



PUCK SUBTEAM

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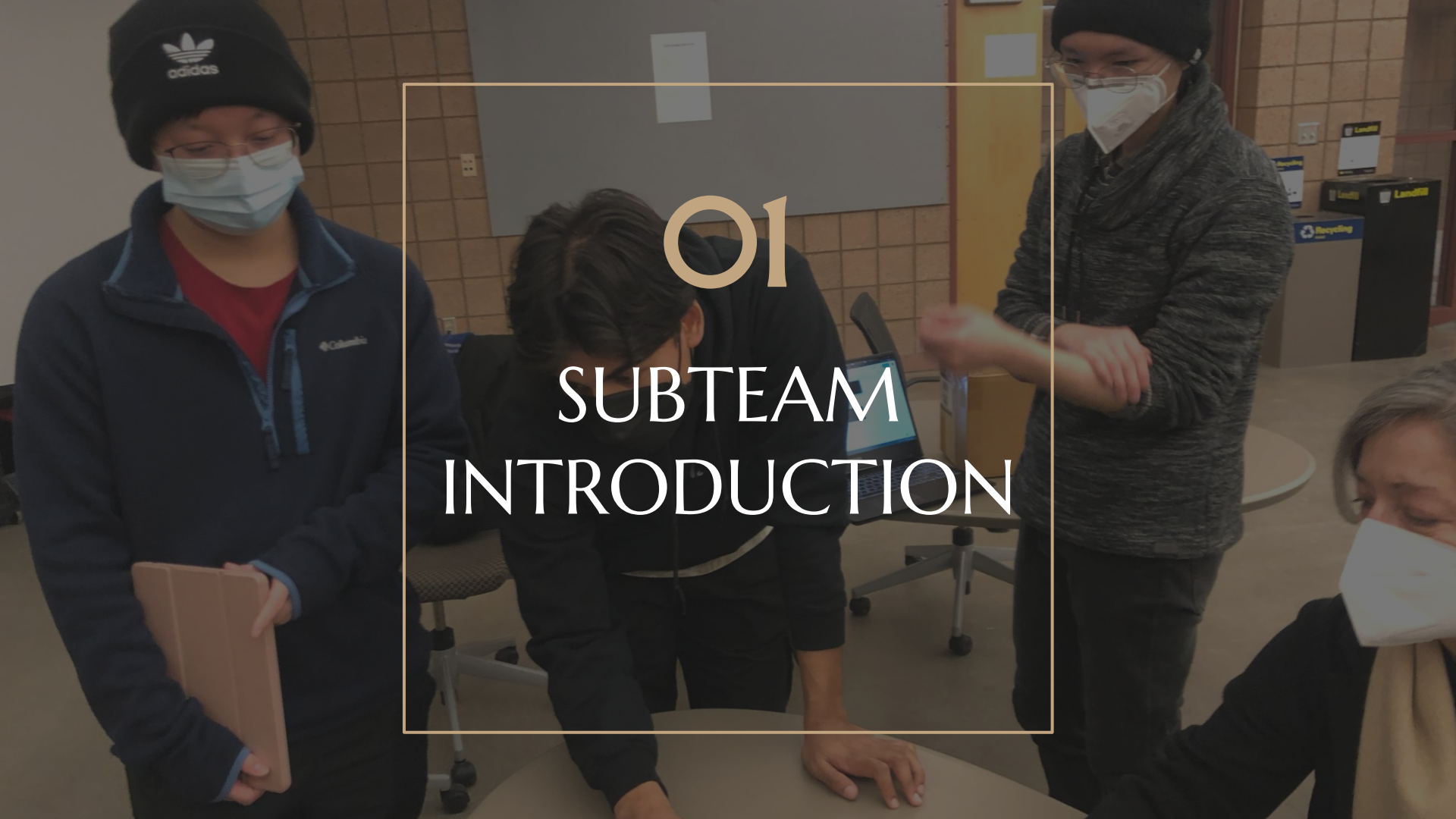
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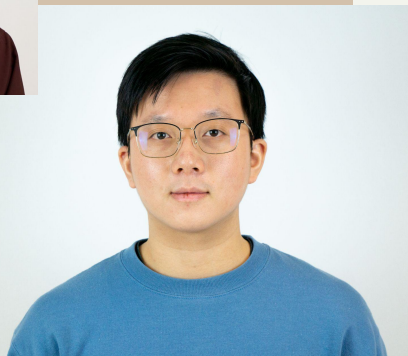
01 SUBTEAM INTRODUCTION



RISHAD HASAN:

YEAR >> FIRST-YEAR UNDERGRADUATE

SPECIALTY >> ELECTRICAL ENGINEERING



HEMING HUANG:

YEAR >> SECOND-YEAR GRADUATE

SPECIALTY >> ROBOTICS



YIPENG LIN:

YEAR >> []

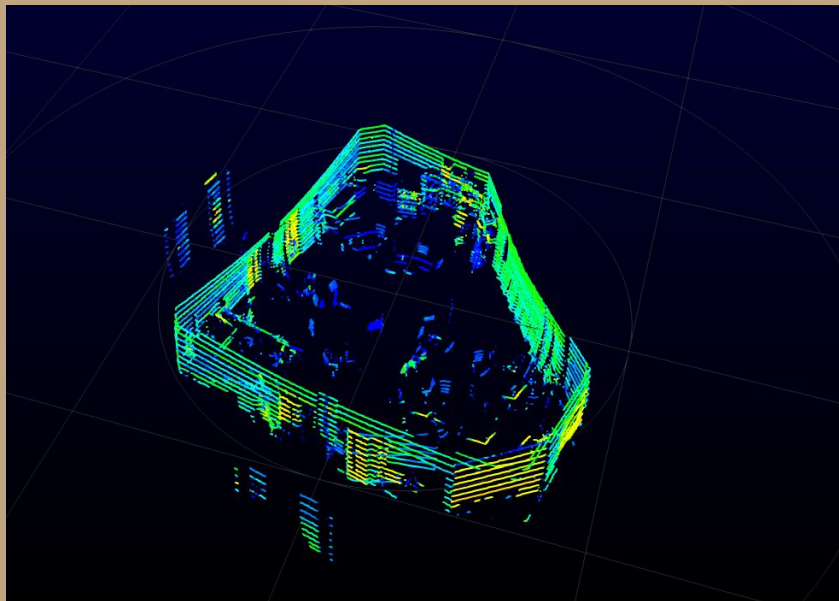
SPECIALTY >> []



