

PUCK SUBTEAM

Rishad Hasan, Heming Huang, Yipeng Lin



TABLE OF CONTENTS

O1

SUBTEAM
INTRODUCTION

O2

PUCK+CAMERA
INTEGRATION

O3

AZURE KINECT
MODELING

O4

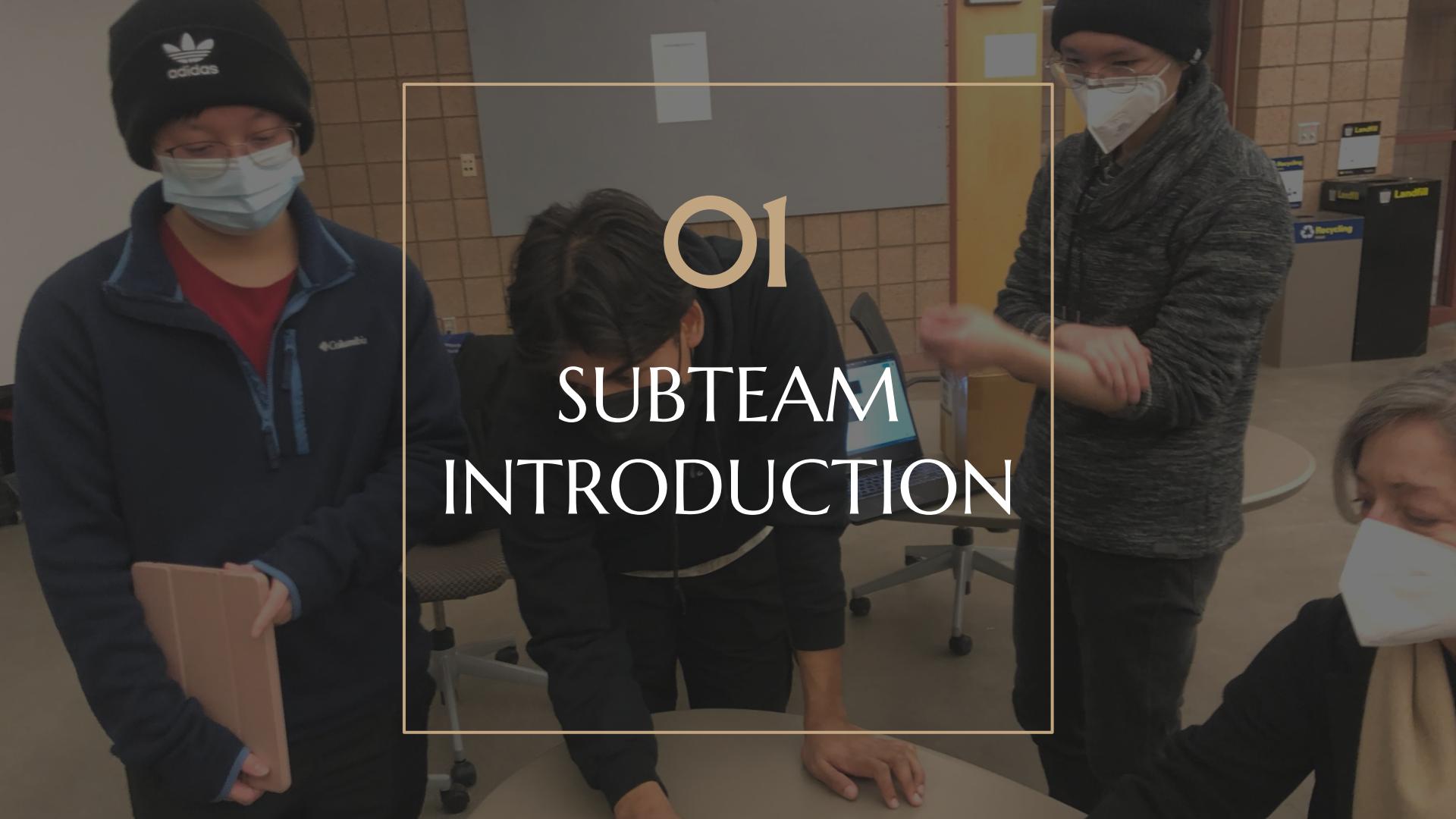
PUCK+KINECT
SLAM

O5

KINECT FULL
DEMO

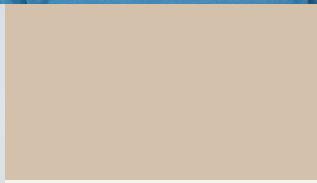
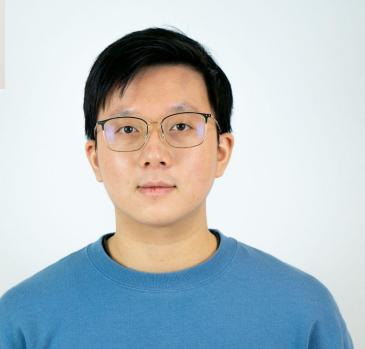
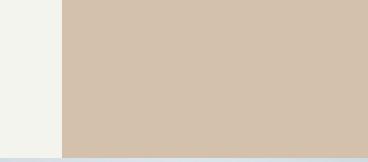
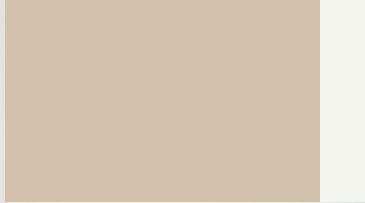
PAST WORK

