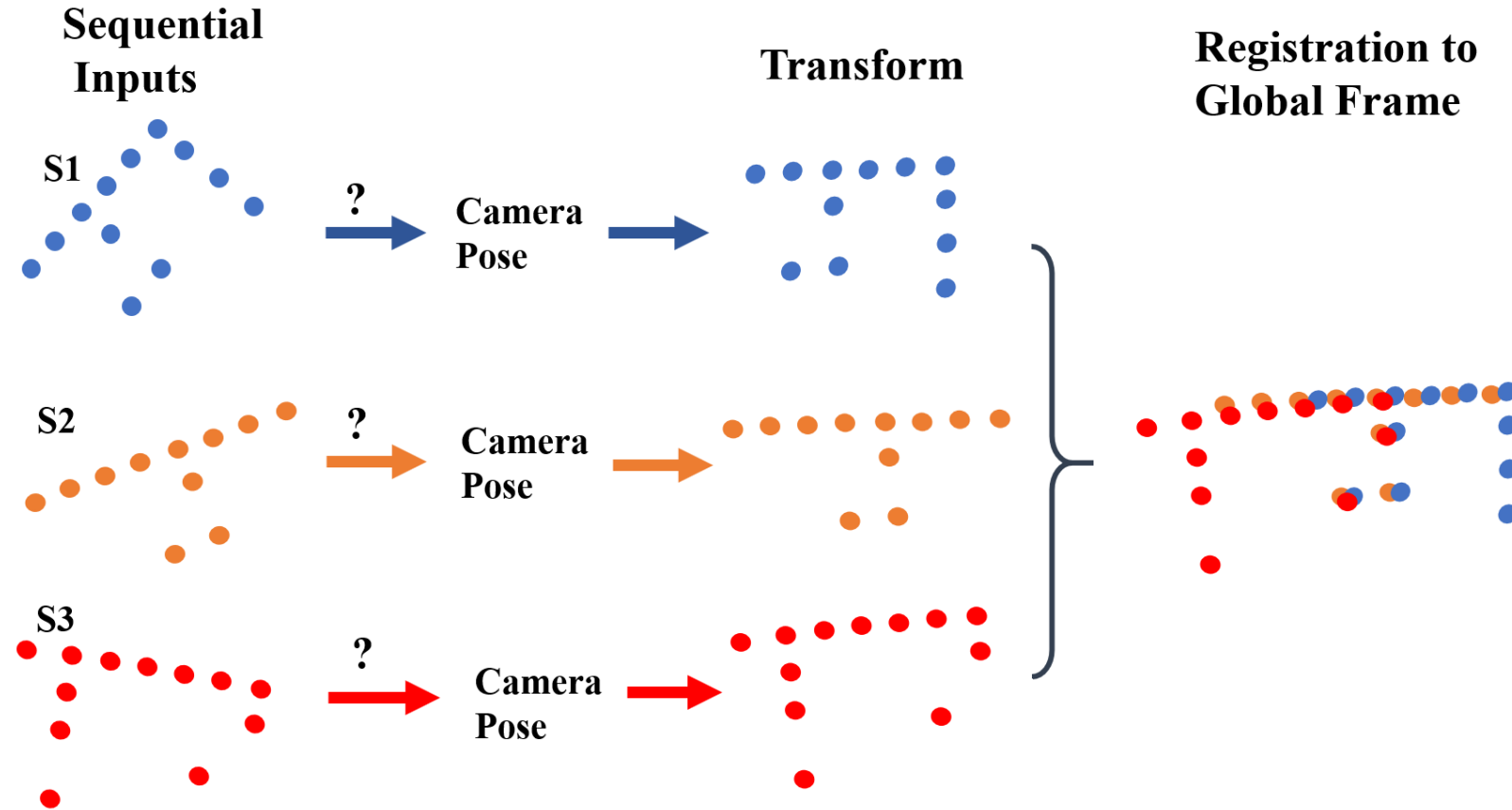# An unsupervised model for 3D Mapping
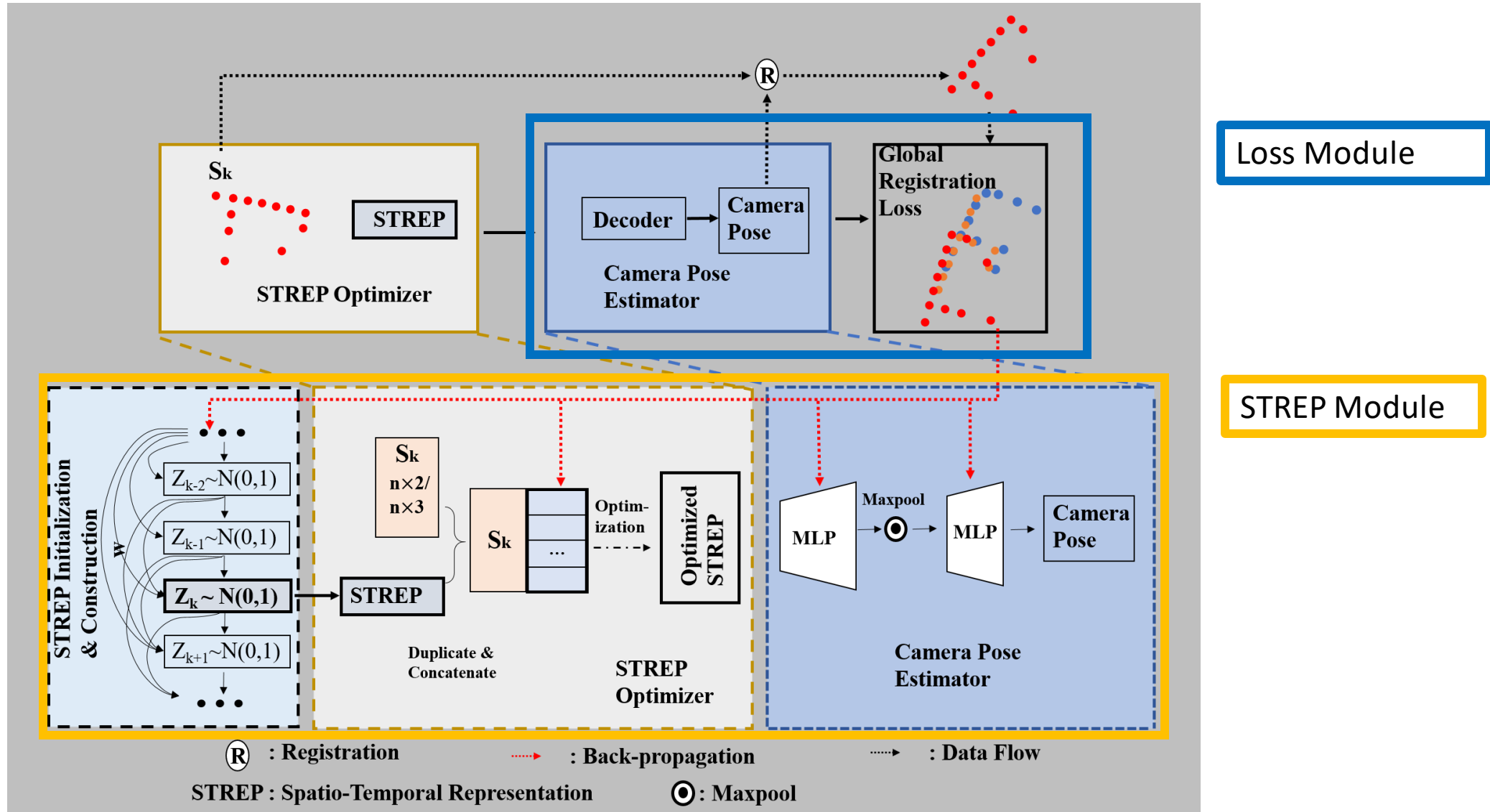
Yi Shi

