

# Tixiao Shan

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## EDUCATION

- 2014–Present **Stevens Institute of Technology**, *Ph.D.*, Mechanical Engineering.  
Thesis: A Lightweight, Online Autonomous Navigation System 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

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## RESEARCH EXPERIENCE

- 2014 - Present **Research Assistant**, *Stevens Institute of Technology*.
- Developing a lightweight lidar odometry for ego-estimation running on embedded systems.
  - Developing a traversability mapping algorithm for UGVs equipped with a sparse lidar.
  - Developing a lidar super-resolution method for a sparse lidar using deep learning.
  - Developing multi-objective path planning algorithms for autonomous navigation in cluttered environment using Turtlebot and Clearpath Jackal.
  - Contributing to the motion planning software for underwater pipe inspection using BlueROV2.
- 2013 - 2014 **Assistant Engineer Intern**, *Shanghai ABB Engineering CO. 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.

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## TEACHING EXPERIENCE

- 2017–Present **Intro to Robotics**, *Lab Instructor*, Stevens Institute of Technology.
- 2017–Present **Control Systems**, *Teaching Assistant*, Stevens Institute of Technology.
- 2018 **Engineering Design**, *Instructor*, Stevens Institute of Technology.
- 2016 **Systems Laboratory**, *Instructor*, Stevens Institute of Technology.
- 2012 **CAD and CAM**, *Lecturer*, Shanghai University.

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## 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

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## PUBLICATIONS

- 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)*, DOI:10.1109/TRO.2019.2912487, 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)*, 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 (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.

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## OTHER 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 (IROS)*, 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 (IROS)*, 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*, under review.
- 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*, 2019.
- 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.

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## 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)
  - IEEE Robotics and Automation Letters (RA-L)
  - IEEE Control Systems Letters (L-CSS)

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## AWARDS

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

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## REFERENCES

### **Professor Brendan Englot**

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### **Professor Sven Esche**

Department of Mechanical Engineering  
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### **Professor Mishah Salman**

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