PROPOSAL



01

SUBTEAM INTRODUCTION



RISHAD HASAN:

YEAR >> FIRST-YEAR UNDERGRADUATE
SPECIALTY >> ELECTRICAL ENGINEERING

HEMING HUANG:

YEAR >> SECOND-YEAR GRADUATE
SPECIALTY >> ROBOTICS

YIPENG LIN:

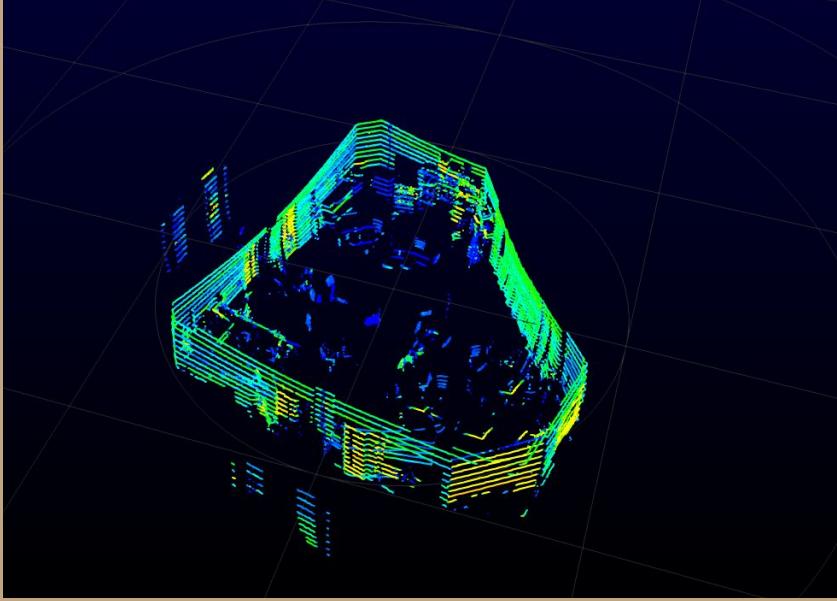
YEAR >> []
SPECIALTY >> []

A photograph of a person wearing a dark beanie and a white surgical mask. They are focused on working on a device, which appears to be a cylindrical component mounted on a robotic arm or similar mechanism. The background shows a workshop or laboratory setting with wooden walls and various equipment.