Project Instructor:
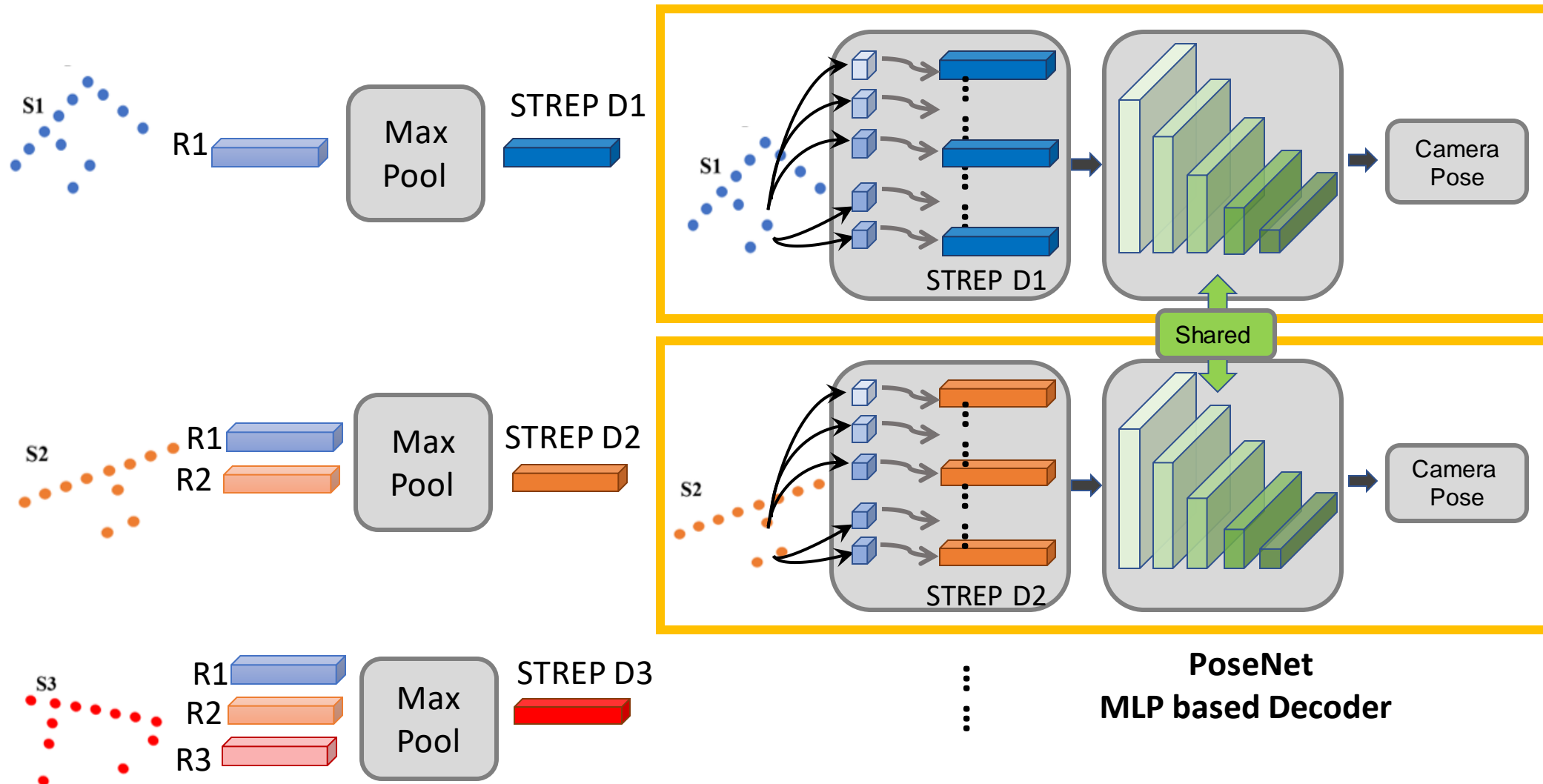# Prof. Yi Fang

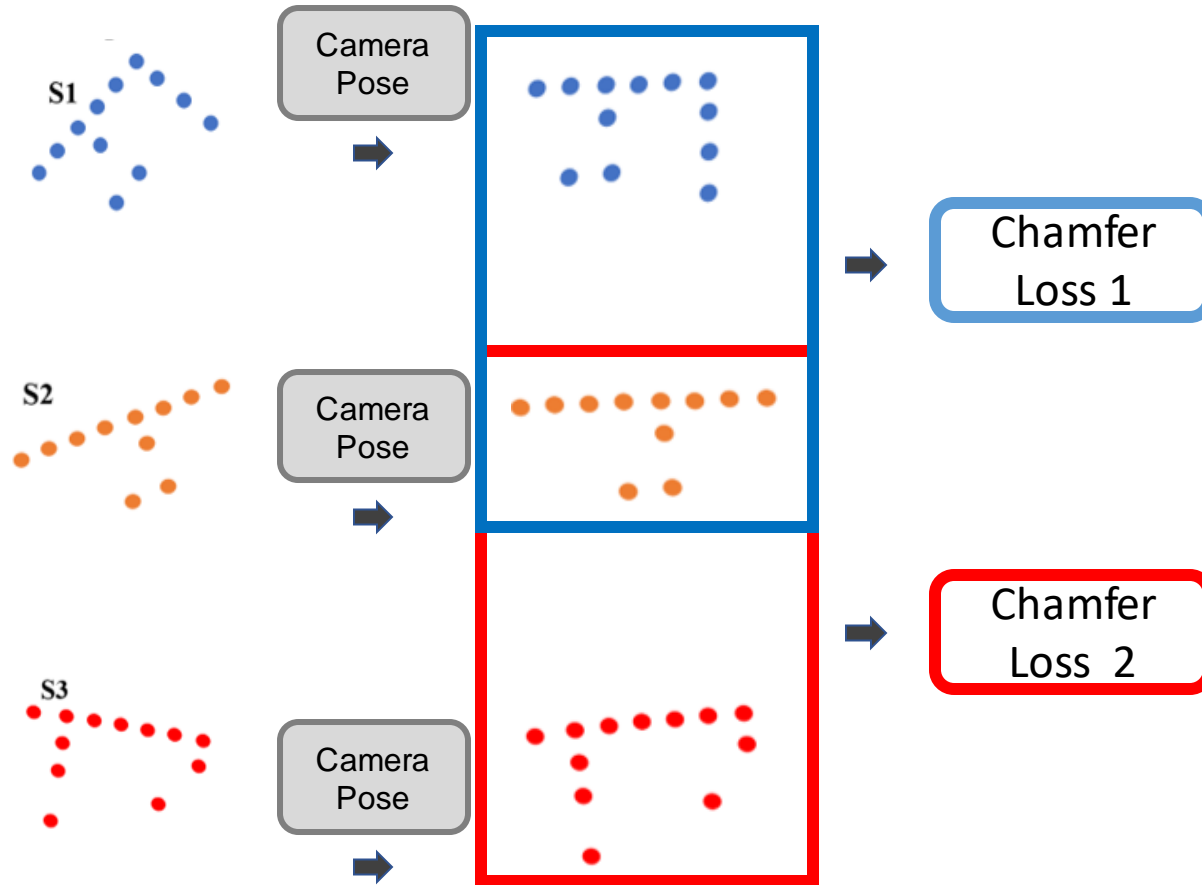# Project: