3D POSE ESTIMATION VIA POINT PAIR FEATURS
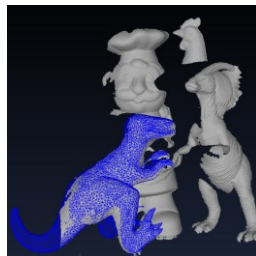
Tolga Birdal

REGISTRATION USING POINT PAIR FEATURES - LASER
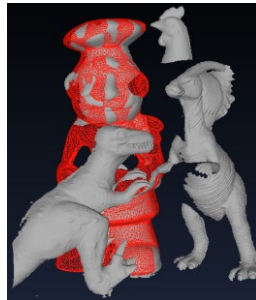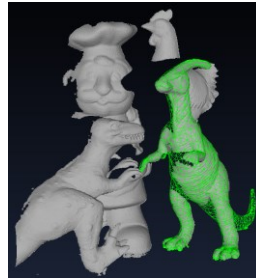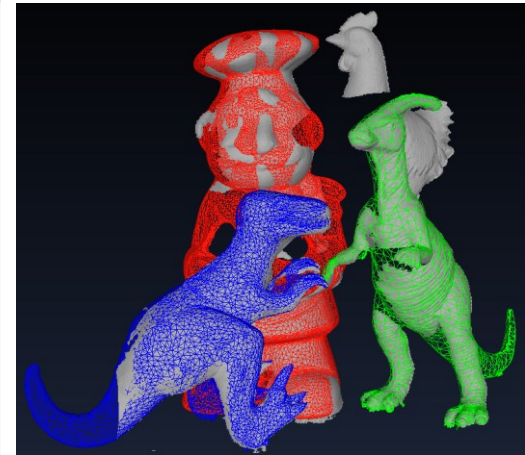

Input 3D Models
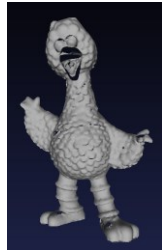
Input 3D Scene

PPF + ICP
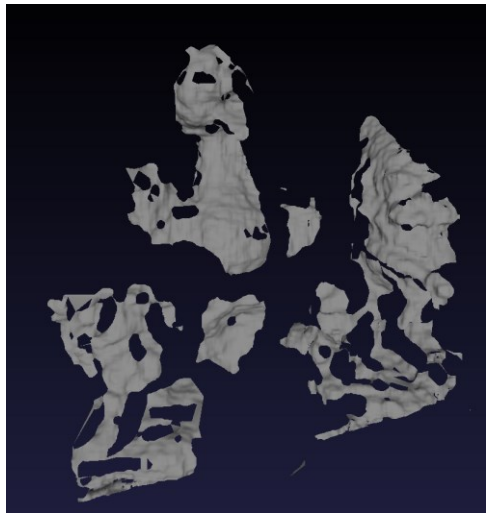
Registrations

All Models

Full Pose Estimation

REGISTRATION USING POINT PAIR FEATURES - STEREO
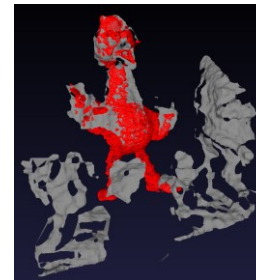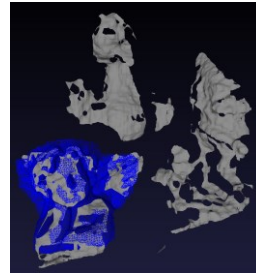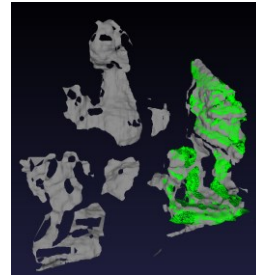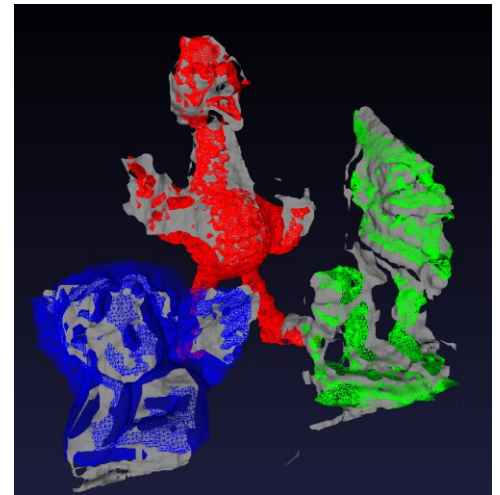