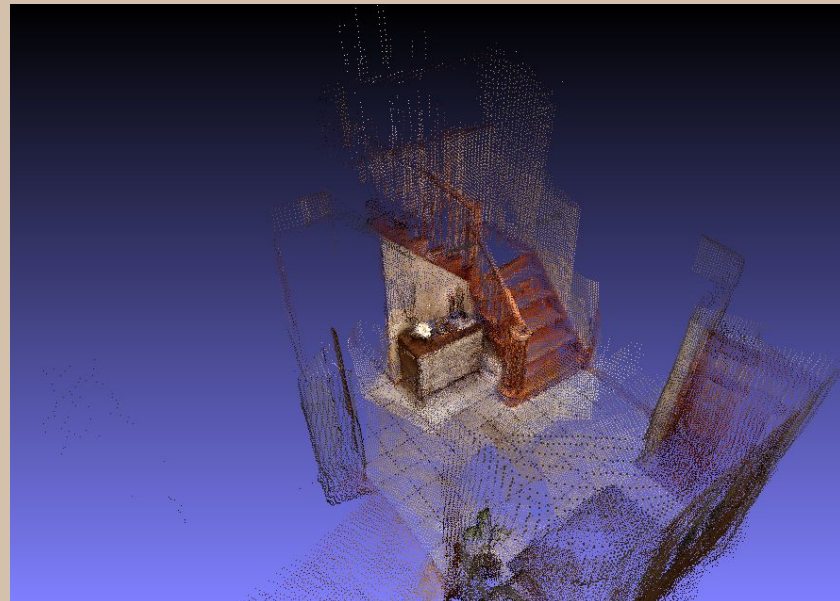
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PUCK+CAMERA INTEGRATION

PAST WORK



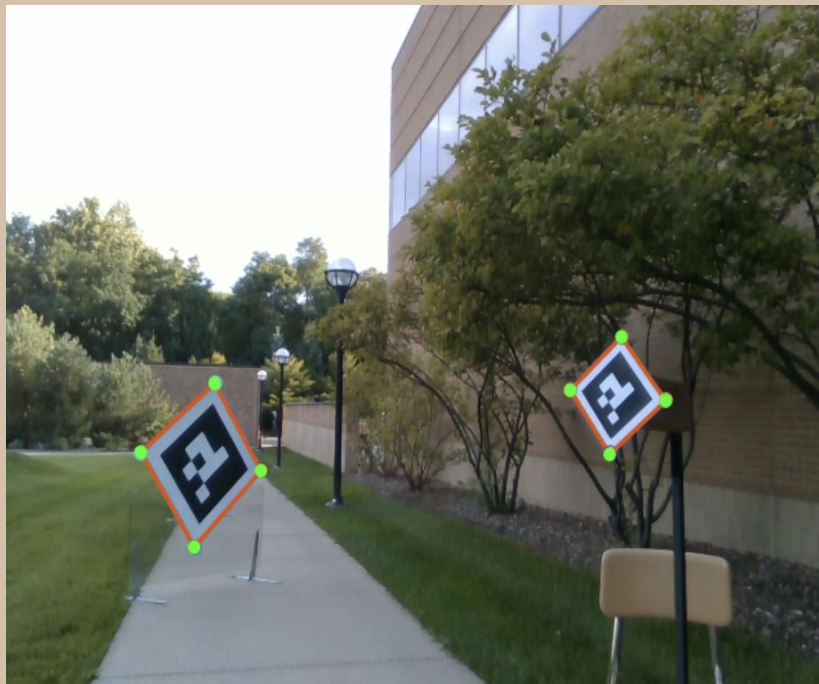
PUCK scanned with no color information



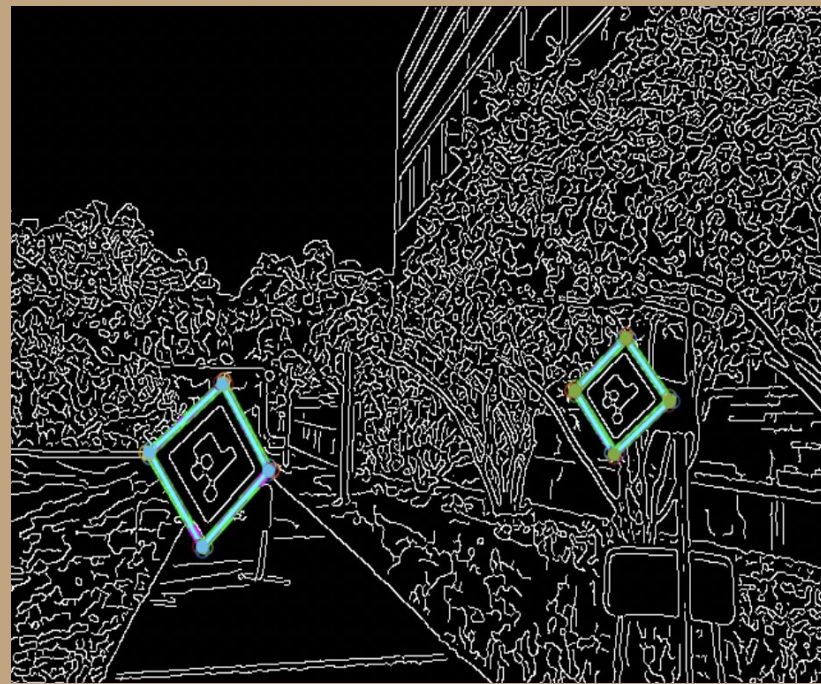
Desired outcome

A natural thought would be aligning PUCK scanned point cloud with image pixels to assign color information to the points. The former team member found a repository¹ that can carry out the camera-lidar calibration, we continued on their work and generated some interesting results with some test data.

