W. Nicholas Greene

Robust Robotics Group
Computer Science and Artificial Intelligence Laboratory (CSAIL)
Massachusetts Institute of Technology (MIT)
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Research Interests

Dense, visual-inertial simultaneous localization and mapping (SLAM) and real-time 3D reconstruction
High-speed autonomous navigation in unknown environments
Augmented reality on small, mobile platforms

Education

Ph.D. Aeronautics and Astronautics 2016-*Present*
Massachusetts Institute of Technology, Cambridge, MA.

Adviser: Nicholas Roy

Concentration: Autonomous Systems

S.M. Aeronautics and Astronautics 2014-2016
Massachusetts Institute of Technology, Cambridge, MA.

Adviser: Nicholas Roy

Concentration: Autonomous Systems

Thesis: *Real-Time Dense Simultaneous Localization and Mapping Using Monocular Cameras*

B.S.E. Electrical Engineering 2006-2010
Princeton University, Princeton, NJ.

Concentration: Signal Processing

Senior Project: "Testing Residual-PCA Traffic Anomaly Detection Schemes"

Additional Coursework: Harvard CSCI-E 124 Algorithms and Data Structures (A-), Stanford CS229 Machine Learning (A), Udacity CS373 Programming a Robotic Car ("Highest Distinction"), Coursera Control of Mobile Robots ("Distinction" - 94.3 percent)

Research Experience

Robust Robotics Group 2012–*Present*
MIT Computer Science and Artifical Intelligence Laboratory (CSAIL), Cambridge, MA.

Conducting research for high-speed autonomous MAV navigation under Professor Nicholas Roy.

Current focus on estimating dense 3D geometry from low-SWaP onboard sensors.

Low-level perception lead on the MIT-Draper team for the DARPA Fast Lightweight Autonomy (FLA) program

Advanced Sensor Techniques Group 2010-2014
MIT Lincoln Laboratory, Lexington, MA.

Developed passive sonar localization and tracking algorithms for faint, acoustic targets in challenging underwater environments.

Recursive Bayesian state estimation algorithms currently deployed on *Los Angeles*-class and *Virginia*-class submarines.

Developed and integrated feature extraction tools for use in a mild traumatic brain injury (mTBI) detection system.

Autonomous Systems Division 2009
Jet Propulsion Laboratory (JPL), Pasadena, CA.

Conducted computer vision and object detection research under Senior Engineer Thomas Lu.

Applied various feature selection and extraction strategies to an existing multi-stage automatic target recognition system previously developed at JPL.

Work accepted for publication at the SPIE symposium on Defense, Security, and Sensing, in April 2010.

Koch Laboratory 2008
California Institute of Technology, Pasadena, CA.

Conducted computer vision and object recognition research under Professor Christof Koch.

Improved upon the existing object recognition algorithm H-MAX using biologically inspired preprocessing, weighted SVMs, and hyperfeature mining.

Invited Talks

"FLaME: Fast Lightweight Mesh Estimation using Variational Smoothing on Delaunay Graphs", International Workshop on Lines, Planes, and Manhattan Models for 3D Mapping (LPM) at the International Conference on Intelligent Robots and Systems (IROS), Vancouver, 2017.

"Monocular Perception for High-Speed Quadrotors", Draper Perception Seminar, Draper, Cambridge, 2017.

Publications

W. N. Greene, N. Roy. "FLaME: Fast Lightweight Mesh Estimation using Variational Smoothing on Delaunay Graphs." International Conference on Computer Vision (ICCV), Venice, 2017.

K. Ok, W. N. Greene, N. Roy. "Simultaneous Tracking and Rendering: Real-time Monocular Localization for MAVs." IEEE International Conference on Robotics and Automation (ICRA), Stockholm, 2016.

L. Keyes, J. Su, T. Quatieri, B. Evans, J. Lacirignola, T. Vian, W. Greene, D. Strom, A. Dai. "FY12 Line-Supported Bio-Medical Initiative Program: Multi- modal Early Detection Interactive Classifier (MEDIC) for Mild Traumatic Brain Injury (mTBI) Triage." MIT Lincoln Laboratory Project Report LSP-41, November 2012.

L. Reilly-Raska, J. Su, P. Bisso, J. Braun, B. Evans, W. Greene, J. Lacirignola, R. Lippmann, T. Quatieri, W. Streilein, T. Vian. "FY11 Line- Supported Bio-Next Program: Multi-modal Early Detection Interactive Classifier (MEDIC) for Mild Traumatic Brain Injury (mTBI) Triage." MIT Lincoln Laboratory Project Report PR-LSP-34, April 2012.

W.N. Greene, Y. Zhang, T.T. Lu, T.S. Chiao. "Feature extraction and selection strategies for automated target recognition." SPIE Vol. 7703, Independent Component Analyses, Wavelets, Neural Networks, Biosystems, and Nanoengineering VIII, April, 2010.

W.N. Greene, J. Harel, C. Koch. "Improving object recognition using informative feature selection and biologically inspired image-preprocessing." Summer Undergraduate Research Fellowship (SURF) Abstract Book, August 2008.

Grants and Fellowships

NSF Graduate Research Fellowship 2014
MIT, Cambridge, MA

Draper Fellowship 2014
Draper, Cambridge, MA

Summer Undergraduate Research Fellowship 2009
Jet Propulsion Laboratory, Pasadena, CA

Summer Undergraduate Research Fellowship 2008
California Institute of Technology, Pasadena, CA

Professional Societies

IEEE Member 2011-Present

IEEE Robotics and Automation Society 2011-Present

Software Experience

Languages: C/C++, Python, Matlab, Java

Operating Systems: Linux/Unix, Windows, Mac OS

Libraries: CUDA/OpenCL, OpenCV, OpenGL, NumPy, SciPy, Eigen, LCM, ROS

Teaching Experience

Open Robotics Laboratory 2012-Present
MIT, Cambridge, MA.

Helped develop Lincoln Laboratory-sponsored introductory robotics course using the Robot Operating System (ROS) for MIT's Independent Activities Period.

Prepared course lectures and programming assignments.

Assisted students during in-class laboratory projects.

Lectured on robotic localization and navigation.

6-8th Grade Math and English 2007
Premier Academy, West Covina, CA.

Taught Algebra I, Geometry, English, and Phonics to middle school students at a preparatory summer school.

Prepared class lectures, activities, homework, quizzes, and tests.