Unsupervised 3D Mapping

Unsupervised 3D Mapping : Pipeline

Unsupervised 3D Mapping:
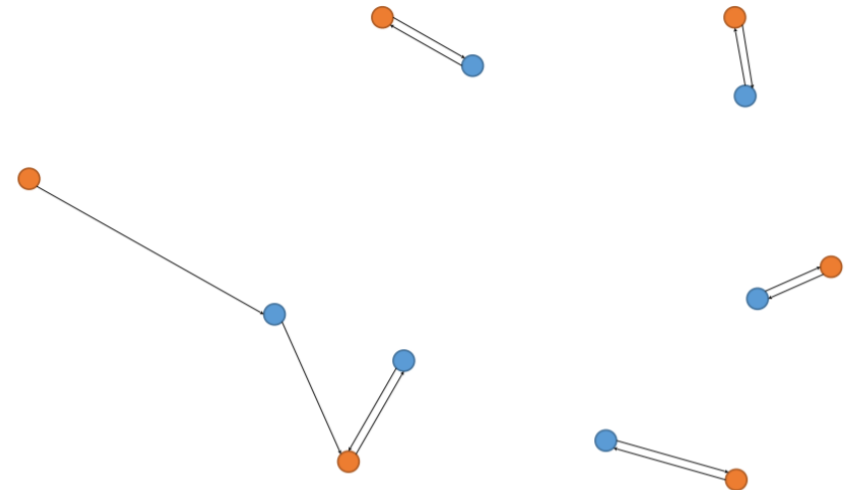# Spatial-Temporal