1. https://github.com/UMich-BipedLab/extrinsic_lidar_camera_calibration

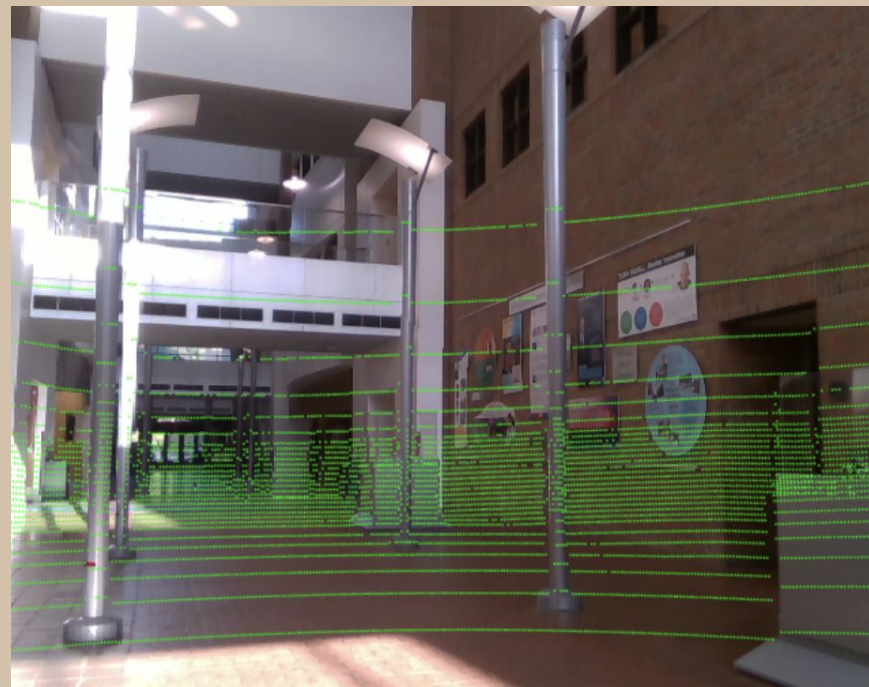
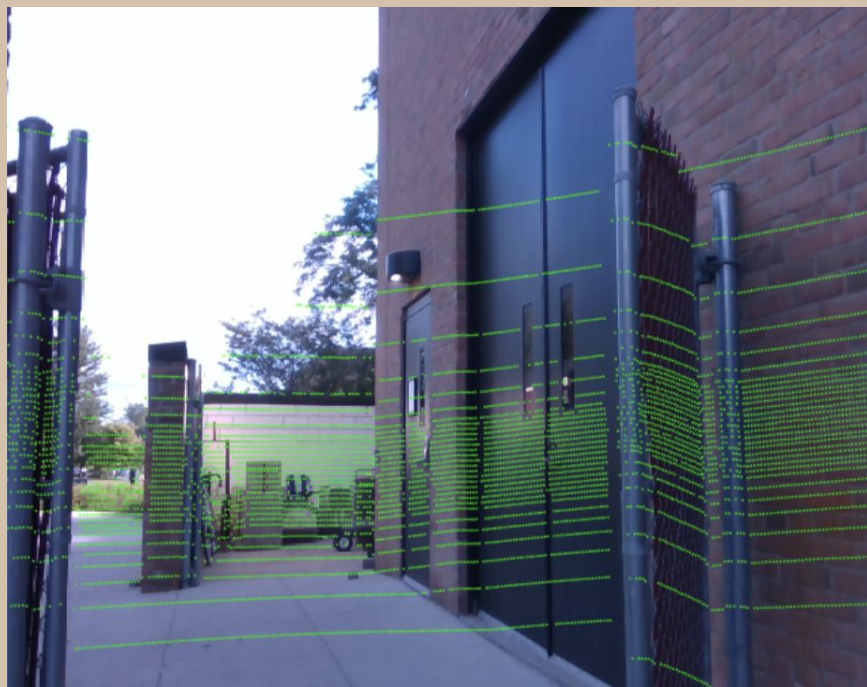


Camera detecting LiDARTags



LiDAR sensor detecting LiDARTags

Use fiducial tags that can be detected both from the camera and the PUCK to calculate the displacement and rotation from camera to the PUCK. This is used to project the 3D point cloud from the PUCK to 2D image from the cameras.



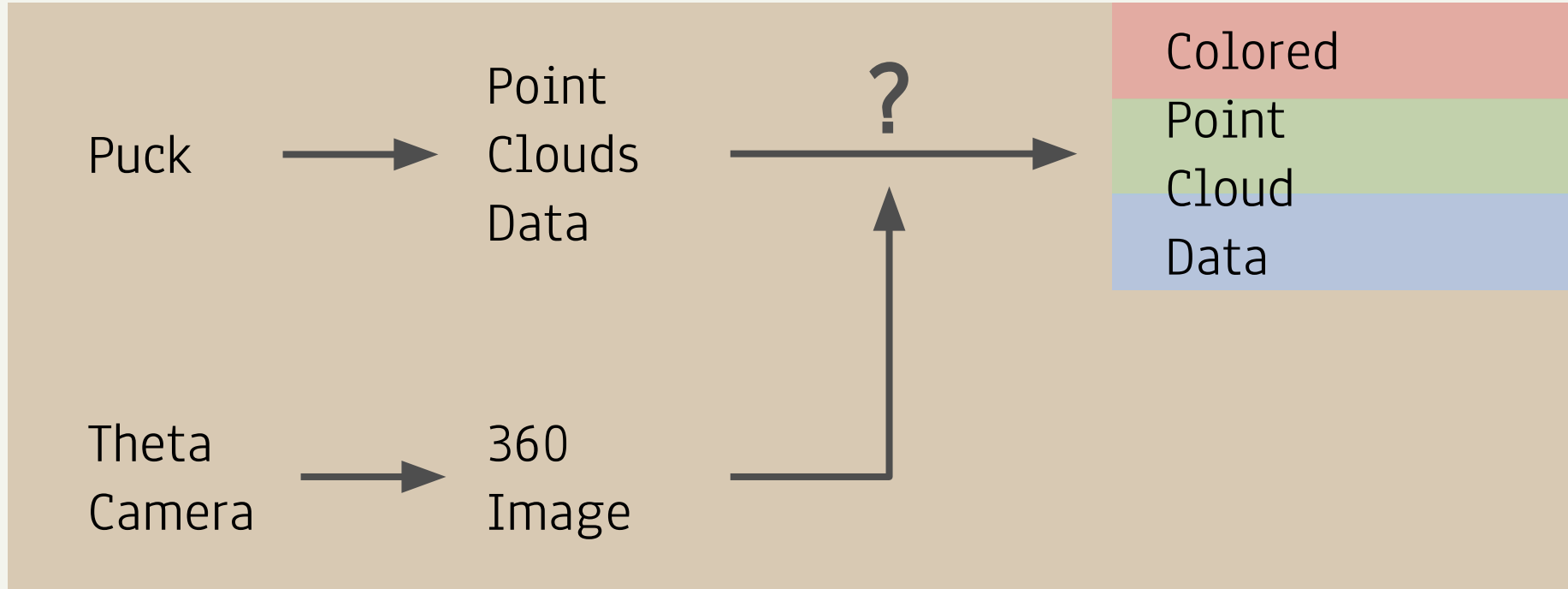
LiDAR scans superimposed on camera images

With the relative position of the PUCK and camera fixed, the calculated translation can be used to align any future pairs of camera images and PUCK scan. Then it is possible to assign color information to the PUCK point cloud given this camera-PUCK correspondence..