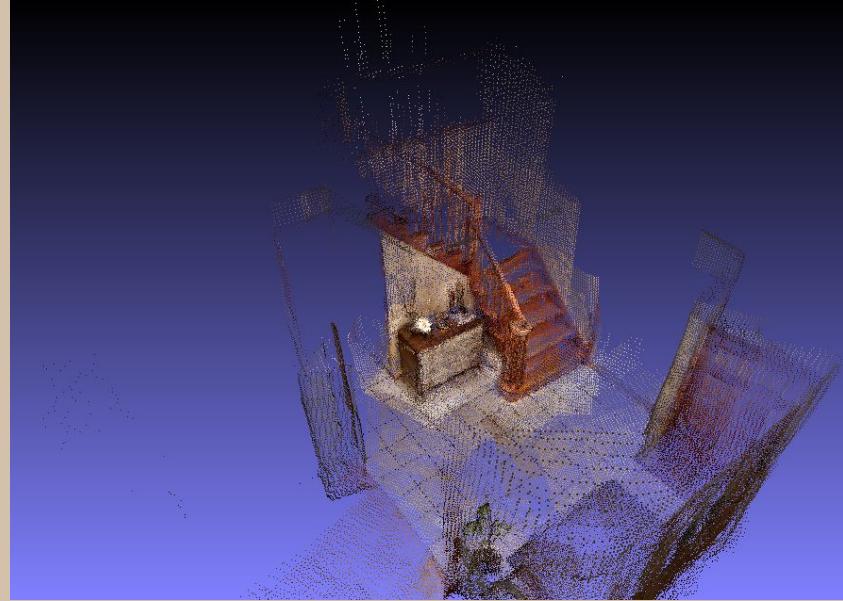
02

PUCK+CAMERA INTEGRATION

PAST WORK



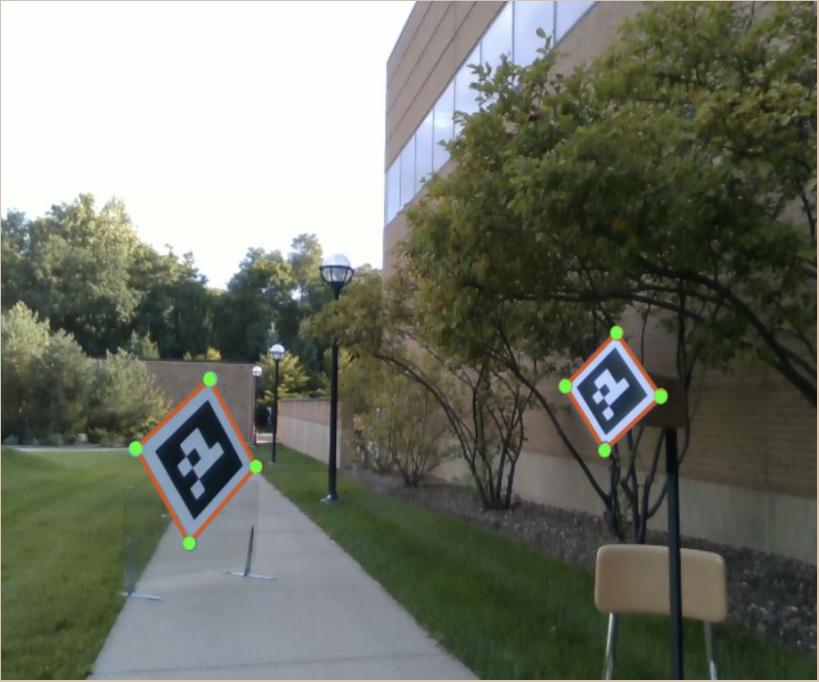
PUCK scanned with no color information



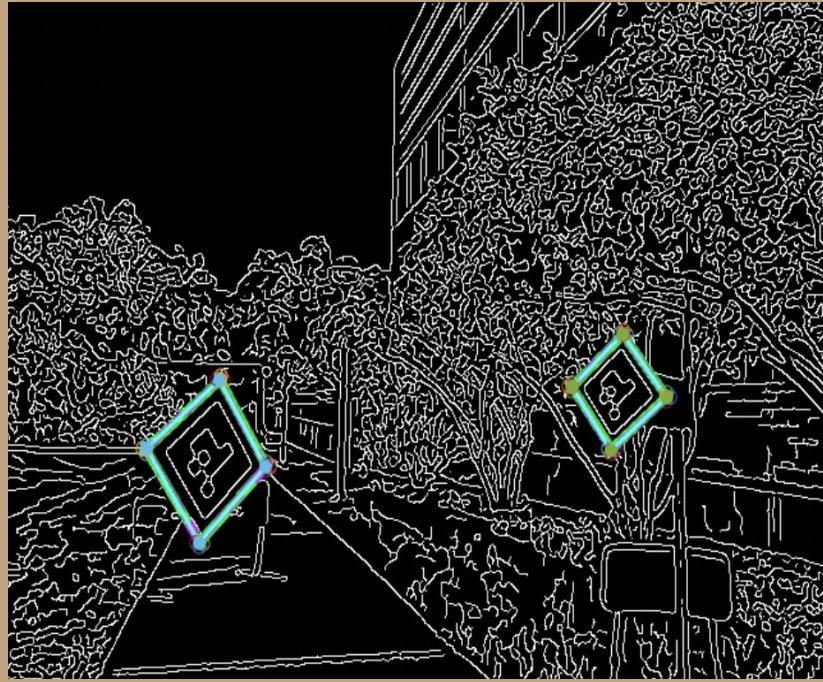
Desired outcome

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.