Input 3D Models

Input 3D Scene

PPF + ICP

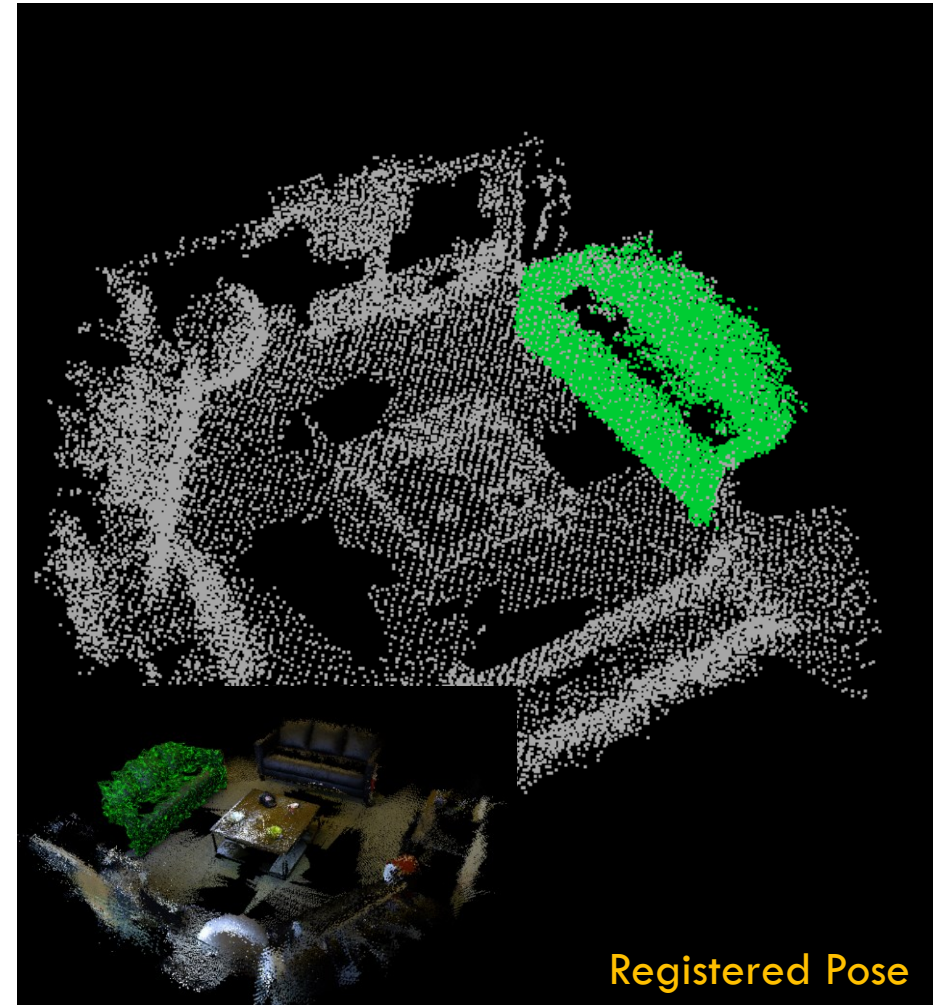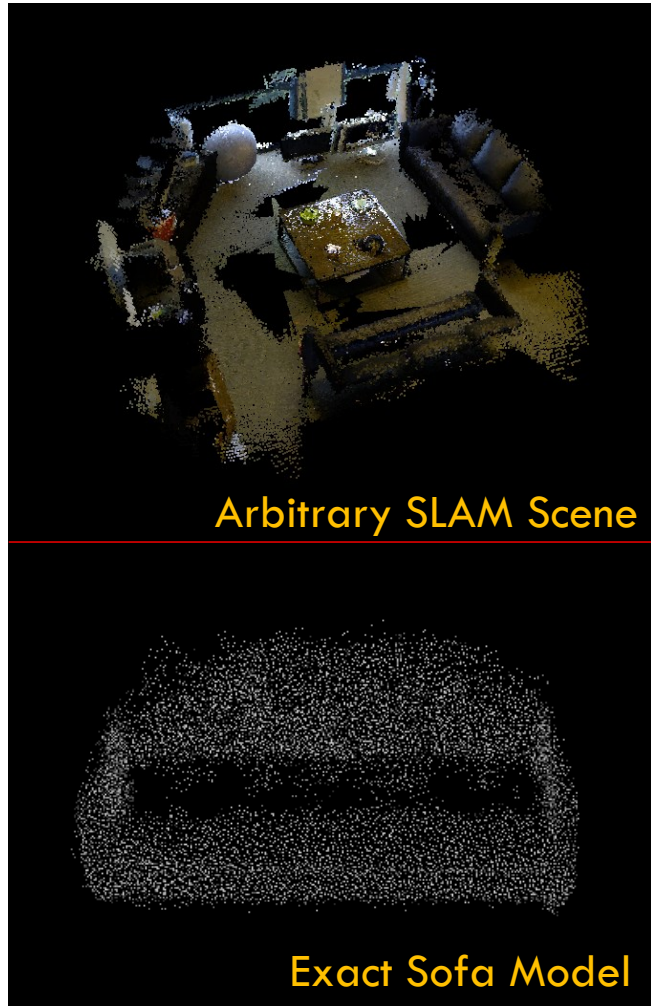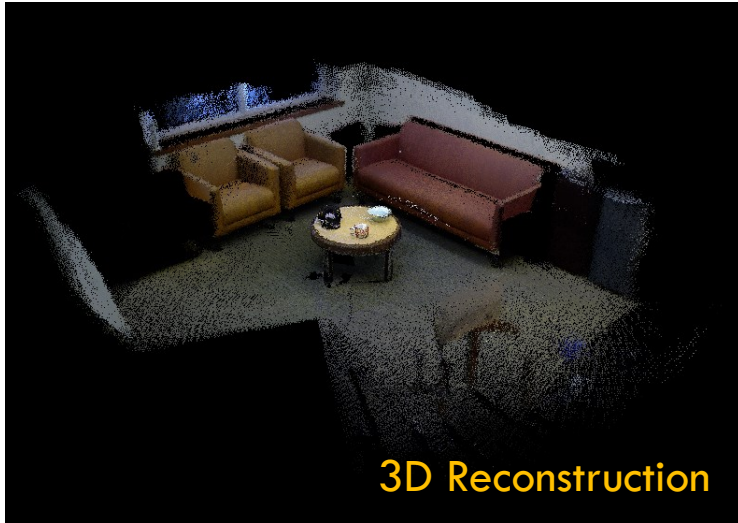Registrations

