

CS11: 3D Scanning of Large Spaces

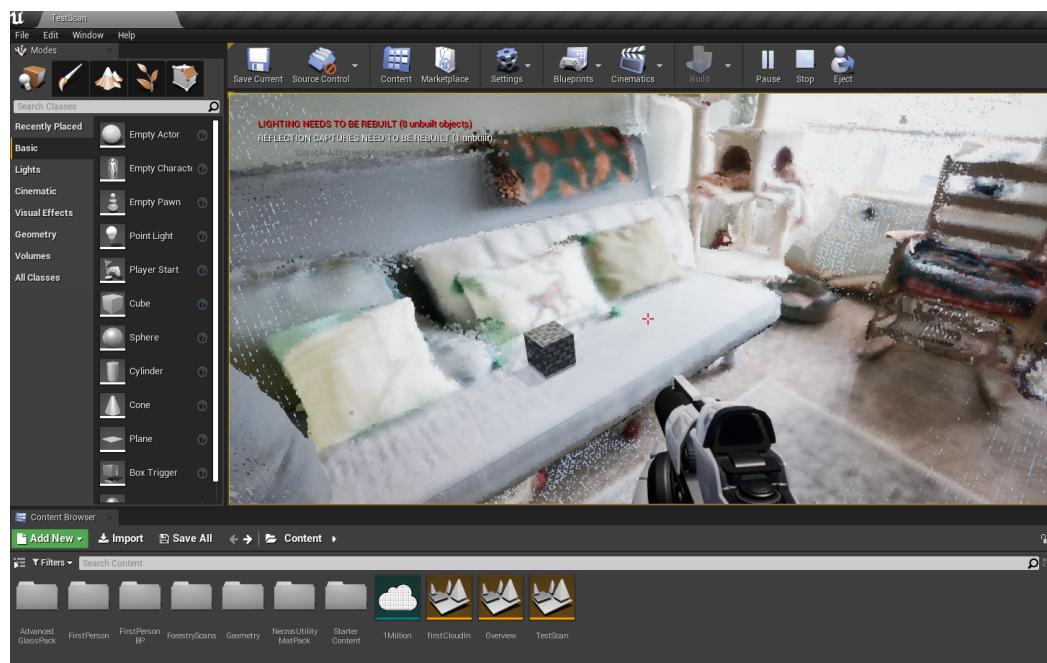
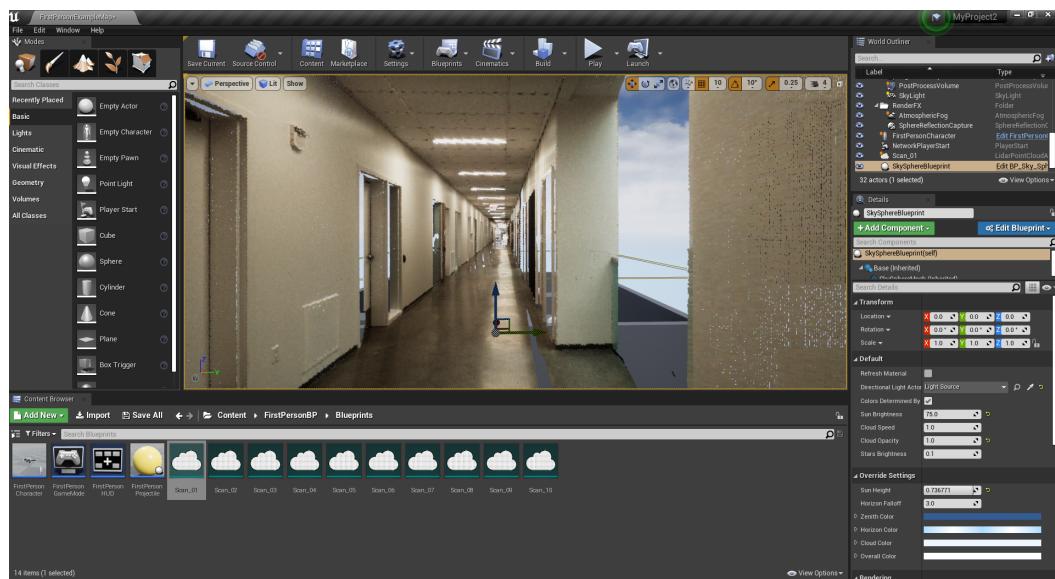
2/5/2021 Meeting

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PointCloudPlugin :

Though we had initial problems with PointCloudPlugin, it turned out to work very well when Unreal Engine is in version 4.24. The process of importing a point cloud that was generated by Dot3D, preferably in PTS format, is very simple. The plugin can also merge meshes, which makes it possible to import a large point cloud in several different pieces. Once the point cloud is in UNreal, it can be given collision that can be used for the virtual walkthrough. However, there is not a way to convert the point cloud into a mesh.