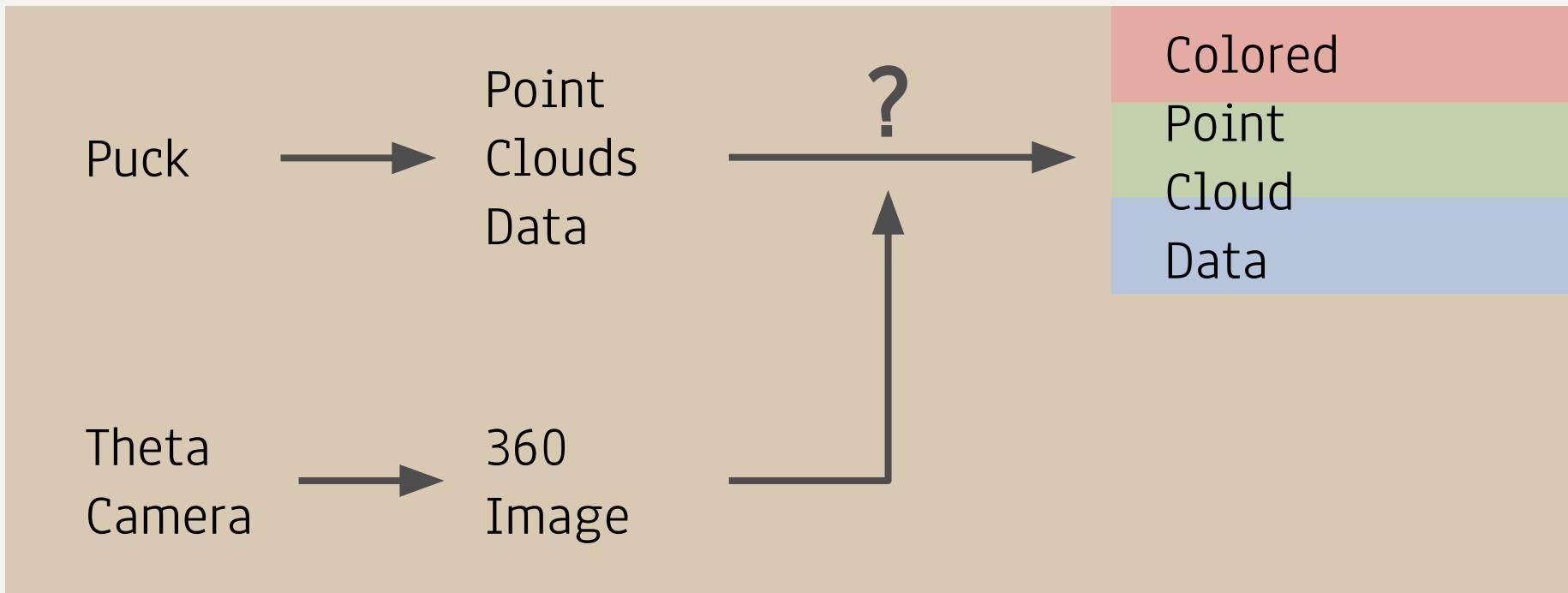
LiDAR scans superimposed on camera images

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

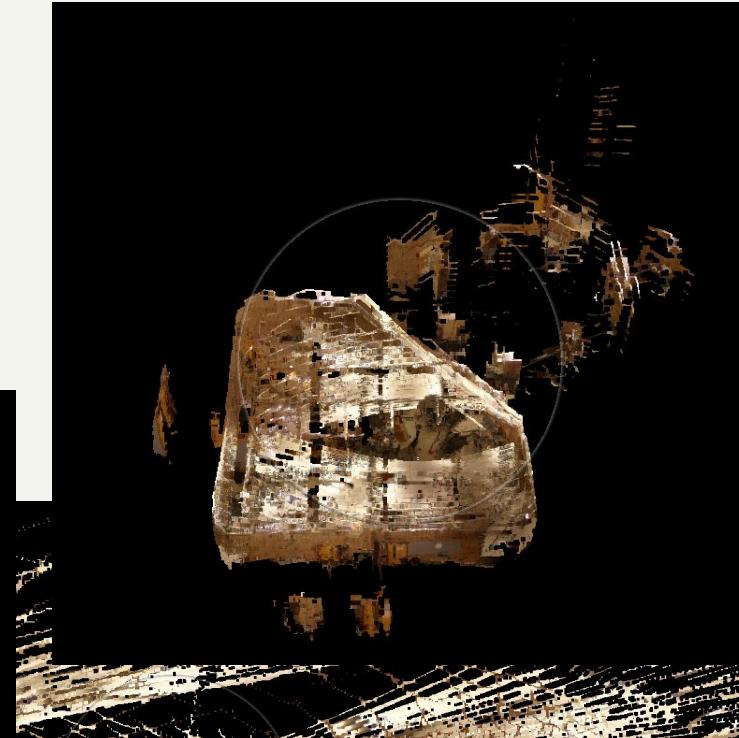
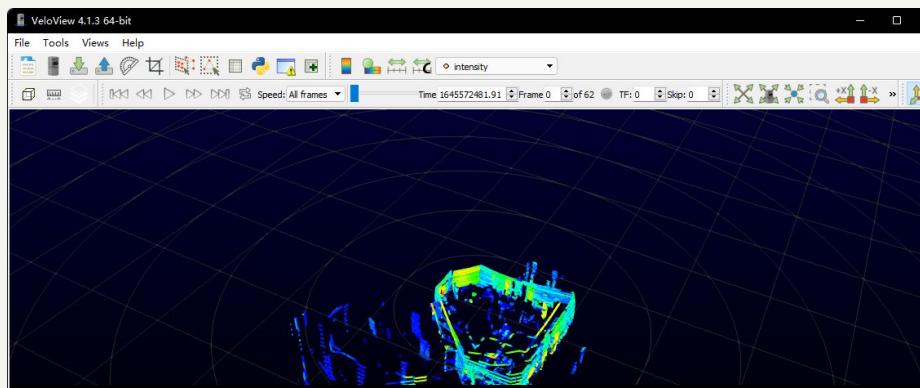