All Models

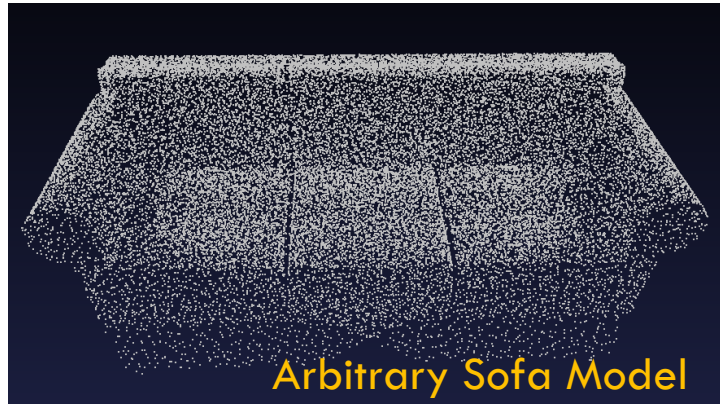Full Pose Estimation

REGISTRATION ON SLAM DATASET - KINECT

Arbitrary SLAM Scene

Exact Sofa Model

PPF + ICP

Registered Pose

REGISTRATION ON SLAM DATASET – KINECT 2

3D Reconstruction

Cropped &
Processed Chair Model

PPF + ICP

Model Matched to Reconstruction

FAILING CASES

1 Arbitrary Sofa Model

2 Scaled and ReMeshed

