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## Modeling Thin Structures From Images And Point Clouds

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## **MODELING THIN STRUCTURES FROM IMAGES AND POINT CLOUDS**

### **ABSTRACT**

A method for creating a 3D model of thin objects is disclosed. This method creates 3D models of each such thin object from cues taken from posed source images and 3D point clouds (which can come from depth maps of these images). The cues could be a vertically aligned line feature or discontinuity in a background image. The 3D models of the thin objects are then added to the input 3D point cloud, and a mesh reconstructed from this augmented point cloud. The above method allows easy creation of 3D imagery of near vertical or thin objects like poles or towers to be incorporated onto maps.

### **BACKGROUND**

Many software products are available for creating 3D models of objects. Some mapping software products also allow such objects to be incorporated onto maps. The 3D model gives a virtual visual effect of the original object to a user trying to locate it on a mapping application. Using existing 3D modeling software, it is easy to create 3D models of large objects like a building or a bridge etc. but the user has to struggle to create thin objects such as a pole.

### **DESCRIPTION**

A method is proposed that allows creating thin objects for incorporation into a mapping application. This method will use detection of poles using both depth maps and source images using the steps as follows.

1. Start with 3D point clouds (which perhaps originated from image depth maps).
2. Identify 3D models of thin objects from the point clouds (with RANSAC).
3. Refine these models, and remove false positives, using cues from source images.

4. If needed, sample an oriented 3D point cloud representing these models, and add it to the original point cloud.
5. Reconstruct a mesh representing the combined data (source 3D point cloud and newly-detected thin objects) from this augmented set.



FIG. 1: Identifying thin objects in an image using image cues

The disclosed method allows easy creation of 3D imagery of near vertical or thin objects like poles or towers to be incorporated onto maps.