Challenges

- ❑ 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

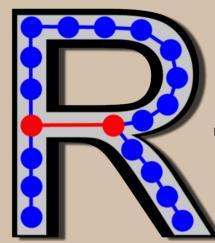


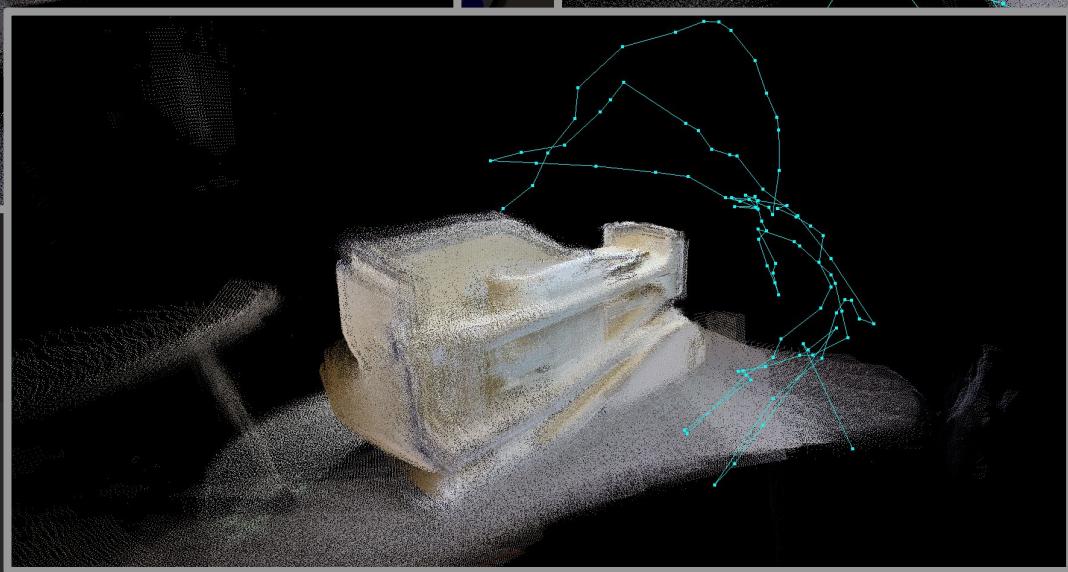
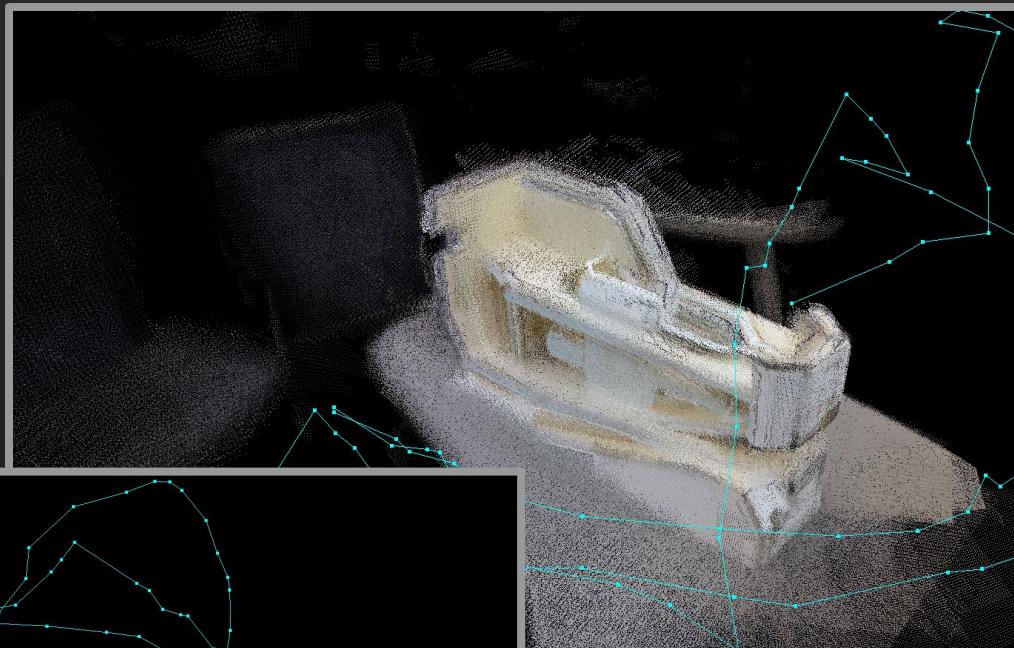
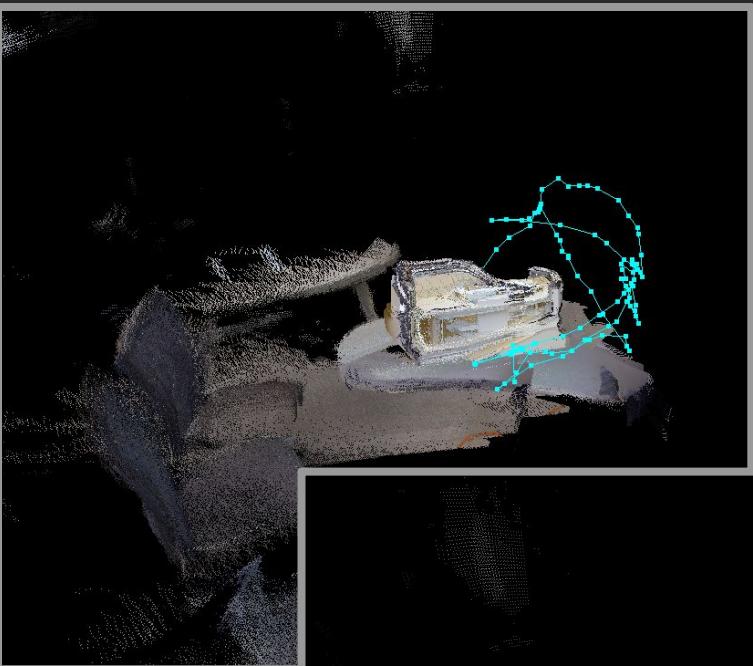