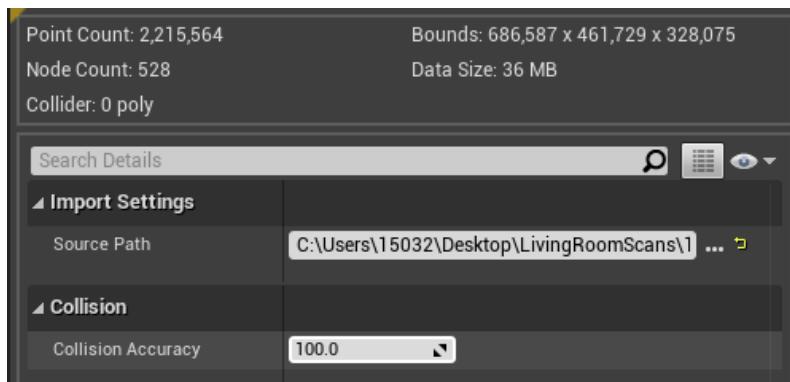
Short video fly through :

<https://youtu.be/mkHfouu66Yc>

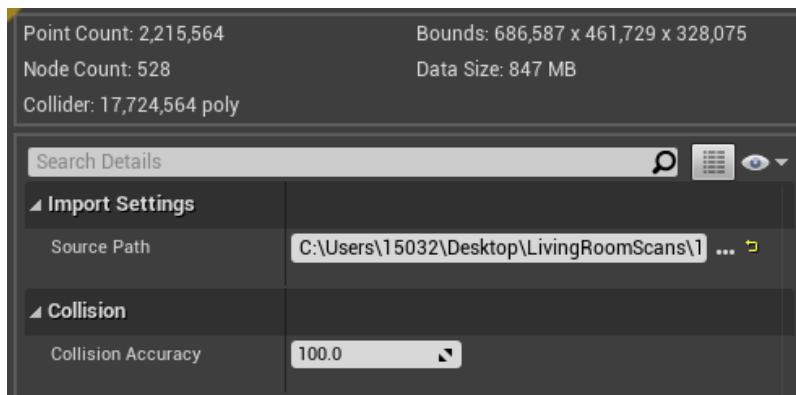
Issues with the plug-in:

The point cloud plugin does work quite well with importing PTS and LAS files. Colors and texture details on rugs and paintings are decently retained. Textures are a little muddled. There is also an issue with mesh creation for these point clouds. The plugin does not support mesh creation which may be a problem.

Creating a collision map will drastically increase the size of the imported scan :

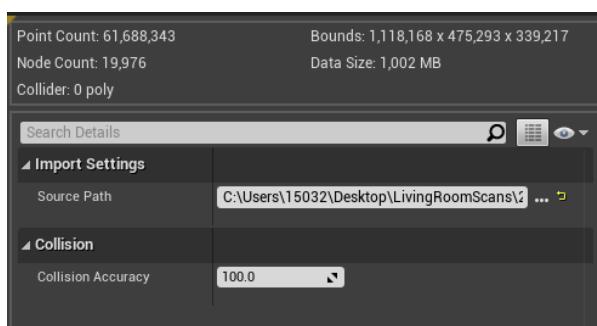


Stats before.



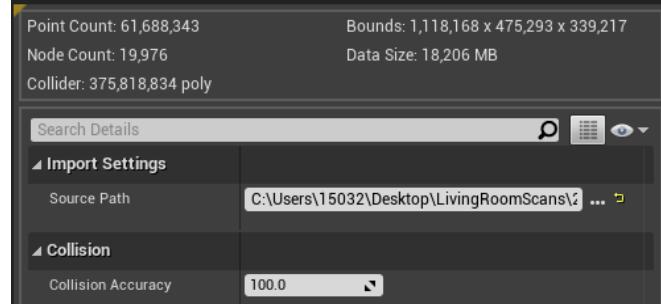
Stats After.

When the Unreal Engine creates collision for an object, it tends to fill holes between pieces of that object automatically. In this case it is filling holes between points in the point cloud. This is needlessly increasing both the polygon count and the collision count of the scan. This in turn will increase the size of the file by a drastic percentage. Below is another example.



Stats Before :

Point count : 61,688,343 Data size : **1002 MB**



Stats After :

Data Size : **18,206 MB** Collider Count : 375 million

Creating collisions for each scan takes an extraordinary amount of computational time and power. It is also not guaranteed to work, either. Due to the high cost of running the plugin's collision generation tool it will occasionally crash the Unreal Engine and or our computers in the process. This is not user friendly. We believe that the underlying issue is with larger point counts. We cannot make any definitive claims on this quite yet as we have not tested it extensively.

