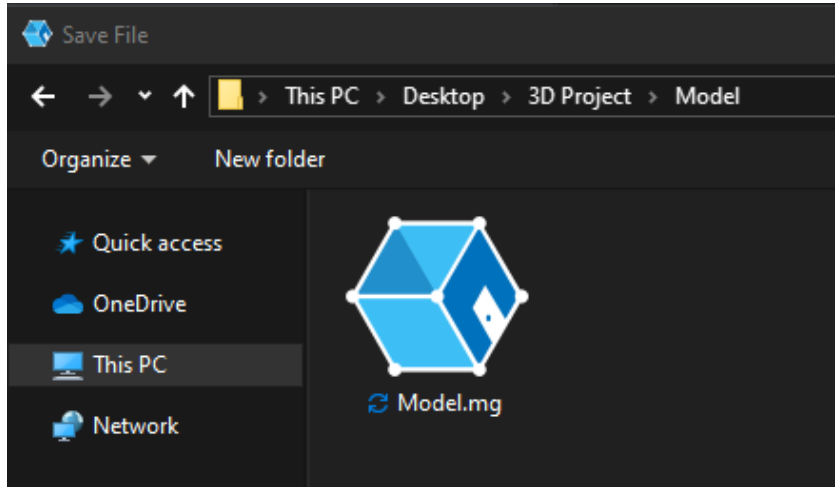


Using Meshroom – The Basics (save project)

- This will ensure you save your project settings and any data you produce
- Open Meshroom and click “File” -> “Save As”
- A window will then open allowing you to select the location to save your project
- Navigate to your desktop and find the “3D Project” folder
- Open the “Model” folder and save your Meshroom project as “Model”

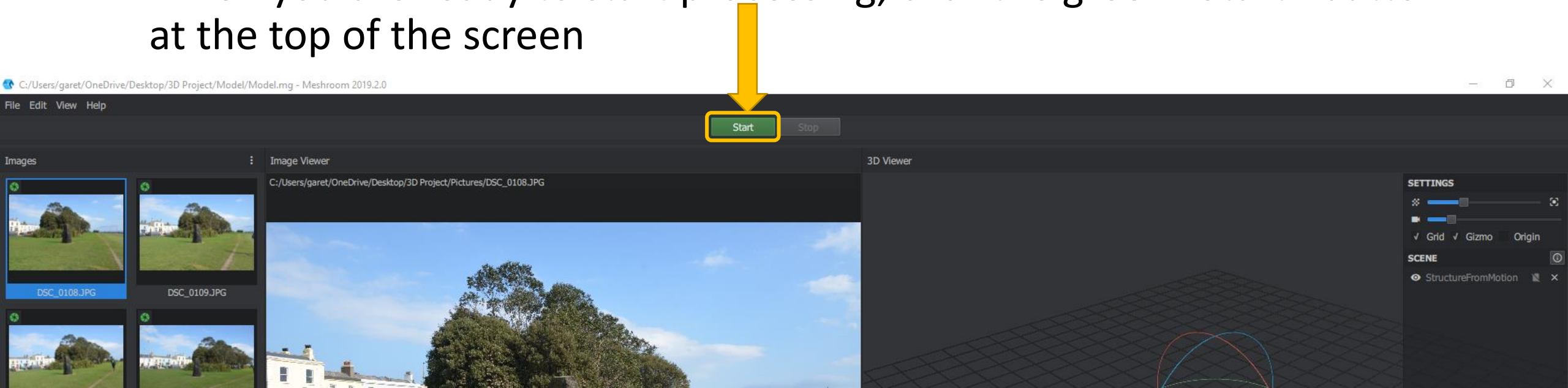






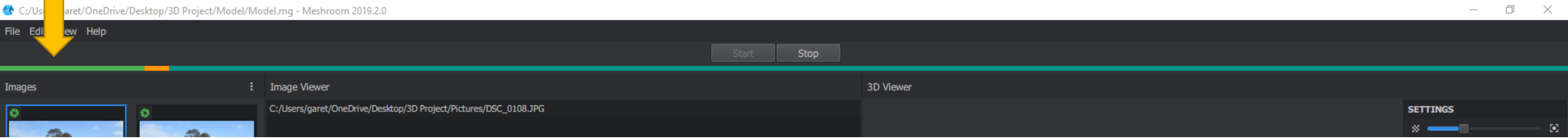
Using Meshroom – Start meshing!