Representation (STREP)

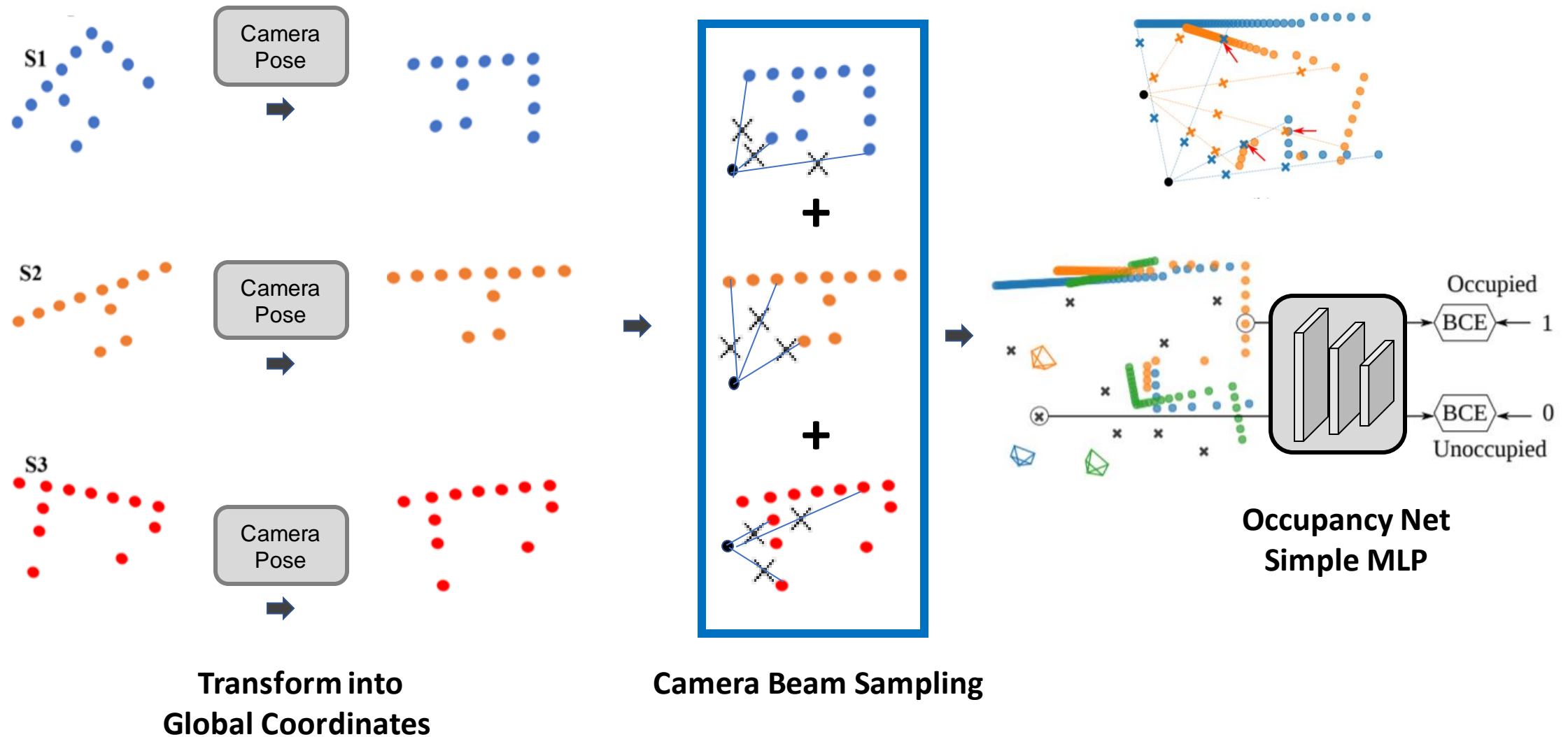# Unsupervised 3D Mapping:
Local Pairwise Chamfer Losses