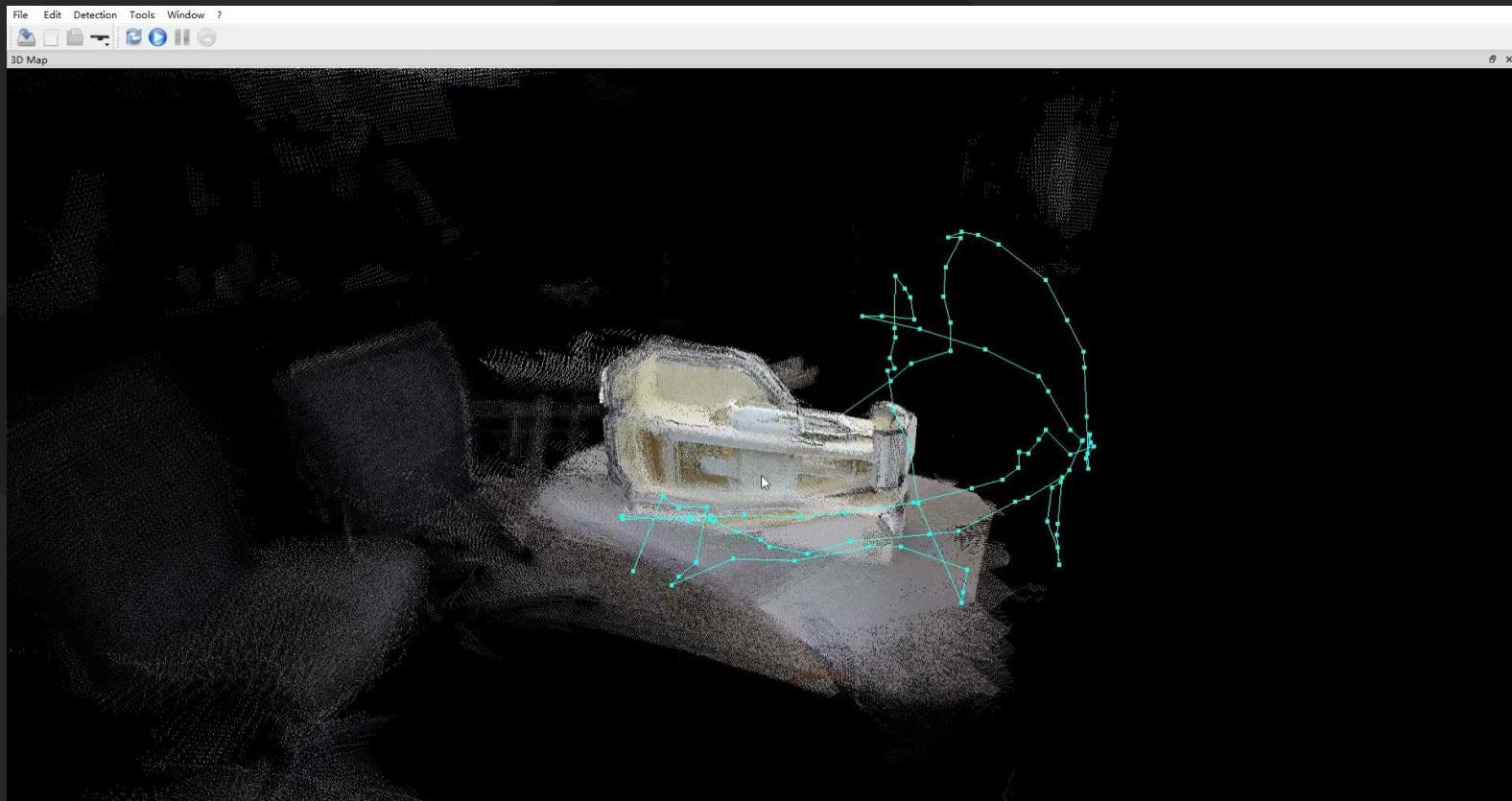
03

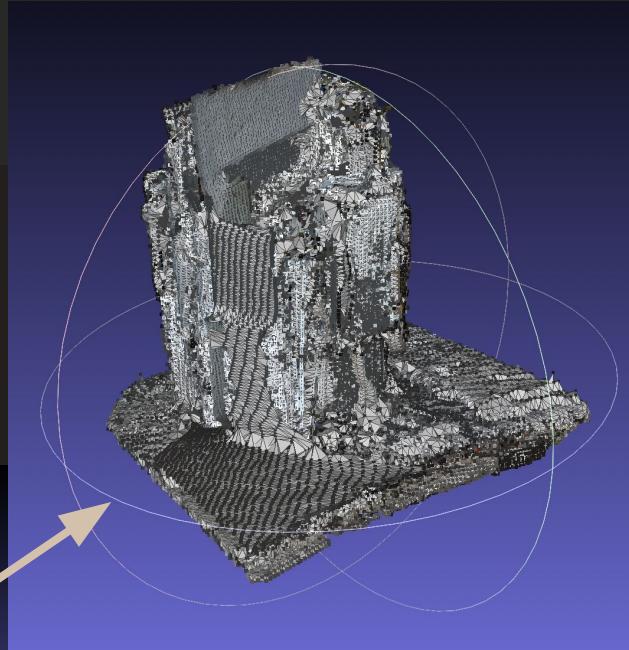