- The meshing process can take anywhere from 20 minutes to several hours depending on the number of pictures, your Meshroom settings, your computer's memory and your GPU
- You may wish to leave your PC processing overnight - remember to change your Power and Sleep settings to allow this
- When you are ready to start processing, click the green "Start" button at the top of the screen

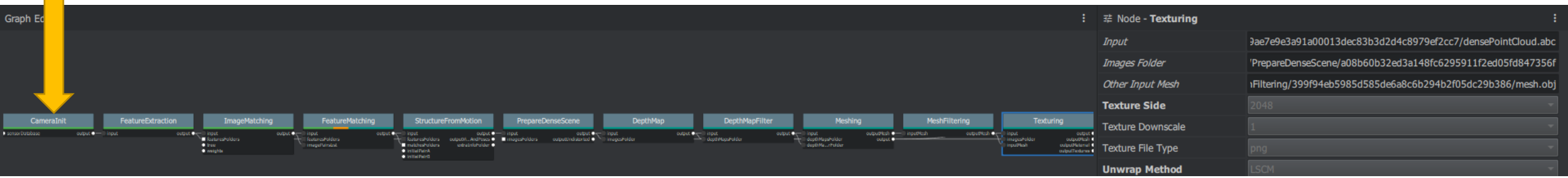


Using Meshroom – Checking progress

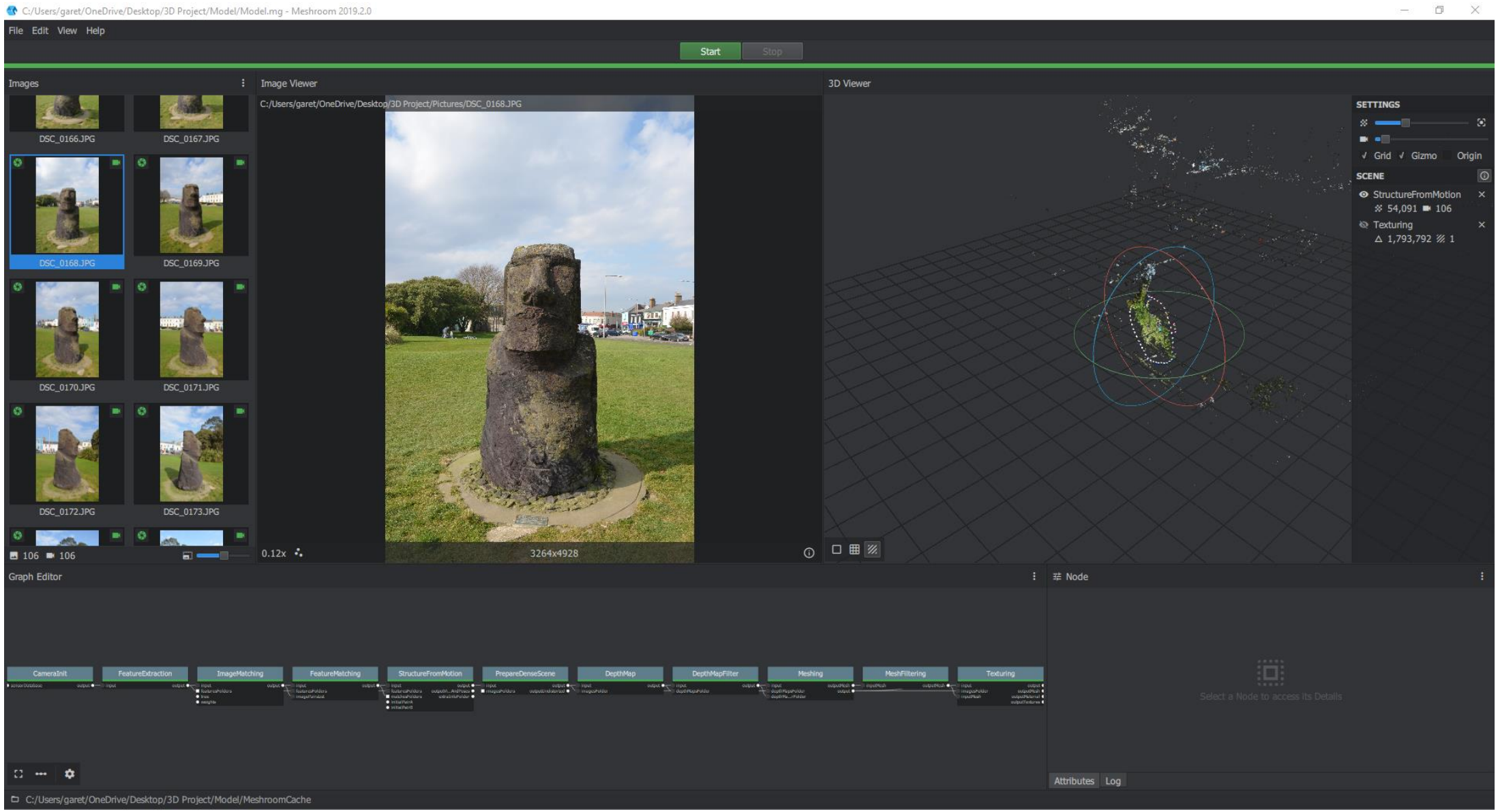
- When the meshing process has started, a progress bar will appear at the top of the screen



