

# Self-Supervised Object Detection and Visual Navigation



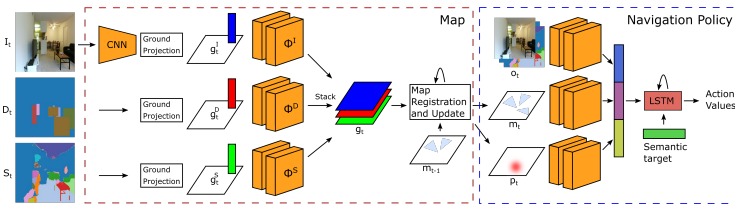
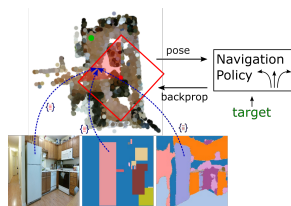
Jana Kosecka  
<http://cs.gmu.edu/~kosecka>



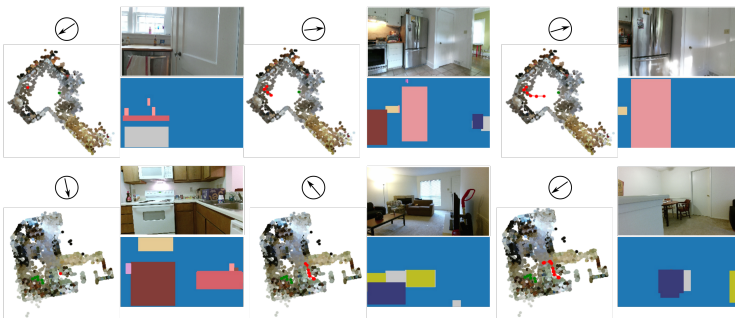
- Self-supervised object discovery
- Few shot object detection
- Learning visual representations for navigation and mapping

## Simultaneous Mapping and Target Driven Navigation

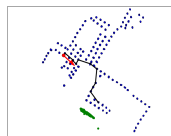
- Learning semantic spatial maps
- Joint target driven navigation and localization
- Real (AVD) and simulated Datasets (Matterport3D)



Navigation Policy on AVD Environment



## Visual Representations for Target Driven Navigation



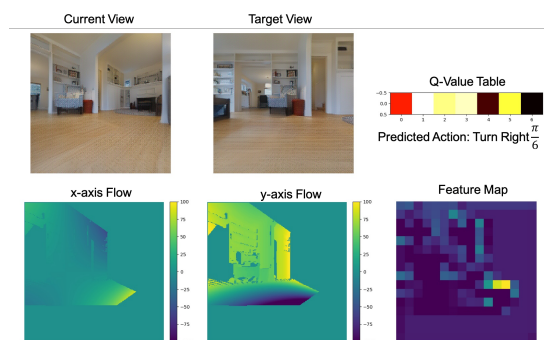
- Given a semantic target  $c$ , navigate towards any instance of the category  $c$
- Learn common embeddings of all modalities
- Joint use of real and simulated data

### Publications

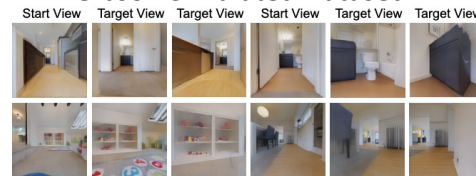
- E. Pot, A. Toshev, J. Kosecka. Self-supervisory signals for object discovery and detection, *arXiv 2018*.
- A. Mousavian, A. Toshev, M. Fisher, J. Kosecka, J. Davidson. Visual representations for target driven navigation, ICRA 2019.
- G. Georgiakis, Y. Li, J. Kosecka. Simultaneous Mapping and Target Driven Navigation, *arXiv 2019* (under submission).
- Y. Li, J. Kosecka. Learning View and Target Invariant Visual Servoing for Navigation, ICRA 2020.

## Visual Servoing for Relative Target Positioning

- End-to-end visual servoing for target reaching if target object is visible
- Deep Q-learning framework with novel dense reward structure



Gibson Simulated Dataset



## Novel Out-of-distribution object detection

- Detect novel objects not in the categories encountered in training
- Semantic Segmentation of Object Proposals with novel distance aware uncertainty estimates
- Lost and Found and Road Anomaly dataset