$$d_{CD}(S_1, S_2) = \sum_{x \in S_1} \min_{y \in S_2} \|x - y\|_2^2 + \sum_{y \in S_2} \min_{x \in S_1} \|x - y\|_2^2$$

Chamfer Distance

Transform with Predicted Global Rotation Matrices

Unsupervised 3D Mapping:
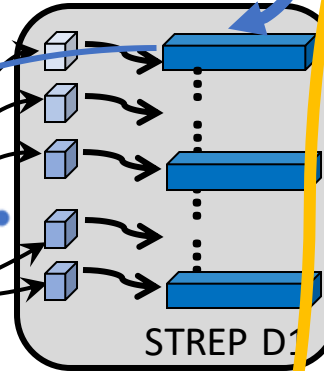# Global Self-Contradiction Loss

Transform into Global Coordinates

Camera Beam Sampling

Occupancy Net Simple MLP

A One-Step Unsupervised Optimization Process.

Total Losses
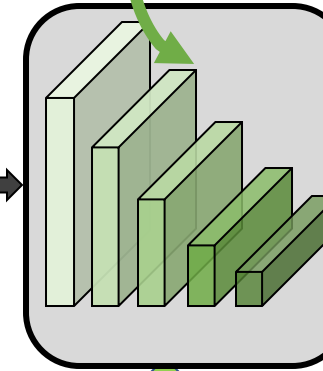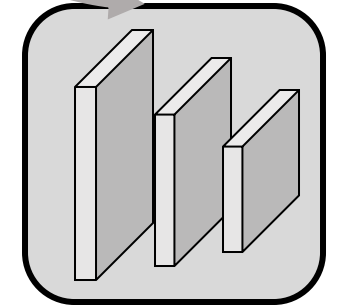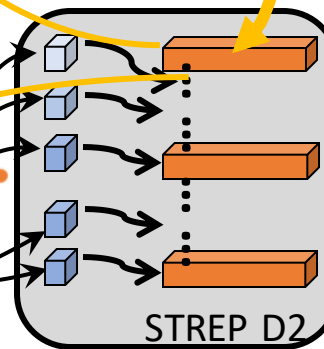
The Loss Reflects the degree of 'alignment' among a series of sequential point clouds.