- The individual nodes will also highlight as they advance through the individual processes



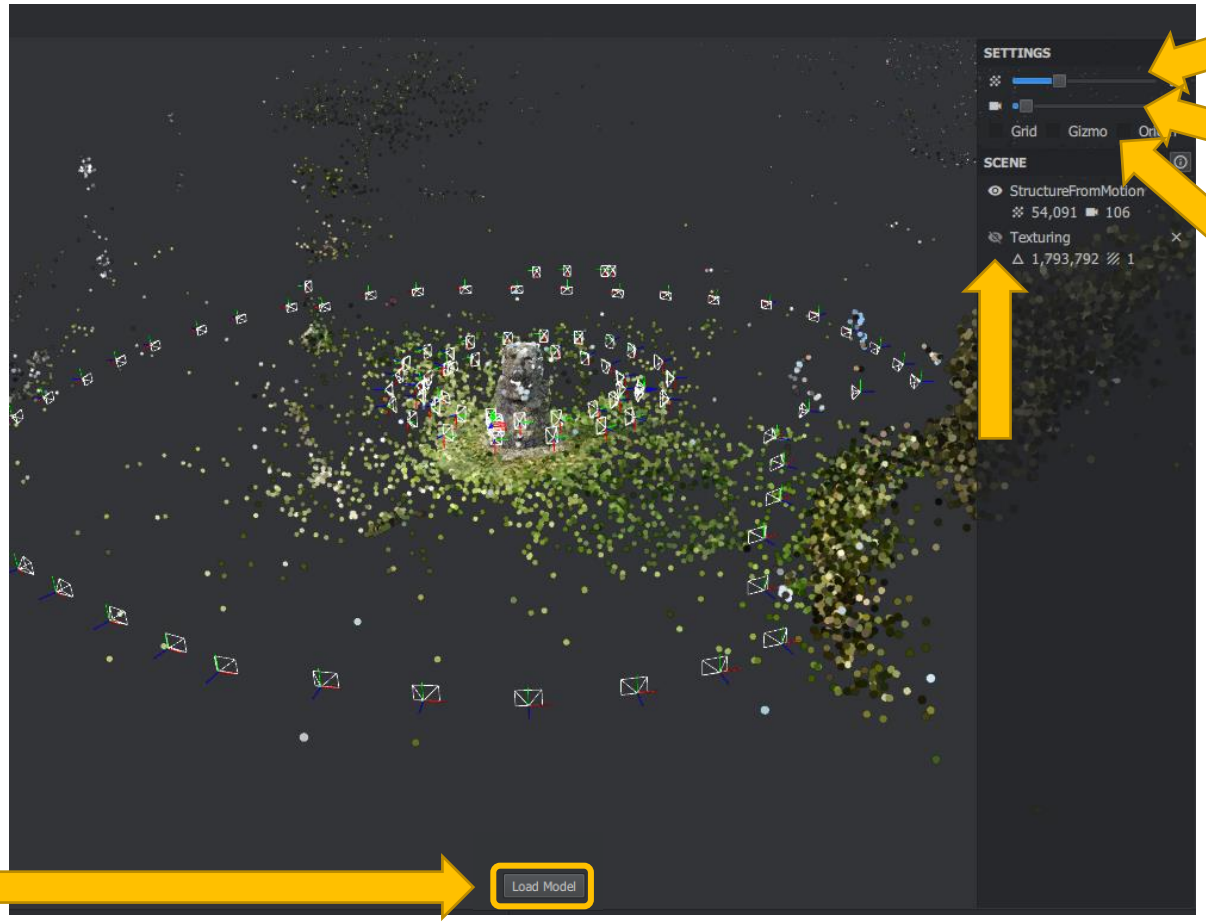
Using Meshroom – Completed!



