ZHENG CHEN

Indiana University Bloomington, USA
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EDUCATION

Indiana University Bloomington, Bloomington, USA *Aug 2018 - present*
PhD student at Vehicle Autonomy and Intelligence Lab, Intelligent Systems Engineering
Research Domains: Robotics, Computer Vision, Deep Learning
Research Interests: Deep Domain Adaptation, Semantic Segmentation, Depth Estimation, Visual SLAM
Adviser: Lantao Liu

Technical University of Madrid, Madrid, Spain *Jan 2017 - Jun 2017*
Research Project: Trajectory Optimization Using Quintic Bessel Spline for Quadrotors
Adviser: Ignacio Gomez Perez

Northwestern Polytechnical University, Shaanxi, China *Sep 2013 - Jun 2017*
Bachelor at Dept. Aerial Vehicle Design and Engineering
Adviser: Zhou Zhou

PUBLICATIONS

- Junhong Xu, Kai Yin, **Zheng Chen**, Jason M. Gregory, Ethan A. Stump, Lantao Liu. Kernel-based Diffusion Approximated Markov Decision Processes for Off-Road Autonomous Navigation and Control
- **Zheng Chen**, Zhengming Ding, David Crandall, Lantao Liu. Polyline Based Generative Navigable Space Segmentation for Autonomous Visual Navigation. submitted to ICRA 2022
- **Zheng Chen**, Lantao Liu. NSS-VAEs: Generative Scene Decomposition for Visual Navigable Space Construction. NeurIPS 2021 Workshop on Machine Learning for Autonomous Driving
- **Zheng Chen**, Shi Bai, Lantao Liu. Efficient Map Prediction via Low-Rank Matrix Completion. 2021 IEEE International Conference on Robotics and Automation
- **Zheng Chen**, Lantao Liu. Navigable Space Construction from Sparse Noisy Point Clouds. IEEE Robotics and Automation Letters 6.3 (2021): 4720-4727.
- **Zheng Chen**, Weizhe Chen, Shi Bai, Lantao Liu. Multi-Objective Autonomous Exploration on Real-Time Continuous Occupancy Maps.
- **Zheng Chen**, Malintha Fernando, Lantao Liu. A Visual Feature based Obstacle Avoidance Method for Autonomous Navigation. In 2019 IEEE Applied Imagery Pattern Recognition Workshop (AIPR) (pp. 1-7). IEEE.

PROJECT EXPERIENCE

Unsupervised Domain Adaptation for Dense Predictions Aug 2021 - present
Bloomington, Indiana

This is my currently **ONGOING** research focus. Training deep models with strong generalization to new environments is extremely important to practical deployment in the real world. We are trying to achieve this capability for semantic segmentation and depth estimation by combining adversarial training and self training such that the trained model can be naturally ready-to-use in desired environments after training.

Polyline Based Generative Navigable Space Segmentation for Autonomous Visual Navigation Mar 2021 - Sep 2021
Bloomington, Indiana

We propose a visual navigation system, which consists of a navigable space segmentation module and a motion-primitives-based planning module.

Generative Visual Navigable Space Construction Feb 2021 - Jul 2021
Bloomington, Indiana

We propose a new network, NSS-VAEs (**N**avigable **S**pace **S**egmentation **V**ariational **A**uto**E**ncoders), a representation learning-based framework to enable robots to learn the navigable space segmentation in an unsupervised manner.

Efficient Map Prediction using Low-Rank Matrix Completion May 2020 - Nov 2020
Bloomington, Indiana

We propose a novel map prediction method built upon *Low-Rank Matrix Completion*. The proposed map prediction is able to achieve both map interpolation and extrapolation on raw poor-quality maps with missing or noisy observations.

Multi-Objective Exploration on Continuous Occupancy Mapping Jan 2020 - May 2020
Bloomington, Indiana

We propose to use a multi-objective variant of Monte-Carlo tree search that provides a non-myopic Pareto optimal action sequence leading the robot to a frontier with greatest extent of unknown area uncovering.

Navigable Space Construction from Sparse Noisy Map Points Jan 2019 - Oct 2020
Bloomington, Indiana

We present a framework for creating navigable space from cluttered point clouds generated by low-end sensors with high sparsity and noise.

Visual Feature based Obstacle Avoidance Mar 2019 - Oct 2019
Bloomington, Indiana

We propose a simple but effective obstacle-avoiding approach for autonomous robot navigation.

Trajectory Optimization Using Quintic Bessel Spline for Quadrotors Jan 2017 - Jun 2017
Madrid, Spain

We develop an efficient trajectory optimization for quadrotors using quintic Bessel spline and we validate the effectiveness of our proposed method in intensive simulated experiments.

HONORS

- First-class scholarship in Northwestern Polytechnical University in the school year of 2014, 2015, and 2016
- Ke Wei speciality scholarship in 2015
- CATIC speciality scholarship in 2016

SERVICES

- Reviewer for IROS2021, ICRA2022
- Teaching assistant for ENGR E511 Machine Learning for Signal Processing, 2020 Spring
- Project mentor for students in New Albany High School