Stationary Mode

This can be the part of the presentation where you can introduce your business or agency. Keep it short and go straight to the point. Your audience will appreciate it

Workflow



Challenges

- ❑ Puck data recorded in separate files
- ❑ File format convert (.pcap to .las)
- ❑ Ways to add color data during the process
- ❑ Relative rotation unknown
- ❑ Color data mapping into real 3D position

What we did

- ❑ **Puck data recorded in separate files**

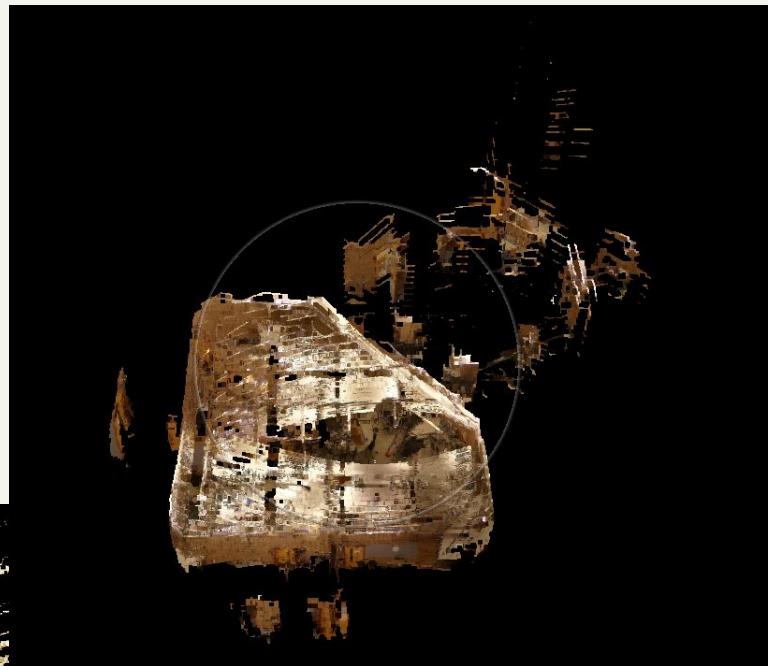
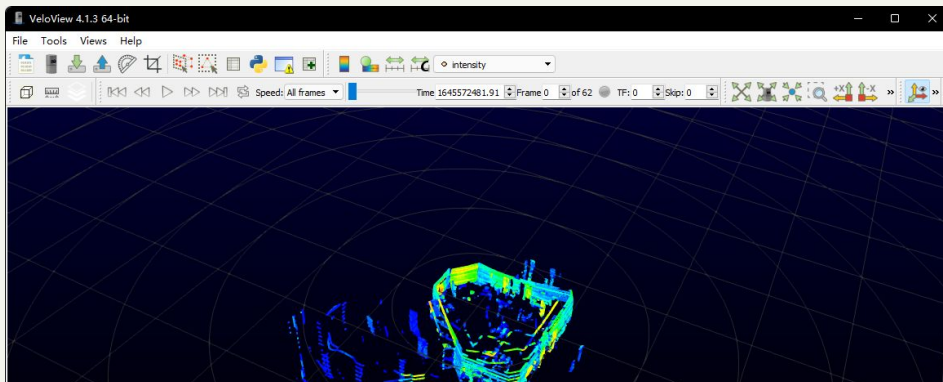
- ❑ Use python to read files and keep them in memories for later usage.

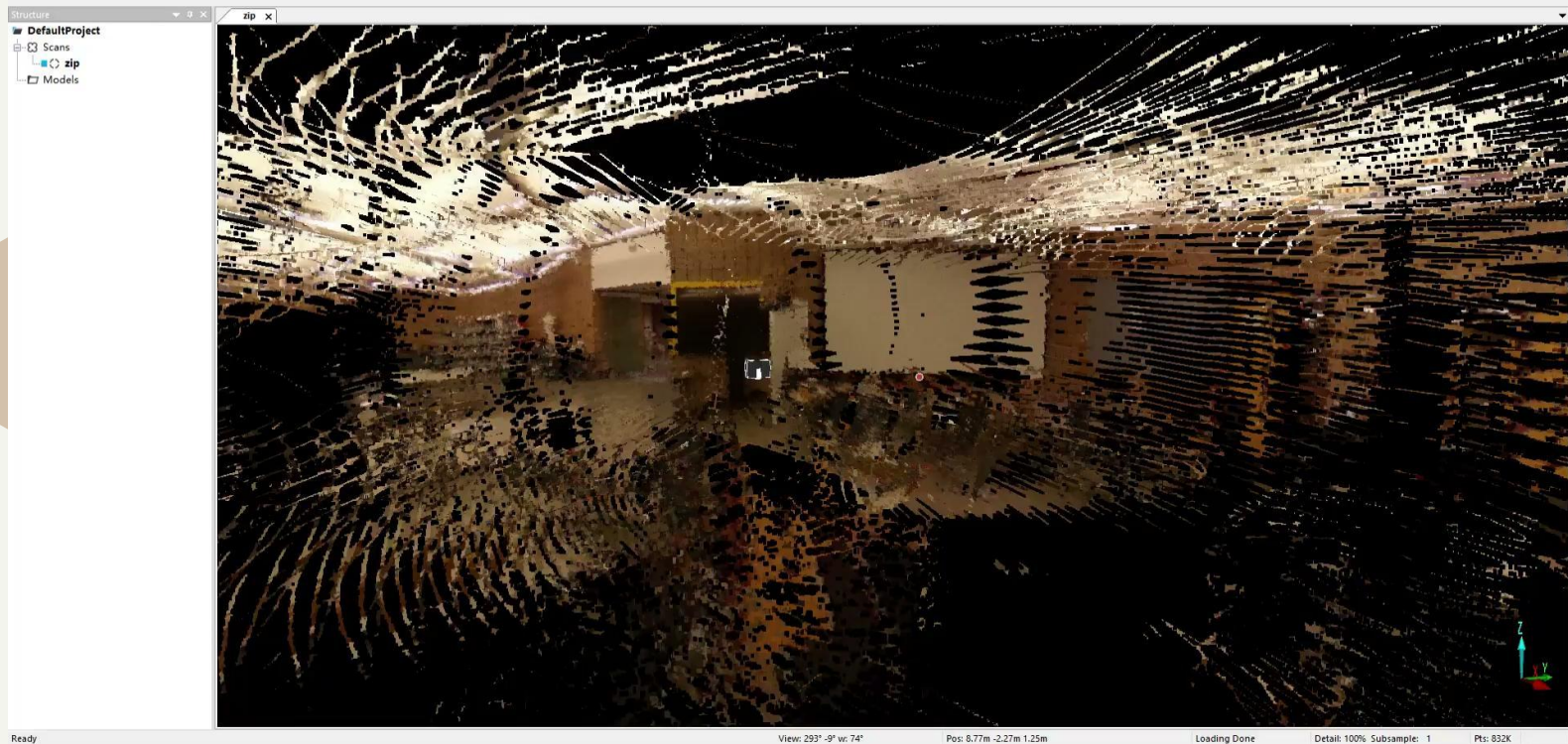
- ❑ **File format convert (.pcap to .las)**