3 Non-Uniform Sampling & Normals Computation

Train & Match

4 Model is Positioned with Error
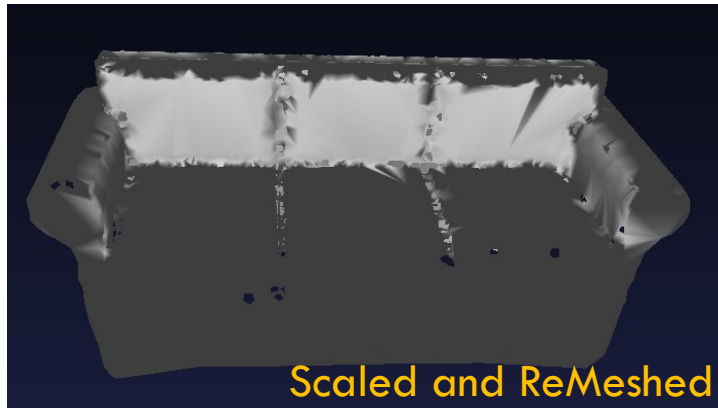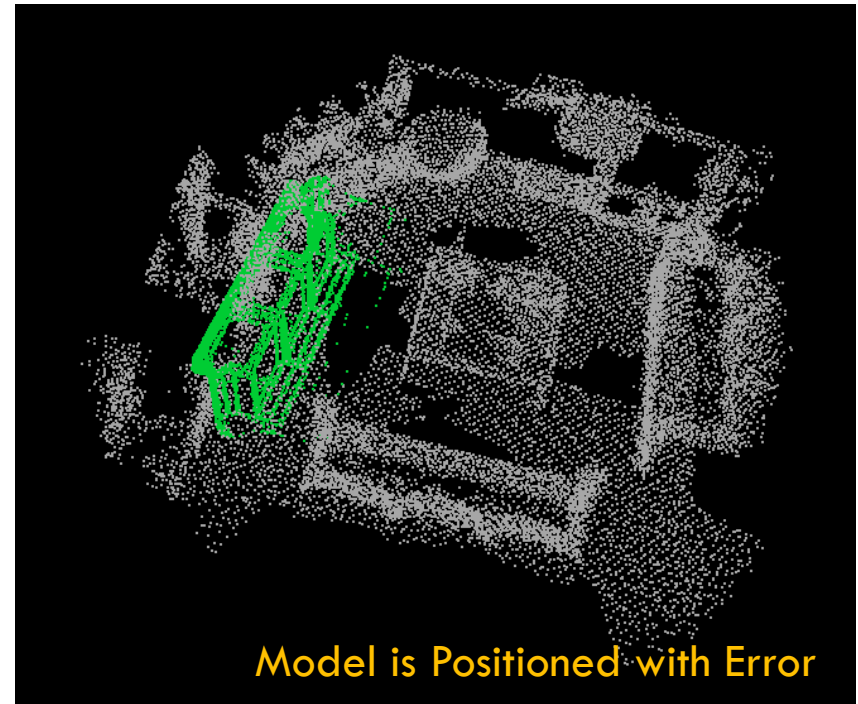
FAST ICP REGISTRATION
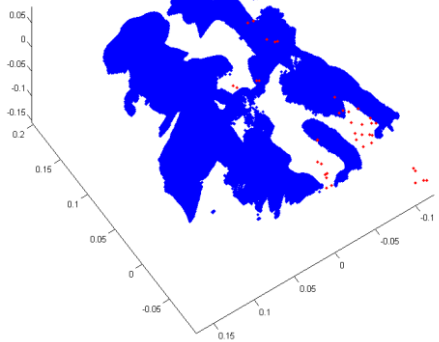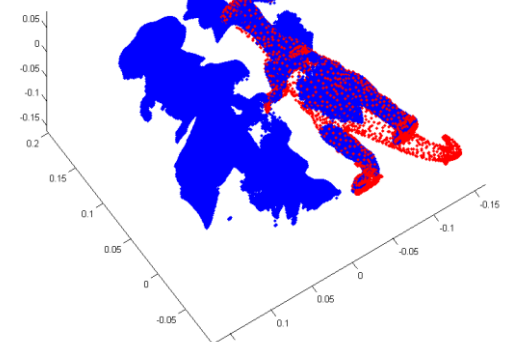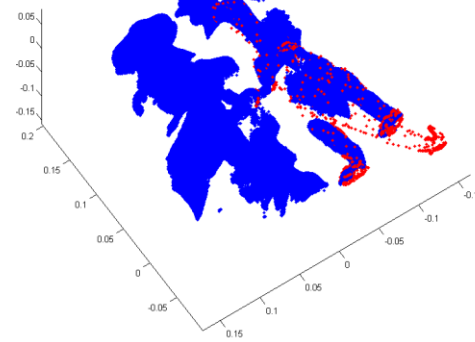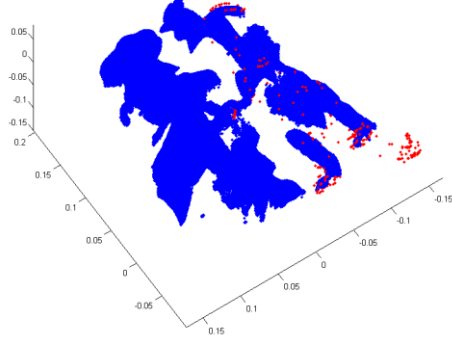
- ✓ Point Cloud Normalization