Using Meshroom – Checking the model

The “3D Viewer” window will now allow you to load your 3D model

- Use the left mouse button to rotate the view
- Use scroll-wheel to zoom and pan the view of the model



Change Point Size

Change Camera Size

Show/Hide Structure from Motion to toggle the point cloud

Show/Hide Texturing to toggle the 3D model

Click **‘Load Model’**

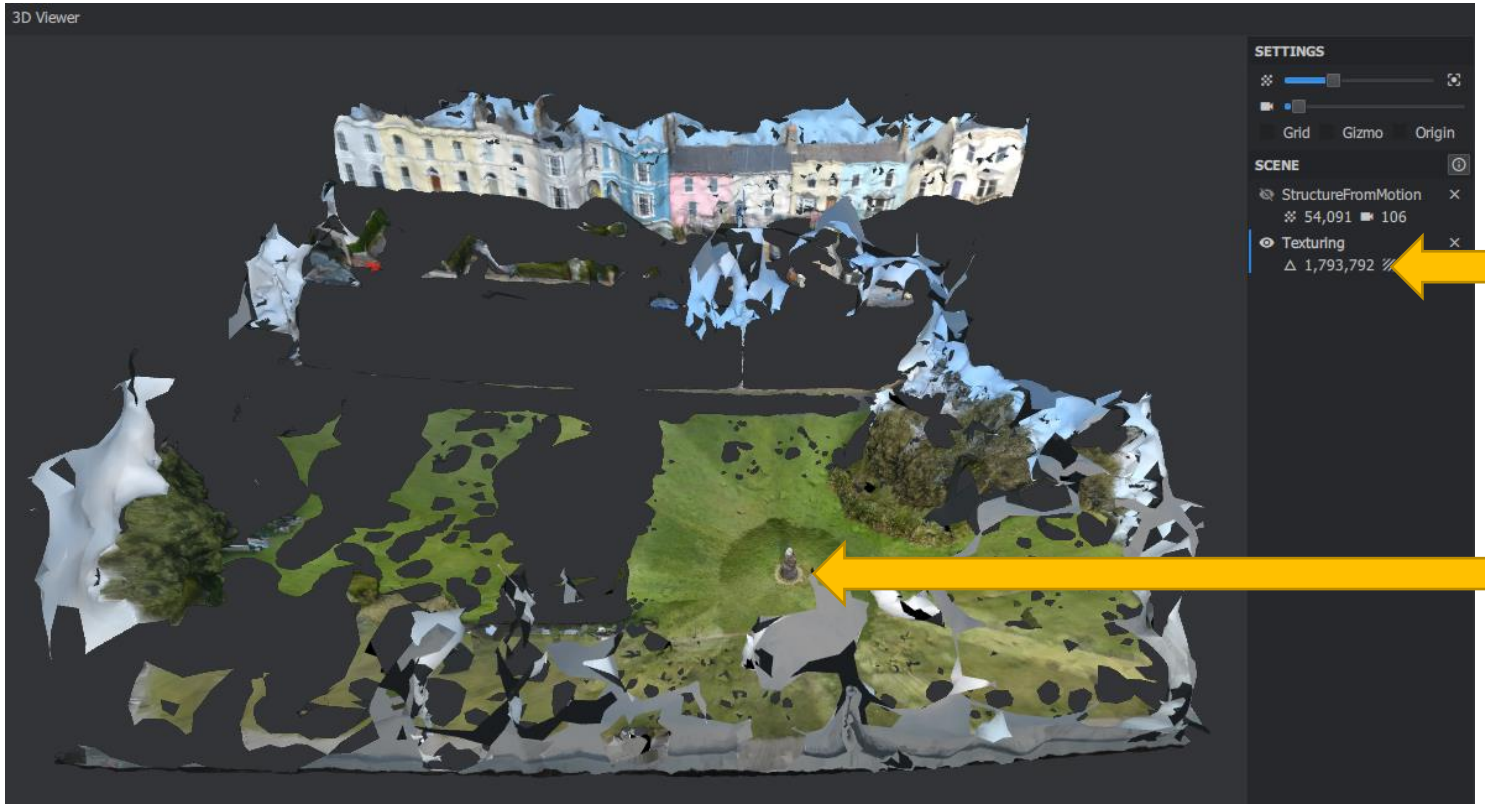
Using Meshroom – Checking the model

- You can explore the model in the 3D Viewer window
- Hide the Structure from Motion and show Texturing

Hide Structure from Motion and show Texturing by clicking on the “eye” icon

Using Meshroom – Checking the model

- The 3D model is going to be larger than necessary and includes a lot of extra data that you may want to remove
- In the next stage we will clean up the model and reduce the file size using Blender



Too many “faces” and too much extra 3D data around the area of interest