

Point Cloud Processing and Visualization for Landscape Architecture

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Architectural Visualization involves generating a set of 2D and 3D drawings to convey a designer's intent. It is also used to aid in the design process by studying the 3 dimensionality of a space and how the addition of designed elements affects the flow of a space. The issue with this workflow is that in order to create a 3D model of the space, simplification of the space's geospatial qualities is required. Spot elevations are difficult to create in a 3d model, so modeled topography is over simplified and does not capture what the space truly is like. Point cloud models can help to create smarter 3D models for the purposes of landscape architecture. By using lidar data to generate a "source model" of a site's existing conditions. designers can make more informed decisions and

create stronger designs. In addition to this, the use of a point cloud model streamlines the design process, allowing for more efficient work. LIDAR data can quickly generate accurate models which can be used to create several different types of products, such as VR models and 3D printed models. The poster will explain the workflow to generate a source model for the purpose of design, along with how that affects the established design process. In addition, the poster will also show a variety of products that can be made to convey the finished design, such as an altered point cloud model as well as a VR model and a 3D printed model.

For the purposes of this project, I worked with the VT student organization "Design for America" to implement this workflow into their real life project in Narrows, VA. They had no basis of site analysis, so this work would truly test if it was worth using or not as they were relying on it to inform the design process.

In order to create more accurate 3D models for designers, georeferenced data is required as a base. This is then constructed into a source nodel, which is studied throughout the design process. New elements are then added to the model to create an altered model, which can be viewed in VR or 3D printed.

The Workflow

- Download data into cloudcompare
- Process with orthophoto using GIS
- Begin site analysis using plas.io and CC (using segmentation)
- Generate design using standard architectural process
- Generate master plan & model
- Merge synthetic points to source model in cloudcompare
- Upload altered model to immersive viewing softwares (unity game engine and sketchfab)
- Create tiled 3D printed model (Cura)



"From Point Cloud to Documentation ." Performance by Luis M Ruiz, and Fahad Zahar, Vectorworks, 14 July 2016, https://www.youtube.com/watch?v=7H2GX2TgS2k&list=WL&i ndex=274. Accessed 2021.

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