- ❑ Use python library laspy for conversion

- ❑ **Ways to add color data during the process**

- ❑ Within the laspy conversion, color data can be added as rgb value as a feature



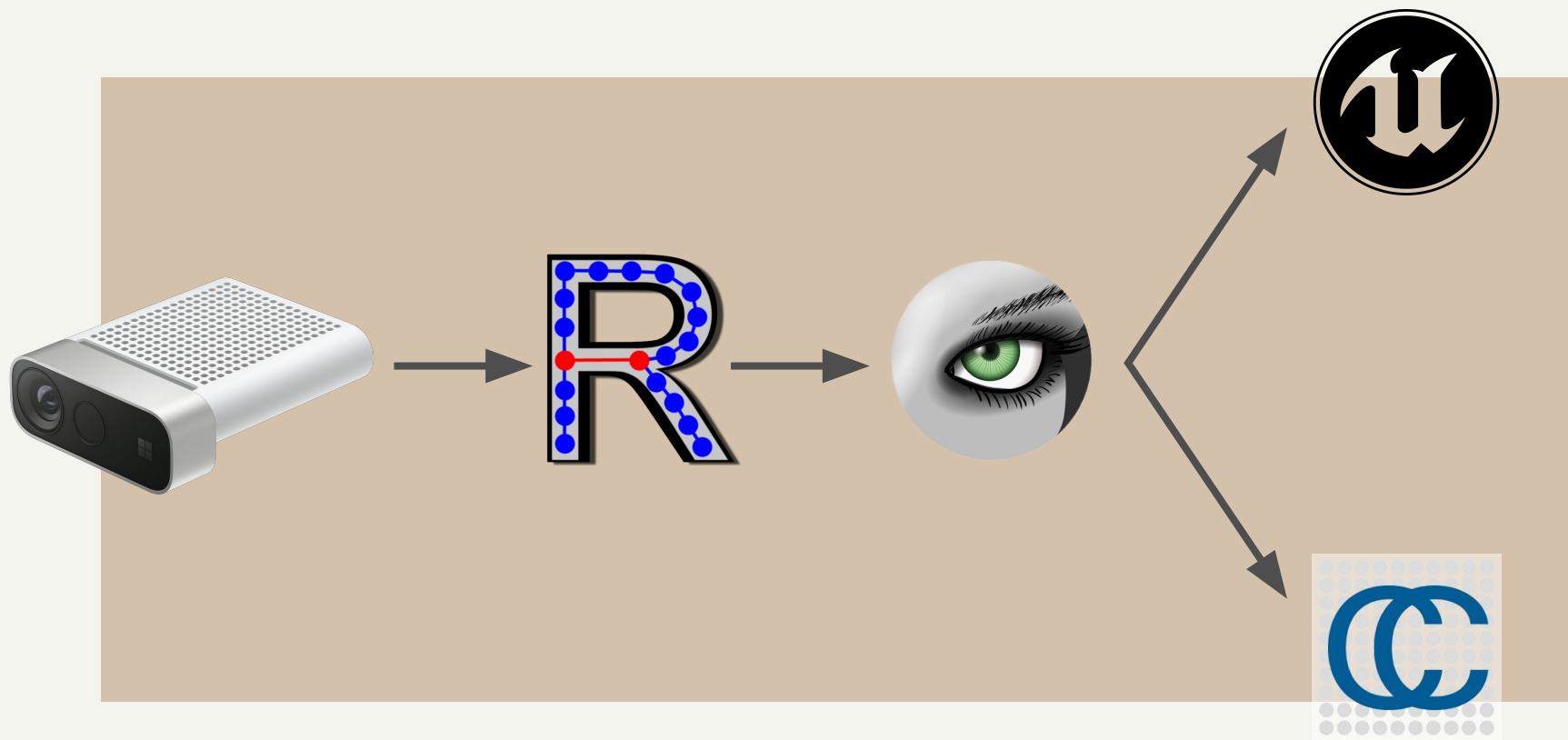


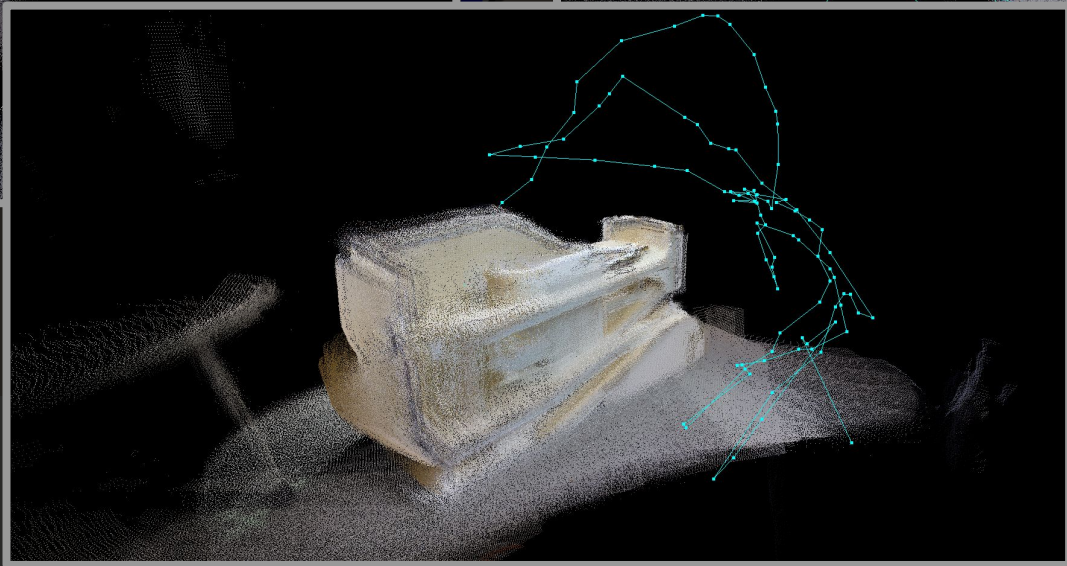
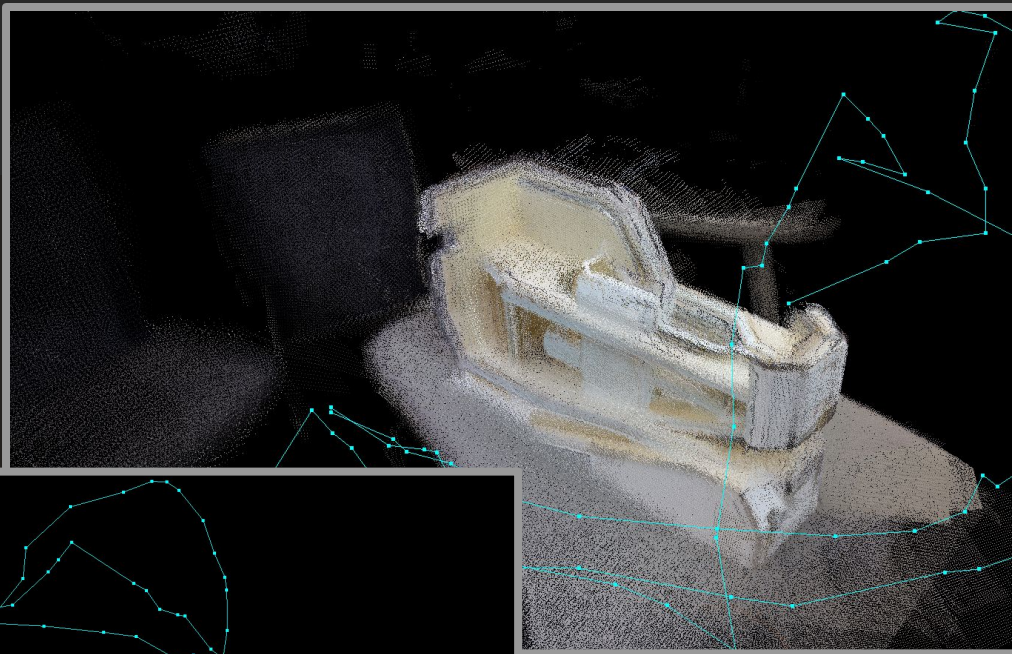
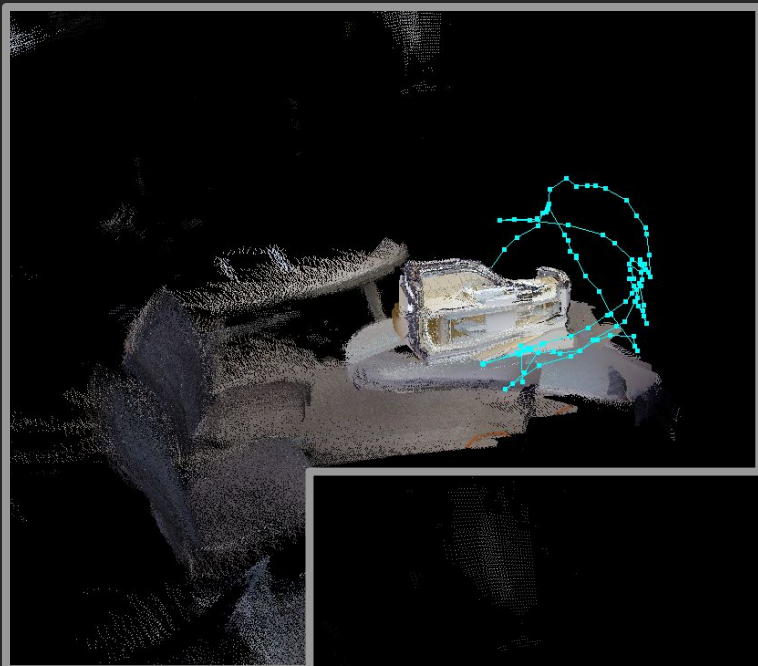