- ✓ Robust Registration: Median Absolute Deviations

- ✓ Coarse to Fine Registration

- ✓ Linearized Point to Plane Metric

- ✓ Duplicate Assignment Resolution: Picky ICP
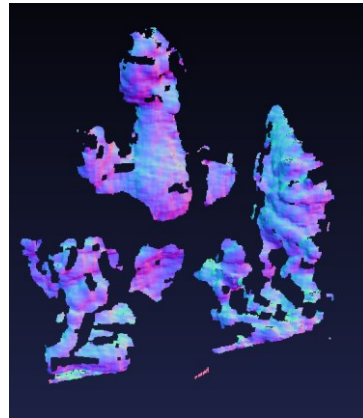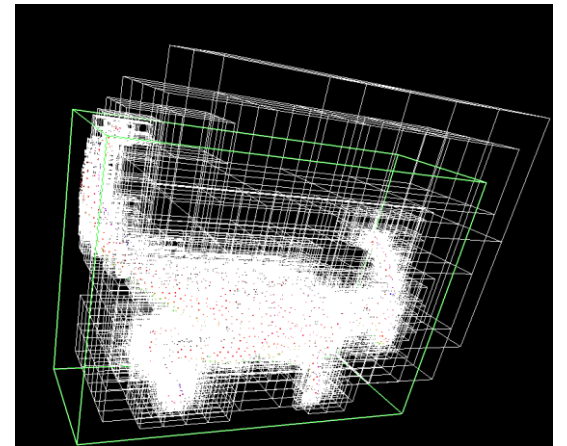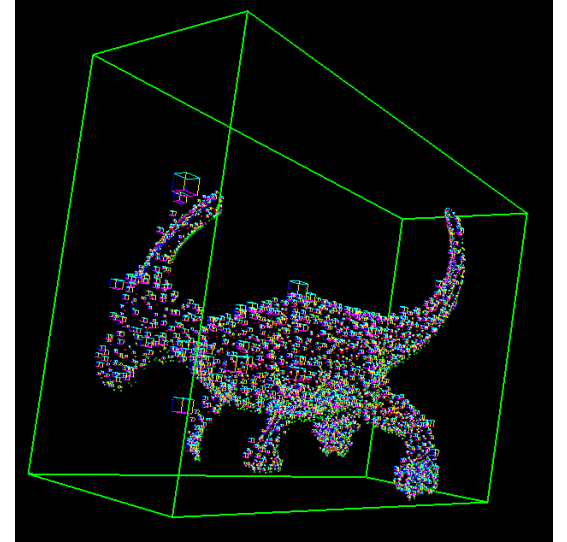
Registration in ~300 ms

Coarsest Level → Finest Level

OTHER GAINED FUNCTIONALITIES

✓ Bounding Boxes

✓ Fast Normal Computation of Point Clouds

✓ Voxel Based Quantization of Point Clouds

✓ PLY Reading / Writing

✓ Naïve Hashtable and Various Hashfunctions

PC Normals

Octrees