Tixiao Shan

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Research Interests

My research focuses on developing an autonomous navigation system for unmanned ground vehicles with constrained computational resources. I have a special interest in SLAM. I have developed localization, mapping and motion planning algorithms that run in real-time on ground vehicles. I also have an interest in deep learning and have used it to solve some real-world problems, such as lidar super-resolution and planning under uncertainty.

Education

2014–Present **Stevens Institute of Technology**, *Ph.D.*, Robotics, Mechanical Engineering.
GPA 4.0/4.0, Top 1%

2011–2014 **Shanghai University**, *MS*, Mechatronics, Mechanical Electronics Engineering.
GPA 3.59/4.0, Top 5%

2007-2011 **Qingdao University**, *BS*, Mechanical and Electrical Engineering.
GPA 3.56/4.0, Top 5%

Research Experience

2014 - Present **Research Assistant**, *Stevens Institute of Technology*.
Design Autonomous navigation system (localization, mapping and motion planning) for unmanned ground vehicles. Utilize deep learning technique to enable lidar super-resolution and planning under uncertainty.

2013 - 2014 **Assistant Engineer**, *Shanghai ABB Engineering CO. Ltd.*.
3D modeling of assembly tools for BMW clutch. Design roll table for BMW engine production line.

2012 - 2014 **Research Assistant**, *Shanghai University*.
Design embedded control system circuit board for UAV, a project sponsored by National Natural Science Foundation of China (No.61175092).

Teaching Experience

2017-Present **ME598**, *Intro to Robotics*, Lab Instructor, Stevens Institute of Technology.

2017-Present **ME483**, *Control Systems*, Teaching Assistant, Stevens Institute of Technology.

2018 **ME322**, *Engineering Design*, Instructor, Stevens Institute of Technology.

2016 **ME470**, *Systems Laboratory*, Instructor, Stevens Institute of Technology.

Skills

Programming C/C++, Python

Software Infrastructure ROS, PCL, OpenCV, Tensorflow, PyTorch, Keras, Numpy, Matplotlib, Matlab, AutoCAD, Solidworks, Gazebo, Linux, Final Cut Pro X

Industry SLAM, Autonomous Navigation, Deep Learning, 3D Modeling

Publications

2019 T. Shan, J. Wang, and B. Englot, "Simulation-based Lidar Super-resolution for Ground Vehicles," *IEEE/RSJ International Conference on Intelligent Robots and Systems*, under review.

2019 J. Wang, T. Shan, and B. Englot, ""Virtual Maps for Autonomous Exploration with Pose SLAM," *IEEE/RSJ International Conference on Intelligent Robots and Systems*, under review.

2019 K. Doherty, T. Shan, J. Wang, and B. Englot, "Learning-aided 3D Occupancy Mapping with Bayesian Generalized Kernel Inference," *IEEE Transactions on Robotics*, Accepted, To Appear.

2019 J. Wang, T. Shan, and B. Englot, "Underwater Terrain Reconstruction from Forward-Looking Sonar Imagery," *IEEE International Conference on Robotics and Automation*, Accepted, To Appear in May 2019.

2019 F. Chen, S. Bai, T. Shan and B. Englot. "Self-Learning Exploration and Mapping for Mobile Robots via Deep Reinforcement Learning." *International AIAA Information-Driven Decision and Control Conference*, 2019

2018 T. Shan, K. Doherty, J. Wang and B. Englot. "Bayesian Generalized Kernel Inference for Terrain Traversability Mapping." *Conference on Robot Learning*, 2018.

2018 T. Shan, and B. Englot. "LeGO-LOAM: Lightweight and Ground-Optimized Lidar Odometry and Mapping on Variable Terrain." *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 4758-4765, 2018.

2017 T. Shan, and B. Englot. "Belief roadmap search: Advances in optimal and efficient planning under uncertainty." *IEEE/RSJ International Conference on Intelligent Robots and Systems*, pp. 5318-5325, 2017.

2016 B. Englot, T. Shan, S.D. Bopardikar, and A. Speranzon. "Sampling-based min-max uncertainty path planning." *IEEE International Conference on Decision and Control*, pp. 6863-6870, 2016.

2015 T. Shan, and B. Englot. "Sampling-based Minimum Risk path planning in multiobjective configuration spaces." *IEEE International Conference on Decision and Control*, pp. 814-821, 2015.

2015 T. Shan and B. Englot, "Tunable-Risk Sampling-Based Path Planning Using a Cost Hierarchy," *IEEE International Conference on Robotics and Automation Workshop*, pp. 2, 2015.

Awards

2014-2017 Stevens Innovation and Entrepreneurship Fellowship

2013 National Scholarship for Graduate Students

2013 Outstanding Students of Shanghai University

2007-2010 Qingdao University Scholarship (6 times)

2008-2010 Outstanding Students of Qingdao University (3 times)

2009 Tsingtao Brewery Education Scholarship