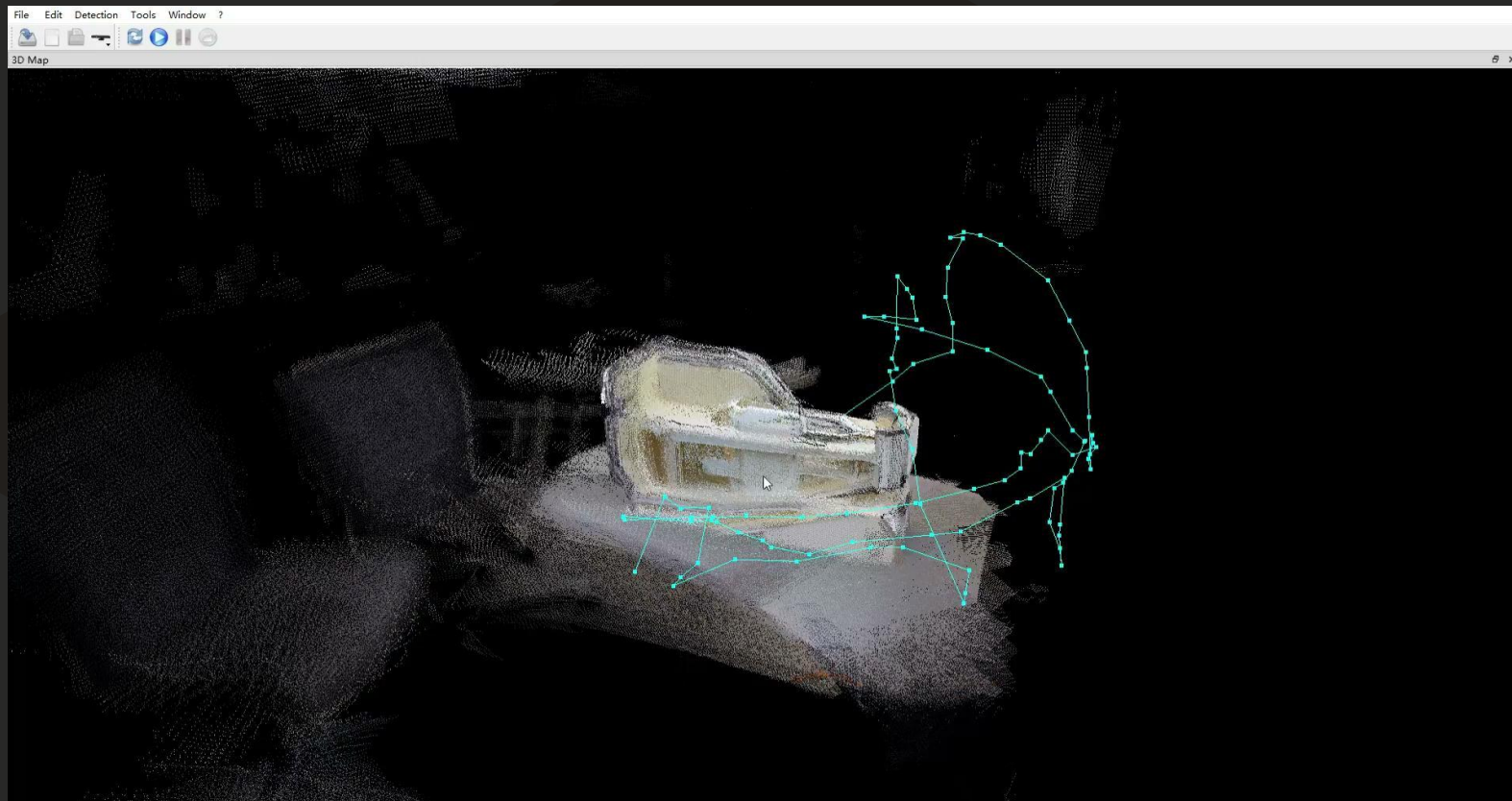
03

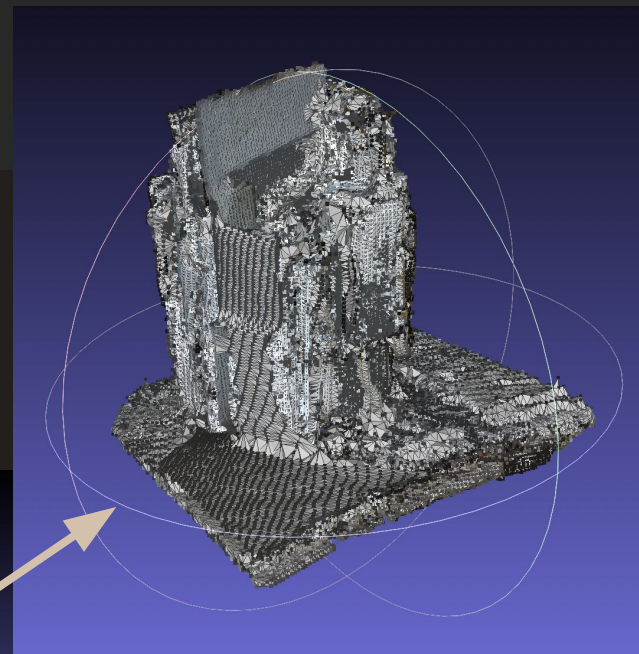
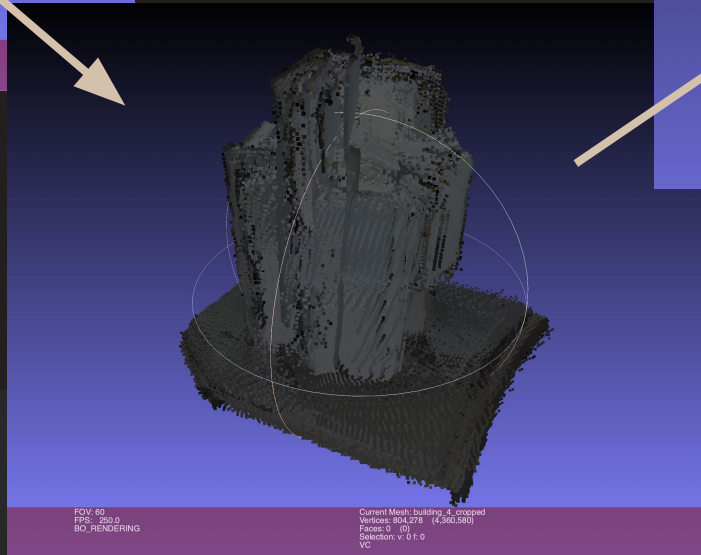
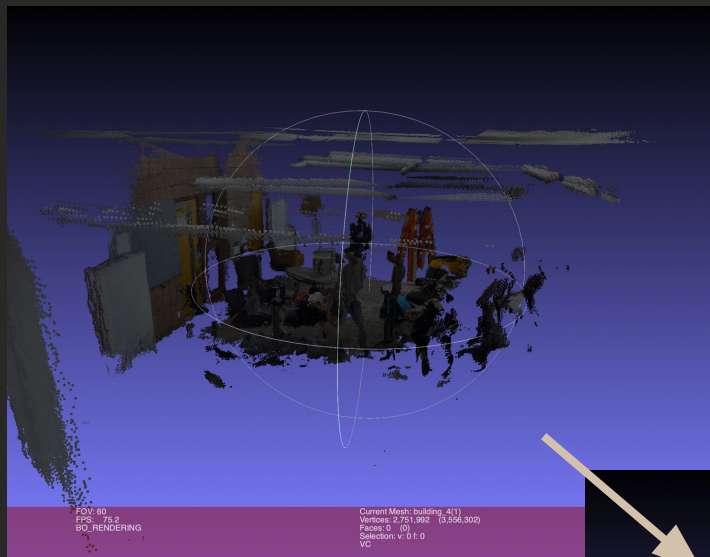
AZURE KINECT MODELING