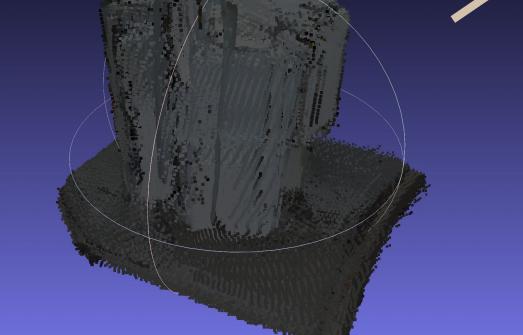
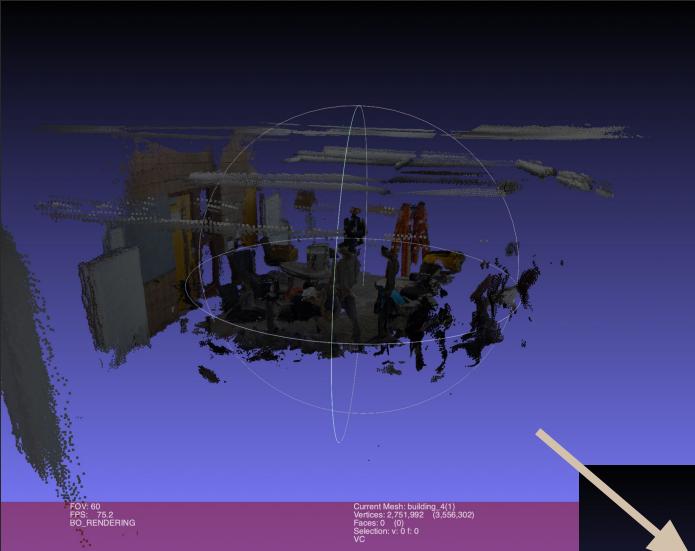
AZURE KINECT MODELING

