

Making Reality Virtual

Jason Herr / jaherr@asu.edu

Collins / Visual Prototyping - ART 494 / Digital Culture / Spring 2016

Abstract

Making use of the Leica Lidar system, the task at hand was to scan a space in the physical world to create a point cloud 3D recreation of vertices of the space, and to then import the point cloud information into Unity. From there, the Unity scene with the data would be made Virtual Reality compatible to see how efficient and plausible point cloud environments could be made for VR, versus the traditional photogrammetry methods in practice today.

Research Question

Photogrammetry is the process of taking real, physical objects and textures using photos to recreate them as digital objects/models and textures. However, photogrammetry often fails to capture the accurate geometry of shapes and objects, so can point cloud laser scanned models become a new and possibly more efficient alternative to photogrammetry for gaming in Virtual Reality?

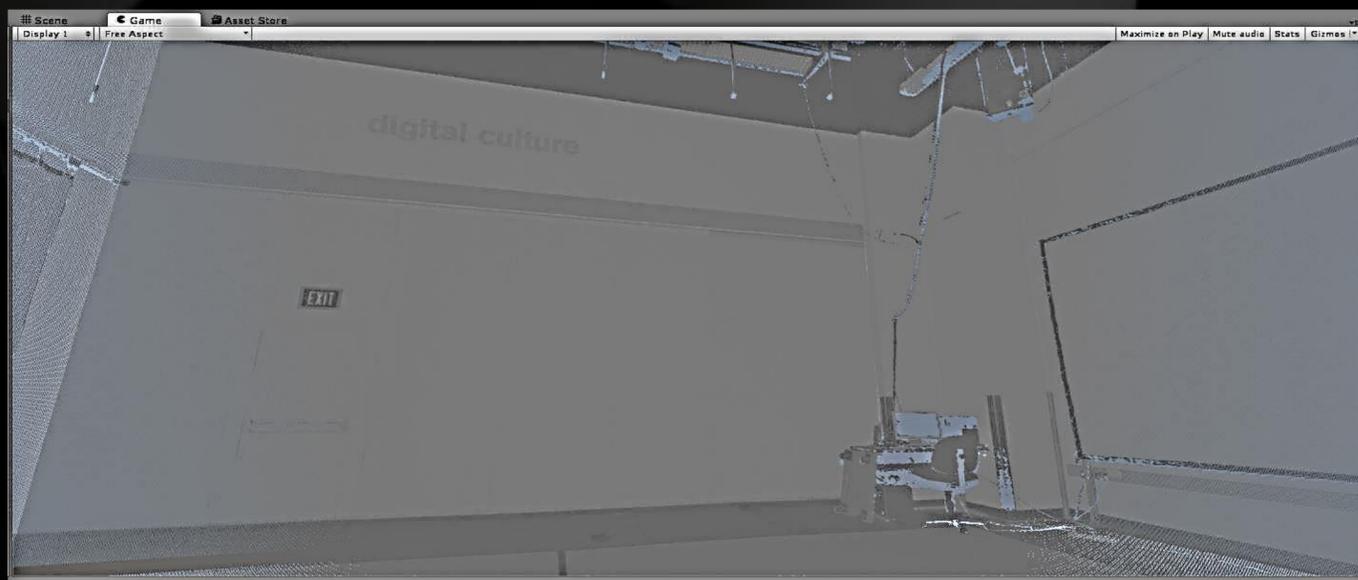
Prior Research

The video game industry is booming, and many games such as *The Vanishing of Ethan Carter*, *Get Even*, and the recent *Star Wars Battlefront* have all made use of photogrammetry in the making of their models and environments to get a realistic feel. With VR making leaps and bounds in the past year, the accuracy of Lidar scanning may be able to provide even more realism for virtual environments, as the geometric accuracy in a Lidar scan is much more accurate than photogrammetry.



Observations

While the current optimal frames per second (fps) for virtual reality and most VR applications is 90, with the imported point cloud data in Unity running on the Oculus Rift DK2 the scene was receiving between 40 and 50 fps, but this is likely due to the fact that the point cloud data is not being registered as a mesh, but rather that Unity is rendering all 9 million vertices from the data individually. This fps is still manageable for the purpose of VR.



Process

The process for acquiring the point cloud data involved using a Leica Lidar laser scanner. The scanner was placed in the center of the rooms that were scanned and set to scan the geometry of the rooms in a 360 degree scan. To achieve a higher quality scan the settings were set to scan with a smaller spacing between scanned points as well as setting the scan area larger than the size of the room to get tighter point grouping. These point cloud scans were then exported as .ptx files, which were then converted to .off files for importation into Unity. A point cloud viewer was then used within Unity to render the data as in-game objects to create the digital environments.

Results

The resulting images on the left are the results of the scans in respect to classroom B125 (above) and the motion-capture space (below) with grey-scale intensity values used instead of color. It was discovered late into the project that in order for the scanner to pick up color value during the scan, a setting prior to scanning needs to be checked.

References

Point Cloud Free Viewer Unity Plugin - Peter Snow

<https://www.assetstore.unity3d.com/en/#!/content/19811>

Thanks to Dan Collins for his assistance and use of his Leica Lidar system.