R1

R2

S1

S2

STREP D1

STREP D2

Shared
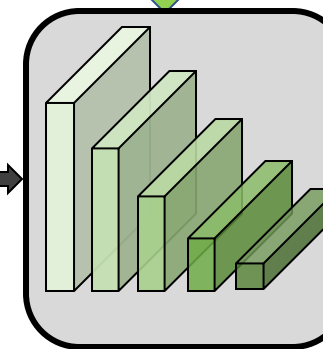
PoseNet
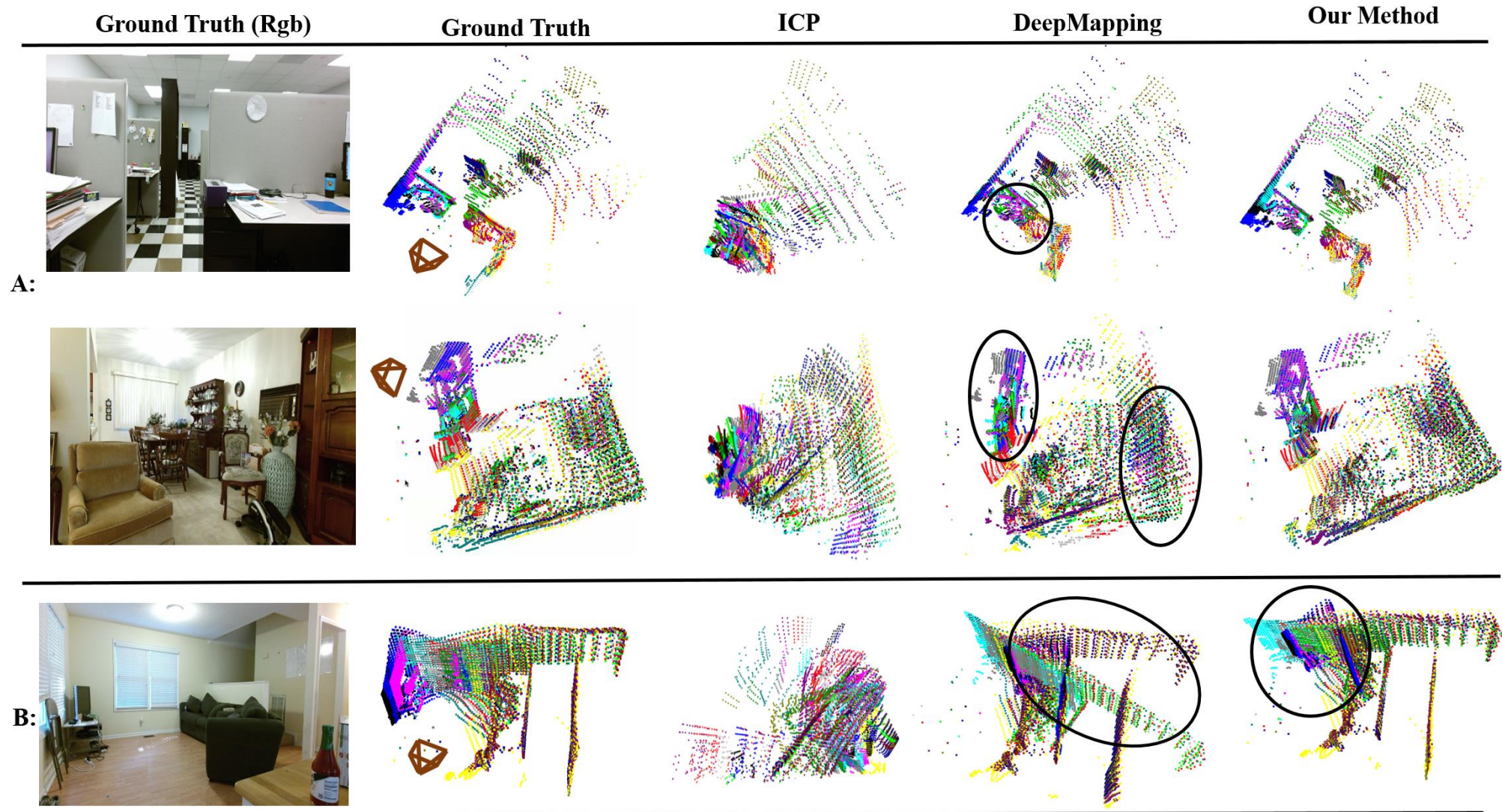
OccupancyNet
