

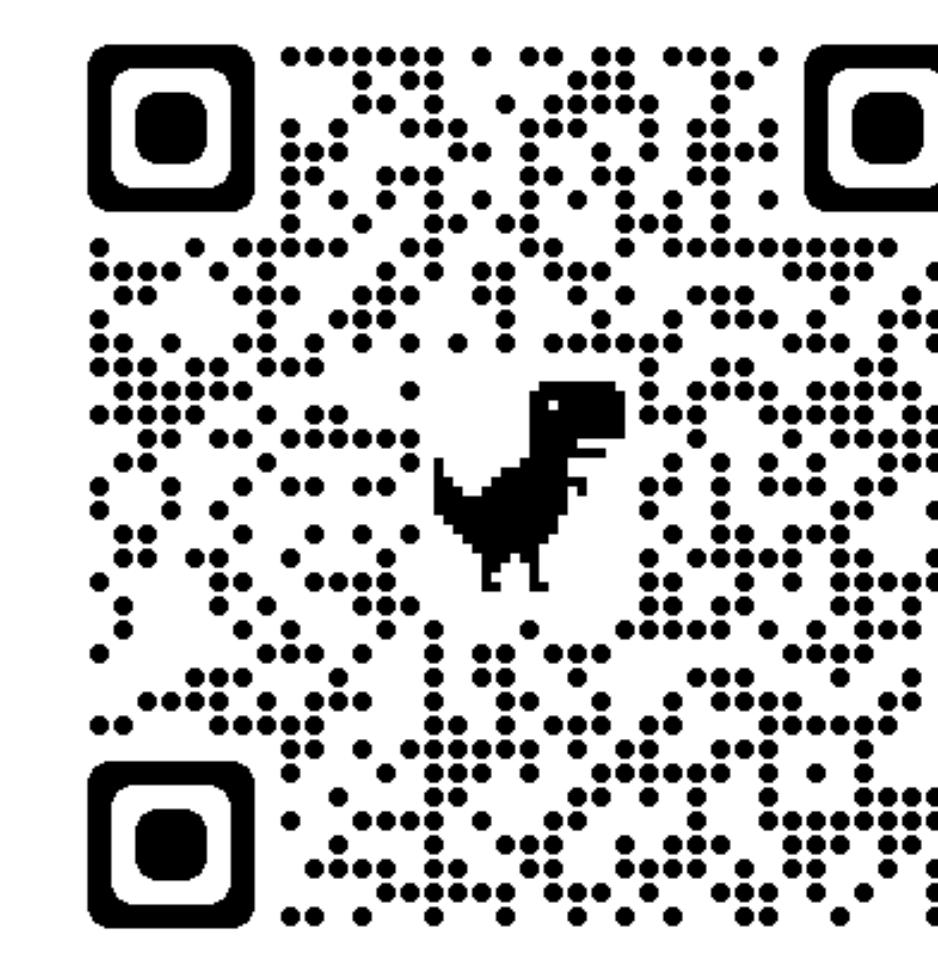
Pathfinding using 3D Point Clouds

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Background

- Point cloud - a set of data points in a 3D space.
- Point clouds can represent real-world objects and spaces.
- Point clouds generated using 3D scanner (such as LiDAR).
- iPhones have built-in LiDAR.

Goals

- Generate obstacle-avoiding path along floor of a room.
- Allow a user to select start and end points.
- Present user with a interactive, 3D space with the path.

