Tixiao Shan

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tixiaoshan.github.io

EDUCATION

2014–2019 **Stevens Institute of Technology**, *Ph.D.*, Mechanical Engineering.
Thesis: Minimalistic and Learning-Enabled Navigation Algorithms for Unmanned Ground Vehicles

2011–2014 **Shanghai University**, *M.S.*, Mechanical Electronics Engineering.
Thesis: Research and Design of Data Fusion of A Navigation System and Path Planning Method for Unmanned Aerial Vehicles

2007-2011 **Qingdao University**, *B.S.*, Mechanical and Electrical Engineering.
Thesis: Dedicated Flange Manufacturing System Design

RESEARCH EXPERIENCE

2019 - present **Postdoctoral Fellow**, *Massachusetts Institute of Technology*.
- Developing perception algorithms for Roboat localization.
- Developing motion planning algorithms for Roboat planning.

2014 - 2019 **Research Assistant**, *Stevens Institute of Technology*.
- Developed a lightweight lidar odometry for ego-estimation running on embedded systems.
- Developed a traversability mapping algorithm for UGVs equipped with a sparse lidar.
- Developed a lidar super-resolution method for a sparse lidar using deep learning.
- Developed multi-objective path planning algorithms for autonomous navigation in cluttered environment using Turtlebot and Clearpath Jackal.
- Contributed to the motion planning software for underwater pipe inspection using BlueROV2.

2013 - 2014 **Assistant Engineer Intern**, *ABB Engineering Ltd.*.
- Contributed to the design of a production line for BMW engine assembly.
- Designed automatic assembly tool for BMW clutch manufacture.

2012 - 2014 **Research Assistant**, *Shanghai University*.
- Designed embedded control system circuit board for UAV, a project sponsored by National Natural Science Foundation of China (No.61175092).
- Implemented sensor fusion algorithm for UAV pose estimation using Kalman filter.

TEACHING EXPERIENCE

2017-2019 **Intro to Robotics**, *Lab Instructor*, Stevens Institute of Technology.

2017-2019 **Control Systems**, *Teaching Assistant*, Stevens Institute of Technology.

2018-2019 **Engineering Design**, *Instructor*, Stevens Institute of Technology.

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

2012 **CAD and CAM**, *Lecturer*, Shanghai University.

SKILLS

Expertise	SLAM, Autonomous Navigation, Deep Learning, 3D Modeling
Programming	C/C++, Python
Software Infrastructure	ROS, PCL, OpenCV, Tensorflow, PyTorch, Keras, Numpy, Matplotlib, Matlab, AutoCAD, Solidworks, Gazebo, Linux, Final Cut Pro X

PUBLICATIONS

2019 T. Shan, J. Wang, F. Chen, P. Szenher, and B. Englot, "Simulation-based Lidar Super-resolution for Ground Vehicles," *Conference on Robot Learning (CoRL)*, under review.

2019 F. Chen, J. Wang, T. Shan, and B. Englot, "Autonomous Exploration Under Uncertainty via Graph Convolutional Networks," *International Symposium on Robotics Research*, October, 2019.

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 (IROS)*, October, 2019.

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

2019 J. Wang, T. Shan, T. Osedach, and B. Englot, "Deep Learning for Detection and Tracking of Underwater Pipelines using Multibeam Imaging Sonar," *IEEE International Conference on Robotics and Automation (ICRA) Workshop*, May, 2019.

2019 J. Wang, T. Shan, and B. Englot, "Underwater Terrain Reconstruction from Forward-Looking Sonar Imagery," *IEEE International Conference on Robotics and Automation (ICRA)*, 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 (AIAA)*, 2019

2018 T. Shan, K. Doherty, J. Wang and B. Englot. "Bayesian Generalized Kernel Inference for Terrain Traversability Mapping." *Conference on Robot Learning (CoRL)*, 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 (IROS)*, 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 (IROS)*, 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 (CDC)*, 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 (CDC)*, 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 (ICRA) Workshop*, pp. 2, 2015.

PROFESSIONAL ACTIVITIES

- Member of IEEE
- Reviewer for the Following Technical Conferences and Publications:
  - International Conference on Robotics and Automation (ICRA)
  - International Conference on Intelligent Robots and Systems (IROS)
  - Workshop on the Algorithmic Foundations of Robotics (WAFR)
  - Conference on Robot Learning (CoRL)
  - IEEE Robotics and Automation Letters (RA-L)
  - IEEE Control Systems Letters (L-CSS)

AWARDS

2019	Fernando L. Fernandez Robotics and Automation Fellowship
2014-2017	Stevens Innovation and Entrepreneurship Fellowship
2013	China National Scholarship for Graduate Students
2013	Shanghai University Outstanding Students
2007-2010	Qingdao University Scholarship
2008-2010	Qingdao University Outstanding Students
2009	Tsingtao Brewery Education Scholarship