Shangjie Xue

240 Sidney St, Cambridge, MA 02139 · sjxue@mit.edu · 857-999-6955 · xueshangjie27 · sjxue.me

Education

Massachusetts Institute of Technology (MIT), Cambridge, MA GPA: 5.0/5.0 May 2021 (Expected)

Candidate for *Master of Science* in Nuclear Engineering
Candidate for *Master of Science* in Electrical Engineering and Computer Science

- Relevant Coursework: Visual Navigation for Autonomous Vehicles, Advances in Computer Vision, Underactuated Robotics, Introduction to Robotics, Applied Machine Learning, Essential Numerical Methods, Nonlinear Optimization, Cognitive Robotics, Robotic Manipulation

Peking University (PKU), Beijing, China GPA: 86/100 July 2018

Bachelor of Science in Physics

- Relevant Coursework: Data Structure and Algorithm, Group Theory, Methods of Mathematical Physics, Theoretical Mechanics, Optics, Quantum Statistical Physics, Computational Physics

Experience

Research Intern | *Uber Advanced Technologies Group (ATG), Toronto, ON* June 2020 - Present

- Photorealistic Image Synthesis for self-driving car research.
- Shadow synthesis via image-based rendering and machine learning based illumination estimation.

Research Assistant | *MIT, Cambridge, MA* 2019 - Present

- Conducted research on machine learning based approach in inverse problem and adaptive sampling for autonomous robotic environmental radiation monitoring.
- Implementing deep learning and optimization-based methods for radioactive object detection and motion prediction. Developed a directional radiation detection system based on CNN; Implemented SLAM and optimization-based method for radiation localization and mapping.

Undergraduate Researcher | *Peking University, Beijing, China* 2015 - 2018

- Performed research in condensed matter physics via spectroscopy techniques in 2 research labs at PKU and MIT department of physics (Summer 2017), performed experiments at 5 national research facilities in Europe, Japan and US.
- Studied on domain dynamics of charge-density-wave via photon scattering and topological magnons via neutron scattering.

Selected Publications

- Y. Chen* F. Rong*,S. Duggal* S. Wang, X. Yan, S. Manivasagam, **S. Xue**, E. Yumer, R. Urtasun†, GeoSim: Photorealistic Image Simulation with Geometry-Aware Compositionfor Self-Driving (in submission)
- L. Yue*, **S. Xue***, J. Li*, C. Mazzol, F. Zheng, L. Wang, J. Feng, S. B. Wilkins, R. Comin† and Y. Li†,"Distinction between pristine and disorder-perturbed charge density waves in $ZrTe_3$", **Nature Communications** 11, no. 1 (2020): 1-8.
- W. Yao*, C. Li*, L. Wang*, **S. Xue**, Y. Dan, K. Iida, K, Kamazawa, K. Li, C. Fang†, Y. Li†, "Topological spin excitations observed in a three-dimensional antiferromagnet", **Nature Physics** 14, no. 10 (2018): 1011-1015.

(* : Equal contribution, † : Corresponding author)

Selected Projects

Scale Invariant Multi-robot Map Merging | *MIT, Cambridge, MA* Fall 2019

- Developed an algorithm for merging multi-robot pose graphs with unknown relative scales for monocular SLAM system;
- Designed a convex objective function that is invariant to similarity transformation. Implemented the algorithm in GTSAM; Implemented adaptive voting algorithm for outliers rejection and scale estimation.

Trajectory Generation and Control for Quadrotor-Tailsitter UAV | *MIT, Cambridge, MA* Spring 2019

- Implemented state dependent LQR controllers for flight phase transition of quadrotor-tailsitter and performed region of attraction analysis. The simulation is performed in DRAKE;
- Performed differential flatness analysis on quadrotor-tailsitter and derived the mapping from flat outputs to full states and control inputs, and then implemented minimum snap trajectory optimization.

MIT RACECAR Hackathon (Rank 1st in the Competition) | *MIT, Cambridge, MA* Winter 2019

- Led a team of 3 for the Rapid Autonomous Complex-Environment Competing Ackermann-drive Robot (RACECAR) Hackathon;
- Implemented particle filter localization, DWA algorithm, and PID controller in ROS for the robot to race autonomously in MIT's tunnels at high speed.

Awards and Honors

- **"Manson Benedict"** Fellowship 2018 - 2019
- **"Wei Lin"** Scholarship in Peking University 2016
- **"Merit Student Award"** in Peking University 2015& 2016
- **"Tung OOCL"** Scholarship in Peking University 2015
- **"Meritorious Winner"** in Mathematical Contest in Modeling (MCM) 2015

- **1st** Prize in National University Students Physics Competition in China 2014
- **1st** Prize in National High Schools Physics Competition in China 2012

SKILLS

- Programming: Python, Matlab, C++, C
- Tools/Software: ROS, PyTorch, Tensorflow, Keras, GTSAM, DRAKE, Arduino, PyQt, Blender, SolidWorks, LaTeX