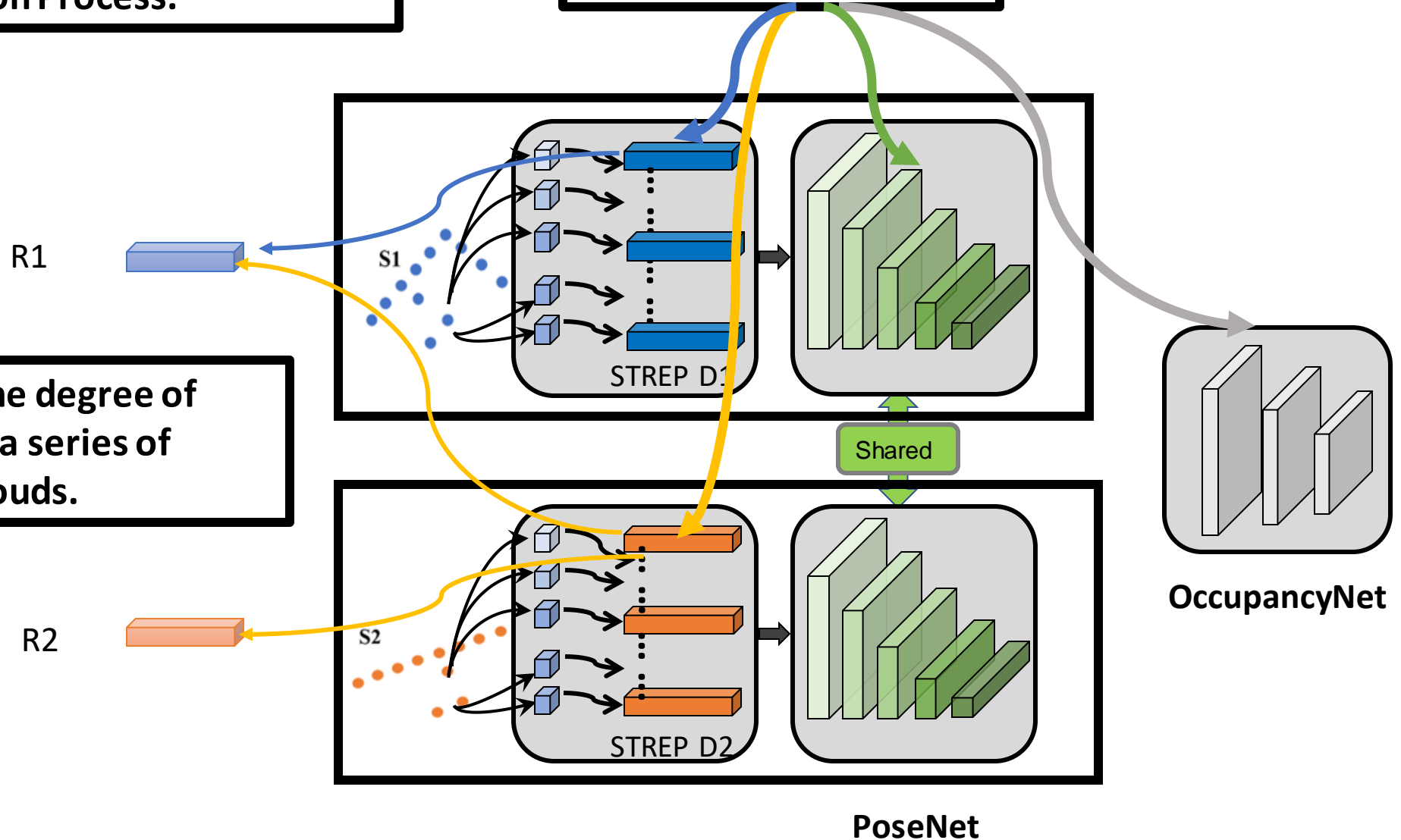
Unsupervised 3D Mapping: 2D Experiments
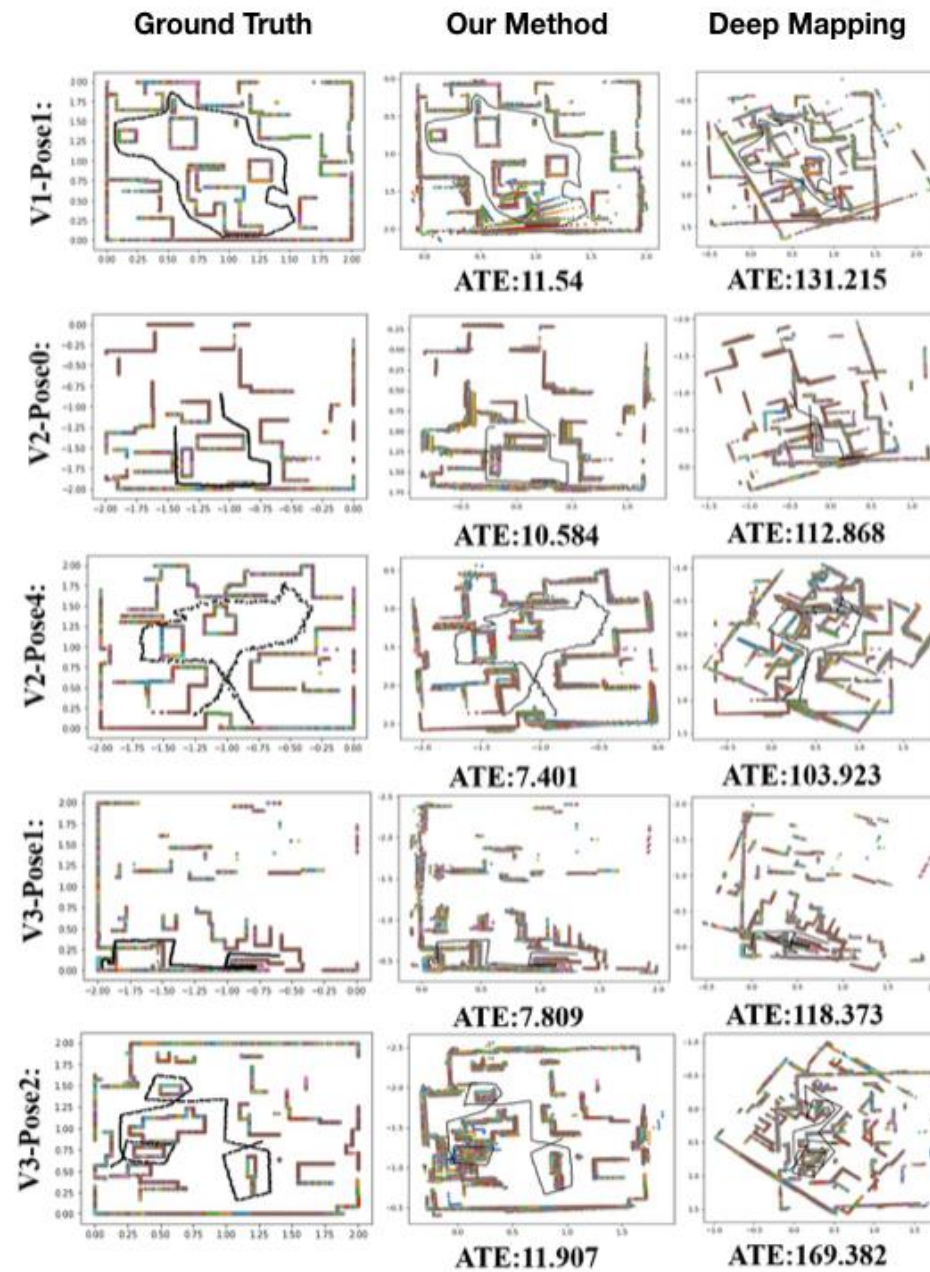
Unsupervised 3D Mapping: 3D AVD Dataset Experiments