PAST WORK





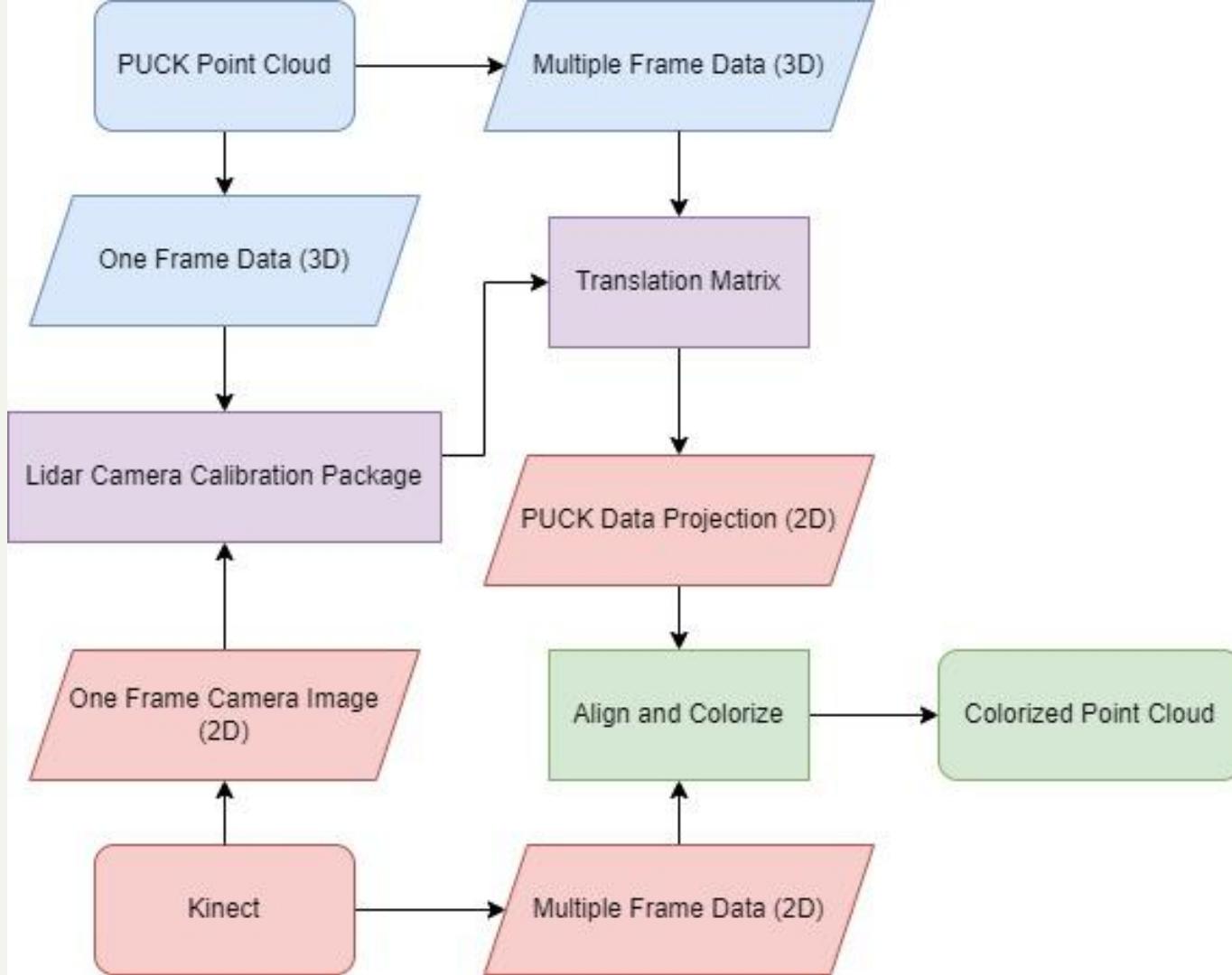


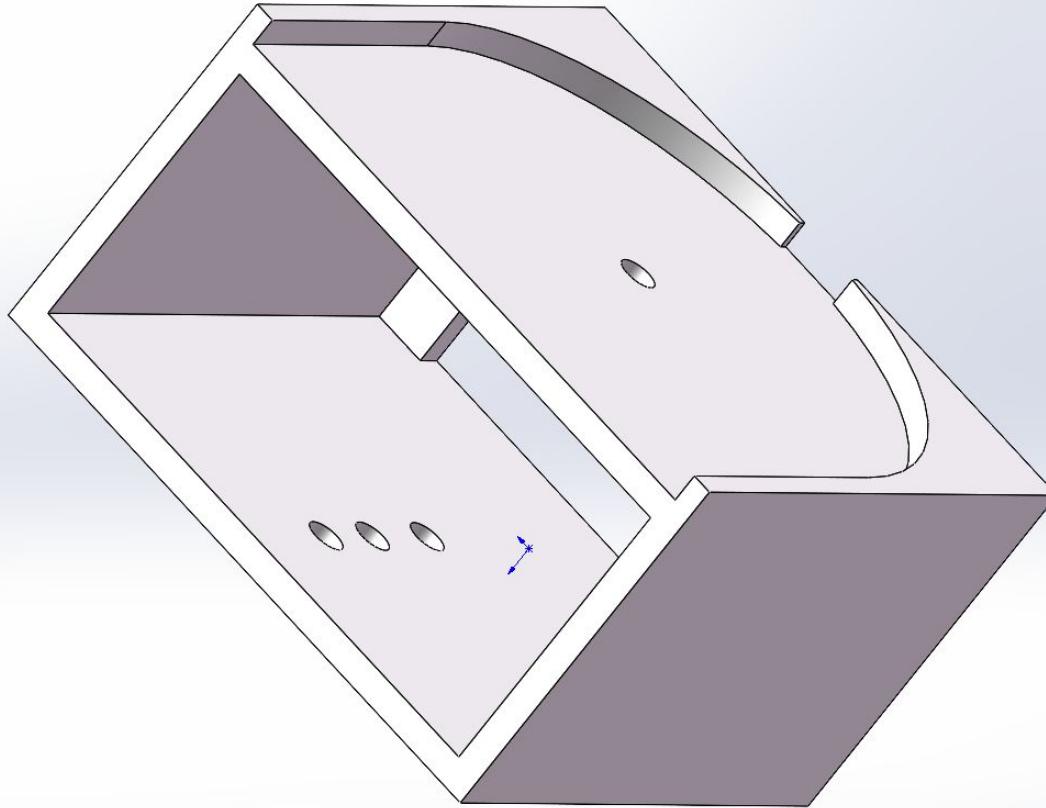


04

PUCK-KINECT SLAM

PROPOSAL





05

KINECT FULL DEMO

PROPOSAL