Collision generation method :

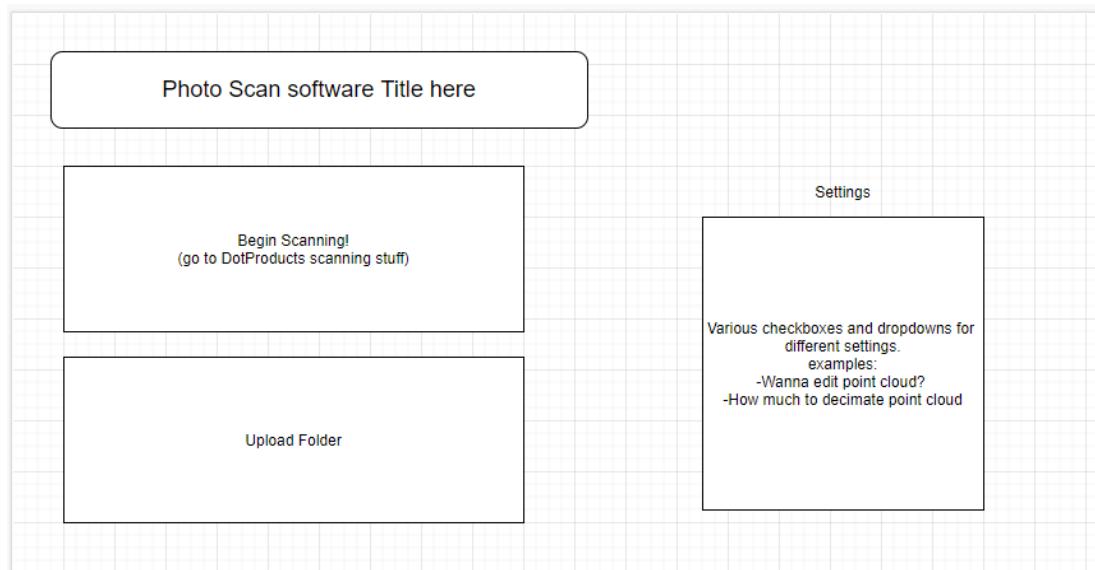
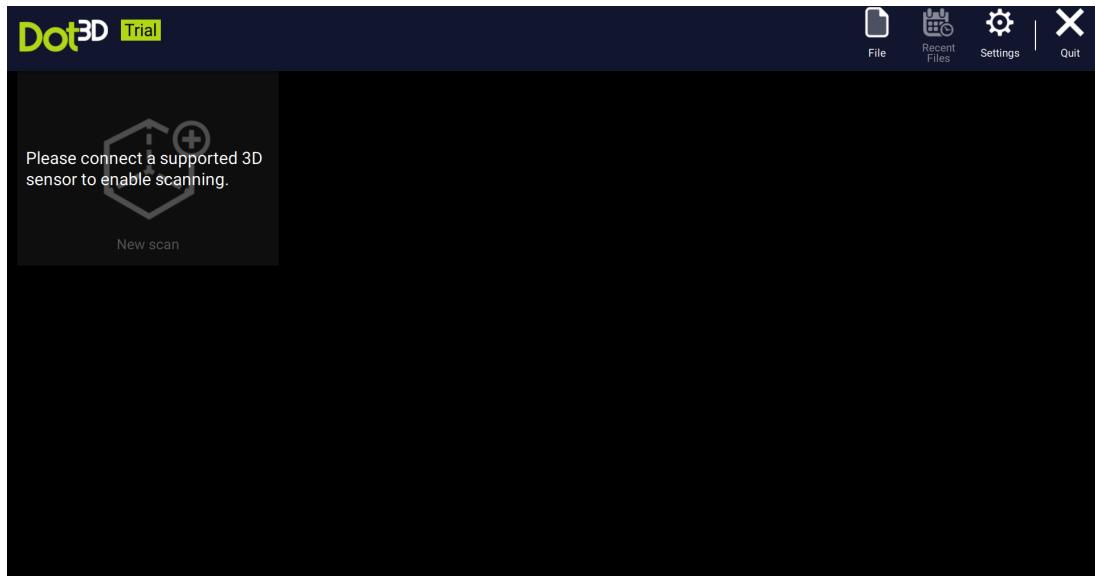
[LiDAR Point Cloud Plugin Quickstart Guide | Unreal Engine Documentation](#)

User Interface Design :

This week there has been discussion as to how we should be designing a user interface for this software that is user-friendly, customisable, and effective.

Some Ideas for the User interface:

- Model it similar to how Dot3D's interface is, where there is a place to begin the scanning process and a location where you can directly upload a folder of images. There would be a settings location that will have checkboxes, such as one that will ask if the user wants to edit the point cloud before it goes to unreal.



Why Photogrammetry?

A question that was proposed in the last meeting is to come up with ideas as for why someone would use this software for virtual classrooms rather than just using a zoom background? This software will end up being fairly expensive and a lot of effort on the users part to get the scan to look right.

There are a few reasons that someone would use this software as a virtual classroom. The first is for 'virtual field trips'. If the user scanned somewhere that was historical, or a museum or something like that, they could show it to their students. Similarly, in a work situation, a person could use this software to scan a newly constructed area, or some type of industrial machinery, and use it as a demonstration to their coworkers.

Another big reason why someone would use this type of software rather than just a zoom background is the ability to interact with things while in it. Because the final product will be in Unreal, the user could potentially add anything else that they would like to their scan. This kind of interactivity would be supplemented by the scan itself, and act as a place that the user can do physics simulations, drawing plugins, and other things.

- **Use cases**
- **Ears methodology, look for intel**
- **www.safe.com**