Next Steps

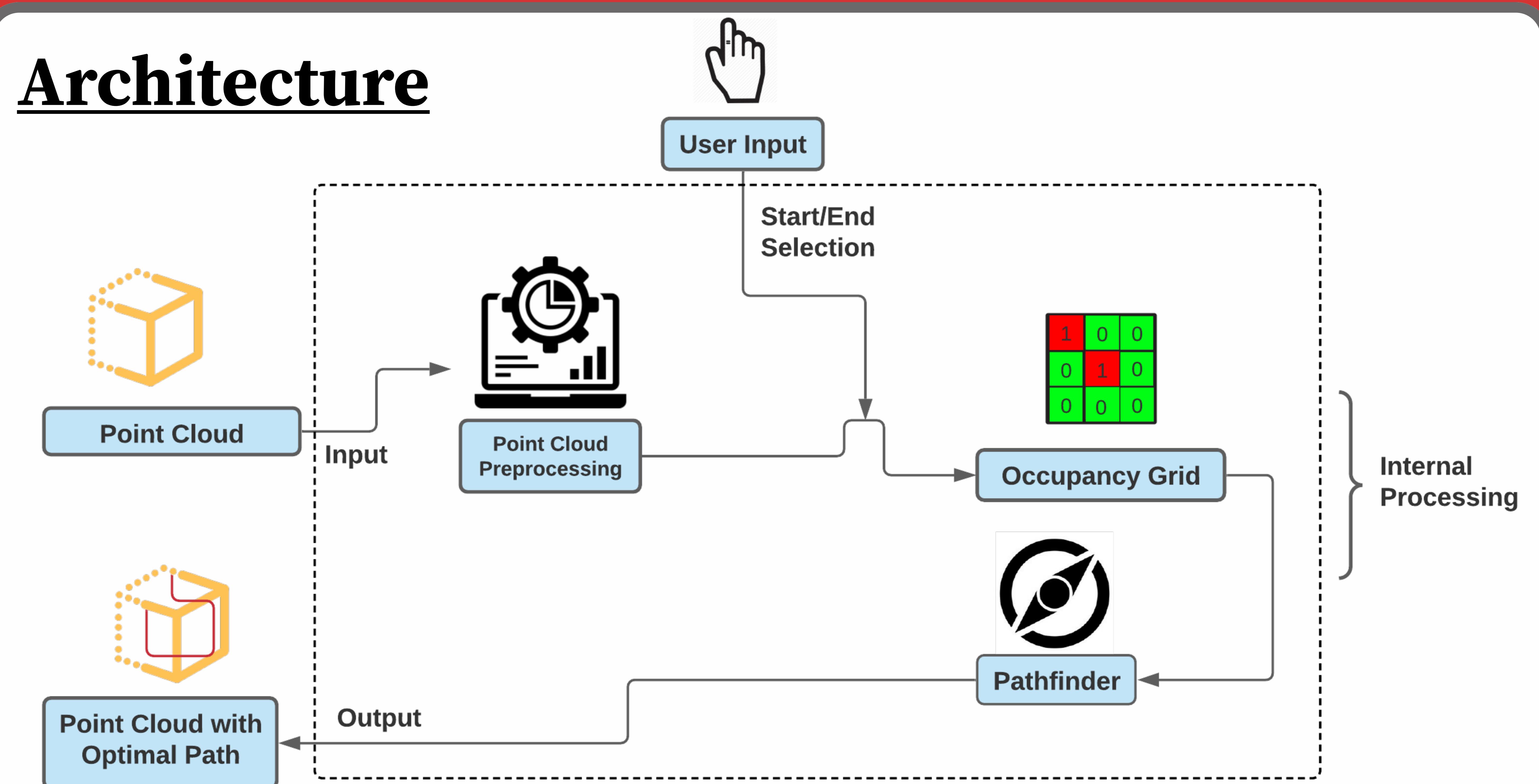
Improvements:

- Generate real time path in 3D interactive map.

Future Use:

- Provide building evacuation route in emergency.
- Guide for vision impaired people.

