Justin Tomasi

Mobile Robotics, Computer Vision, Machine Learning, State Estimation

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Education

Master of Applied Science · University of Toronto
Toronto, Canada

Institute for Aerospace Studies · Space and Terrestrial Autonomous Robotic Systems (STARS) Lab
2018 - 2020

- Thesis title: "Learned Adjustment of Camera Gain and Exposure Time for Improved Visual Feature Detection and Matching." Advised by Dr. Jonathan Kelly.
- Ontario Graduate Scholarship valued at $10,000.

B.E.Sc., Electrical Engineering (with Distinction) · Western University
London, Canada

Department of Electrical and Computer Engineering · Faculty of Engineering
2011 - 2016

- NSERC undergraduate research award.
- Jean Ann Maynard Scholarship Recipient.
- Bluewater Power 4th Year Capstone Project Award.

Experience

Graduate Researcher · University of Toronto
Toronto, Canada

Institute for Aerospace Studies · Space and Terrestrial Autonomous Robotic Systems (STARS) Lab
2018 - 2020

- Research focused on improving visual perception for autonomous vehicles in challenging lighting conditions.
- Developed and tested a neural network based camera parameter adjustment system to aid visual odometry/SLAM.
- Conducted real-world driving experiments using vehicles equipped with machine-vision cameras.

Laboratory Teaching Assistant · University of Toronto
Toronto, Canada

ROB301: Introduction to Robotics · Division of Engineering Science
2019

- Instructed and guided students with state estimation and control laboratory exercises for autonomous robots in ROS.
- Assisted in the development, implementation, and troubleshooting of mobile robotics lab exercises.

Engineer-in-Training · London Hydro Inc.
London, Canada

Engineering and Operations
2017-2018

- Facilitated the development of small-scale solar generation projects with external clients.
- Assisted in the development of technical standards for engineering equipment.
- Independently developed a process for detecting overloaded distribution transformers.

Projects

LiDAR-IMU Calibration for an Autonomous Vehicle · University of Toronto
Toronto, Canada

AER 1514 Mobile Robotics Course Project
2019

- Implemented a state-of-the-art sensor calibration technique for a 3D Velodyne LiDAR-to-IMU calibration.
- Utilized real-world Velodyne point cloud and IMU data captured using the 'aUToronto' autonomous vehicle.

SLAM using Factor Graphs and GTSAM · University of Toronto
Toronto, Canada

AER 1513 State Estimation Course Project
2018

- Implemented a SLAM algorithm using factor graphs for various mobile robot datasets.
- Utilized the Georgia Tech Smoothing and Mapping (GTSAM) library to solve the SLAM problem.

Skills

Technical Expertise	Mobile Robotics, Machine Learning, Computer Vision, State Estimation
Programming	Python, C++, ROS, MATLAB, LaTex, Git, Linux
Libraries	PyTorch, NumPy, SciPy, OpenCV, Libviso2, ORB-SLAM2, GTSAM, Gazebo
Hardware	FLIR Machine Vision Cameras, PCB/circuit Design, TurtleBot3, LiDARs

Professional and Extracurricular Activities

VP Social · Aerospace Students' Association   *Toronto, Canada*

University of Toronto Institute for Aerospace Studies   *2018-2019*

- The ASA represents graduate students at UTIAS and organizes athletic, social, academic, and professional events.

Engineer in Training · PEO   *Toronto, Canada*

Professional Engineers Ontario   *2016-Present*

- The PEO is the regulatory body for the engineering profession in Ontario.

Student Volunteer · Canadian National Exhibition UTIAS Demo Booth   *Toronto, Canada*

University of Toronto Institute for Aerospace Studies   *2019*

- The Centre for Aerial Robotics Research and Education hosted a demonstration booth at the Canadian National Exhibition.

Awards & Honours

2019	**Ontario Graduate Scholarship,** $10,000	*Toronto, Canada*
2016	**Jean Ann Maynard Scholarship,** $1,800	*London, Canada*
2016	**Bluewater Power Distribution 4th Year Project Award,** $400	*London, Canada*
2015	**NSERC Undergraduate Research Award,** $4,500	*London, Canada*

Publications

[1] J. Tomasi, B. Wagstaff, S. L. Waslander, and J. Kelly, "Learned camera gain and exposure control for improved visual feature detection and matching," *submitted to: IEEE Robotics and Automation Letters,* 2020.

[2] J. Tomasi, "Learned adjustment of camera gain and exposure time for improved visual feature detection and matching," Master's thesis, University of Toronto, 2020.

[3] L. Clement, M. Gridseth, J. Tomasi, and J. Kelly, "Learning Matchable Image Transformations for Long-Term Metric Visual Localization," *IEEE Robotics and Automation Letters,* vol. 5, no. 2, pp. 1492–1499, 2020.