| Ground Truth (Rgb) | Ground Truth | ICP | DeepMapping | Our Method |

⬦ :Camera pose for taking the Rgb image

Future Studies: Meta Learning
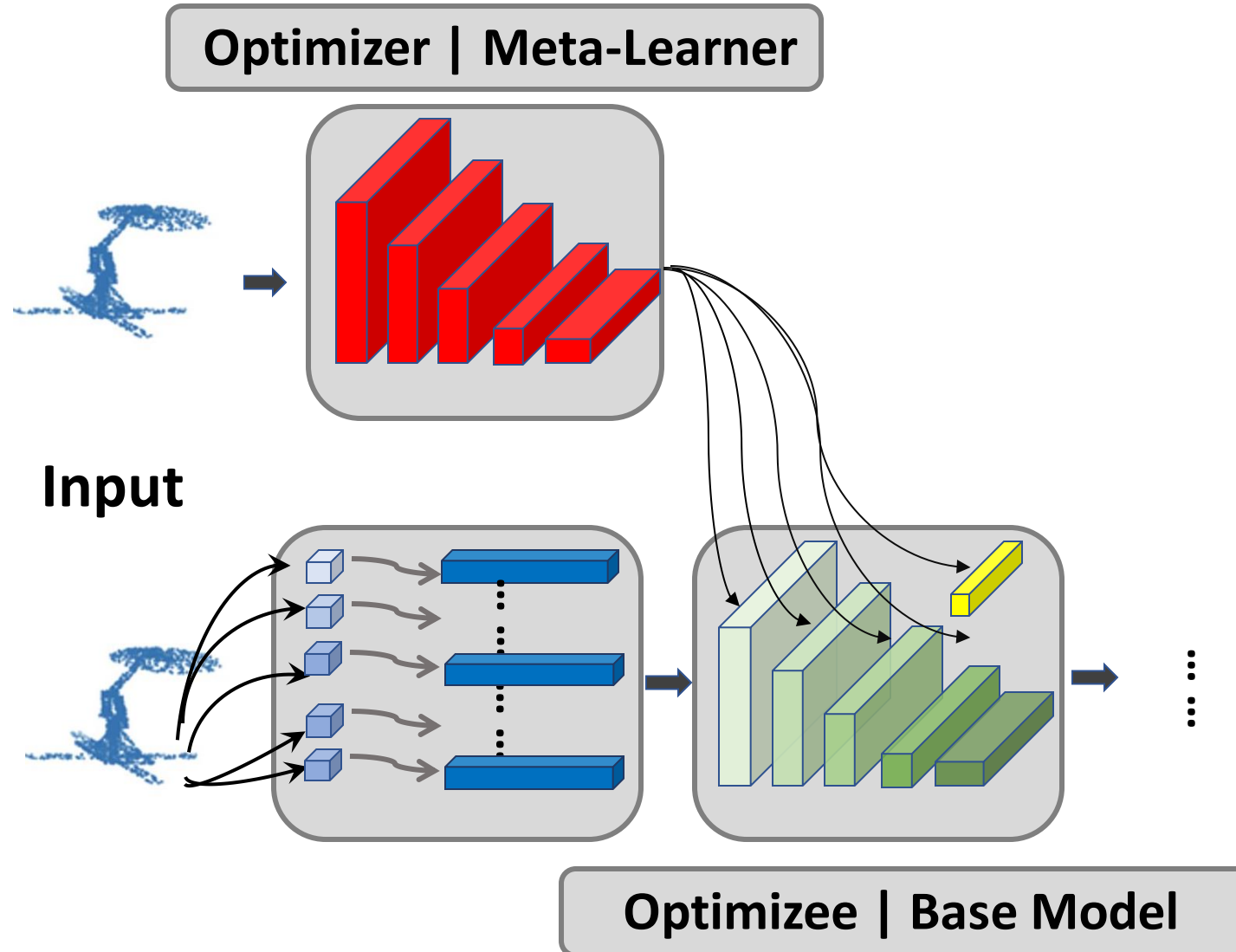
Special thanks to my thesis advisor:

Professor Yi Fang

Thanks to:

Ellen Xu	Dr. Lingjing Wang
Shuaihang Yuan	Dr. Xiang Li