PAST WORK







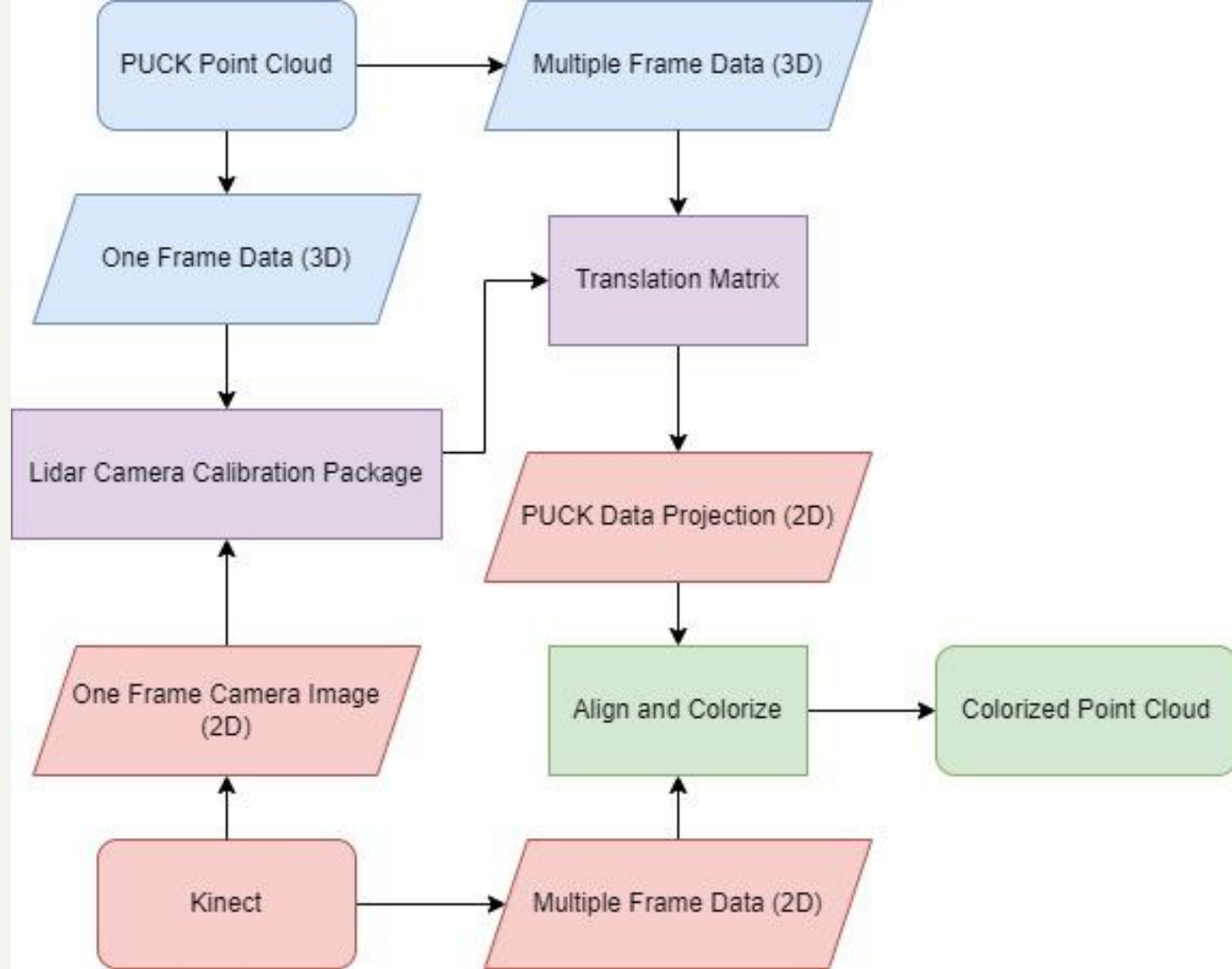


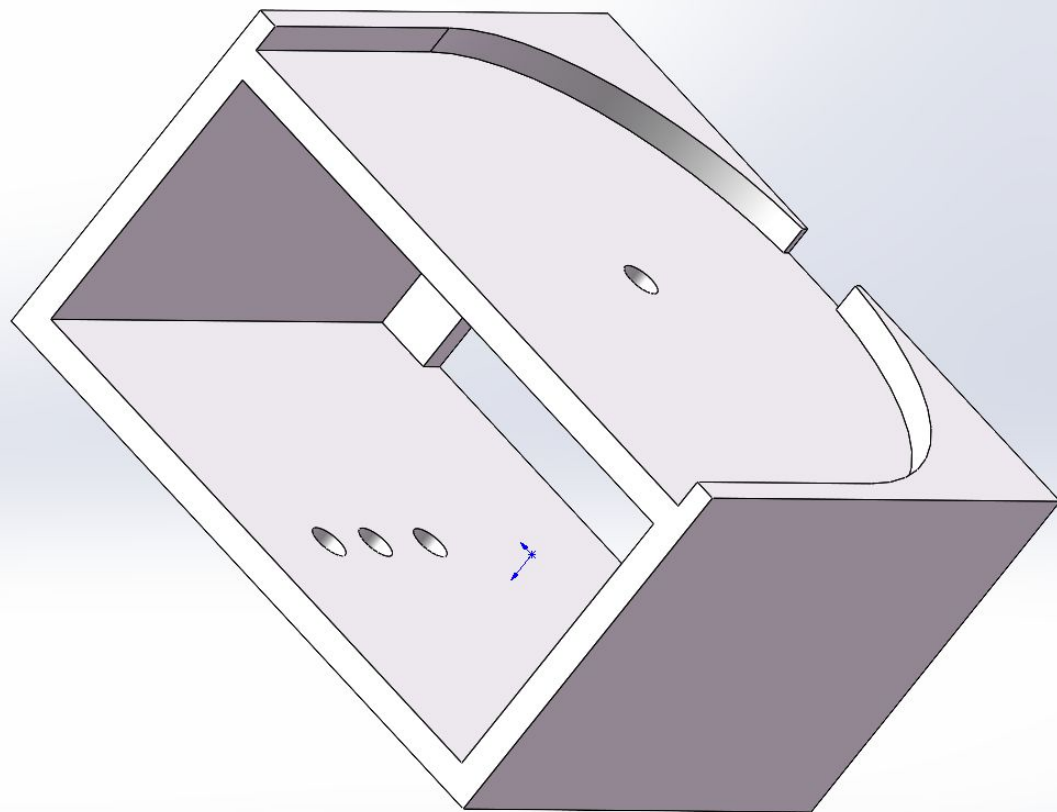
An aerial view of a city street scene, likely a market or festival area, with a 3D point cloud overlay. The point cloud is rendered in a light gray color. Overlaid on the point cloud are several dashed bounding boxes in various colors: yellow, red, blue, and purple. These boxes appear to be highlighting specific areas or objects within the scene. The background is a dark gray, and the overall image has a semi-transparent overlay.

04

PUCK-KINECT SLAM

PROPOSAL





A detailed architectural model of a multi-story building complex, featuring a central courtyard with greenery and a blue sky. The model is made of white and grey blocks, with orange and red accents. The background shows a blurred outdoor setting with trees and a building.

05

KINECT FULL DEMO

PROPOSAL