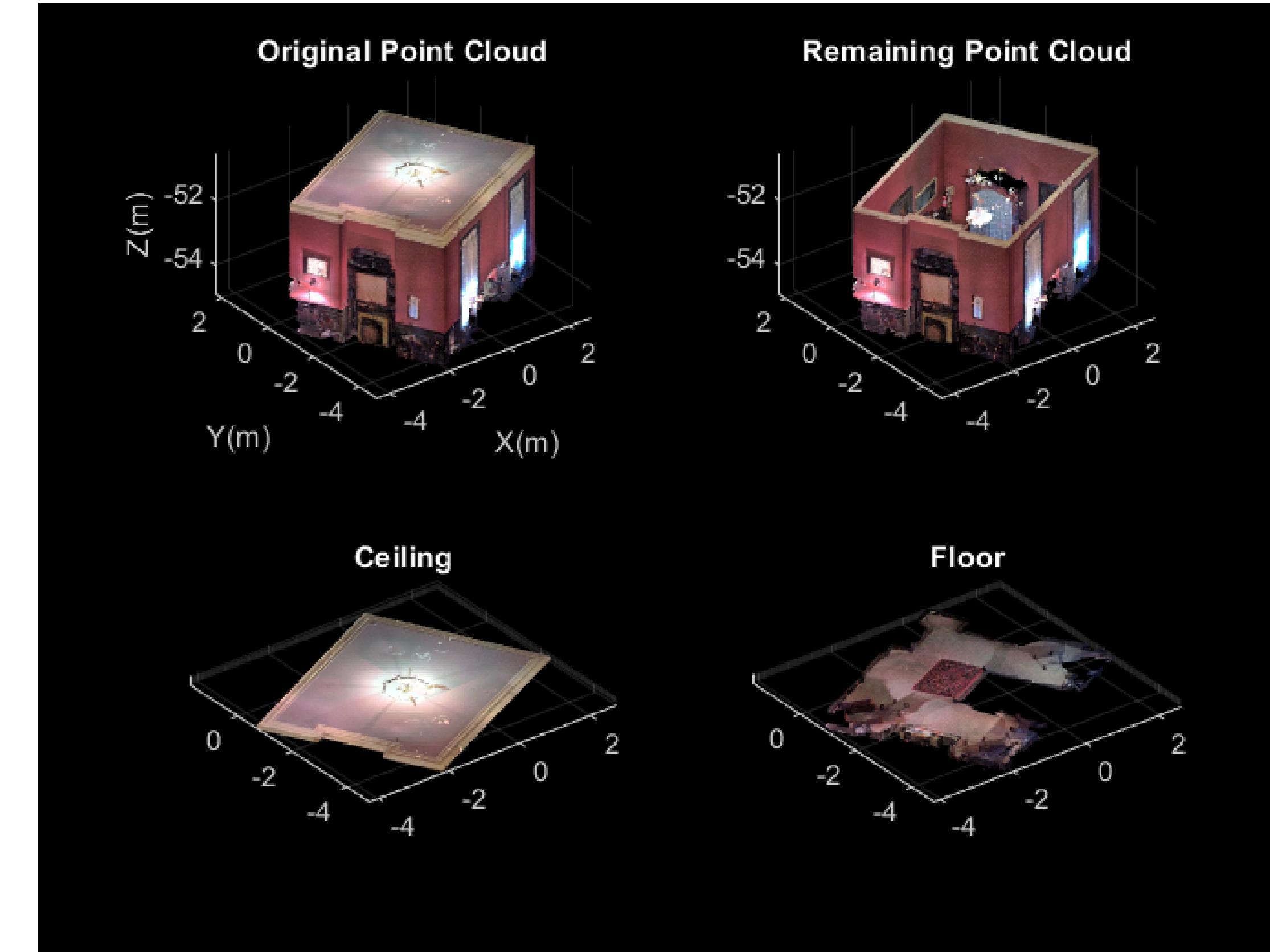
Architecture



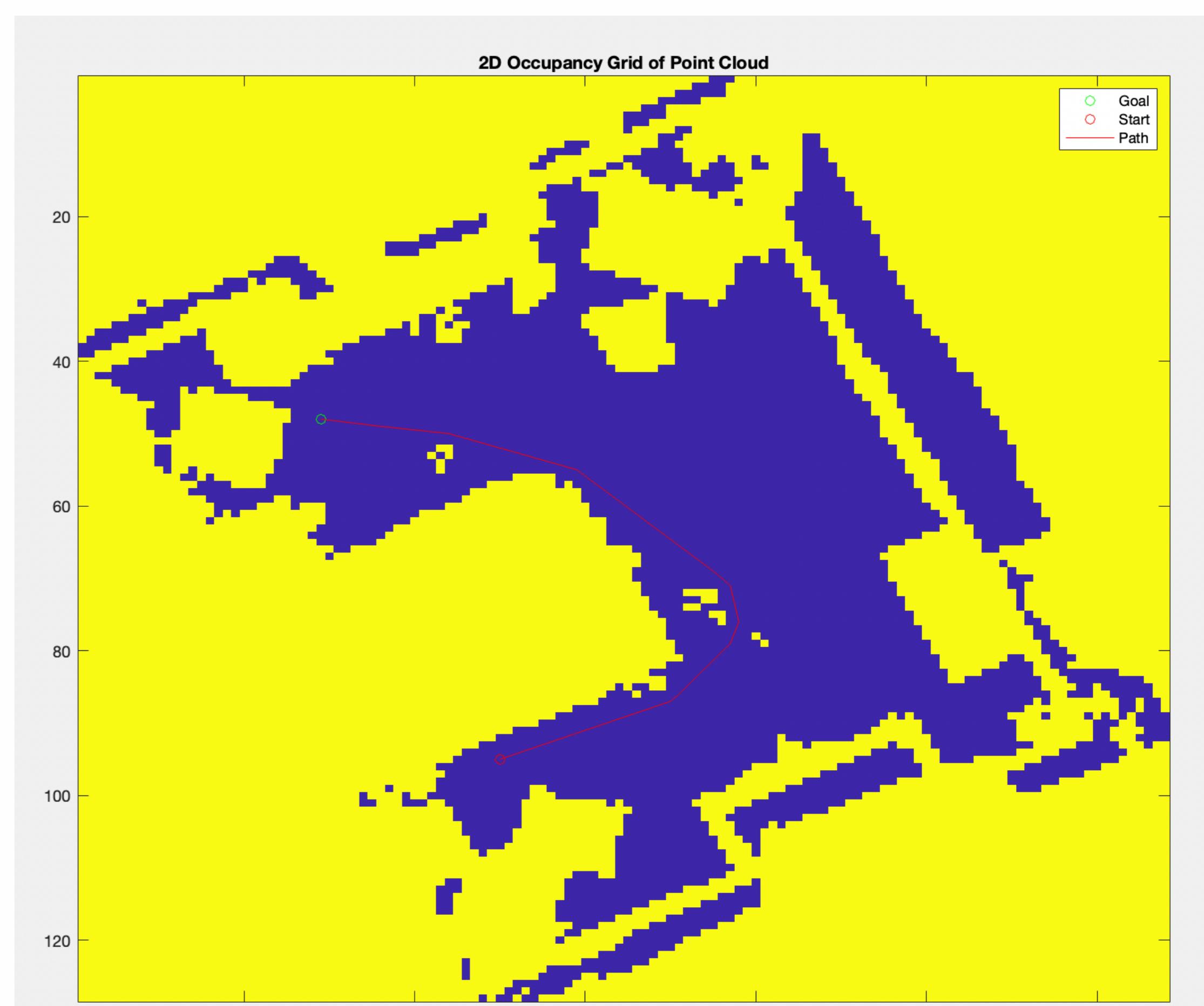
Methods

- Input 3D Point Cloud.
- User selects a start point and goal point from a top-down view of the point cloud.
- Bin points into 2D space, generating 2D occupancy grid.
- A* pathfinder finds path along the 2D spaces that avoids occupied bins.
- If path is found, points on path are colored and path is shown in 3D space

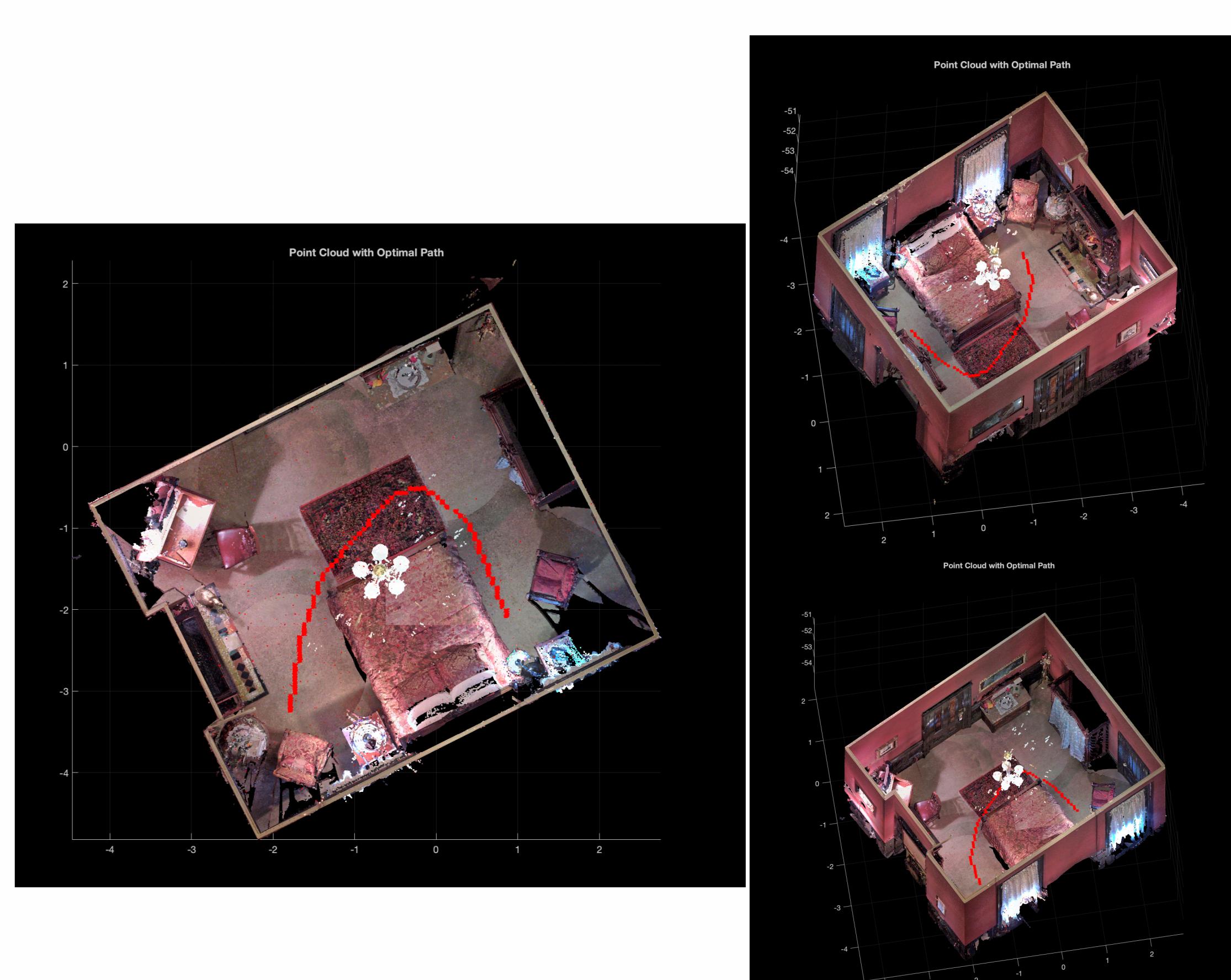
Results



Point Cloud Processing



2D Occupancy Grid



Optimal Path in 3D space