

Joseph L. Knuth

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OBJECTIVE

Seeking a research position in the fields of robot localization, multi-robot systems, and control that utilizes my technical writing and communication skills, as well as my experience in abstract mathematics, statistics, and estimation.

EDUCATION

PhD Mechanical Engineering (expected May 13), University of Florida Jan. 2011 - Present
Department of Mechanical and Aerospace Engineering, Gainesville, FL GPA: 3.96/4.0

MS Mechanical Engineering, University of Florida Aug. 2008 – Dec. 2010
Department of Mechanical and Aerospace Engineering, Gainesville, FL GPA: 3.95/4.0

BS Computer Engineering, University of Illinois at Urbana-Champaign Aug. 2003 – Dec. 2007
Department of Electrical and Computer Engineering, Urbana, IL GPA: 3.31/4.0

EXPERIENCE

Graduate Research Assistant, Dr. Prabir Barooah, University of Florida Aug. 2008 - Present
Department of Mechanical and Aerospace Engineering, Gainesville, FL

- Published several peer-reviewed technical papers
- Developed cutting edge algorithms for the problem of collaborative robot localization utilizing Riemannian manifolds, optimization, probability theory, and statistics on non-Euclidian spaces
- Designed and carried out simulations and experiments testing original algorithms on a pair of mobile robots equipped with monocular vision
- Presented work at technical conferences

Graduate Teaching Assistant, University of Florida Aug. 2008 - Present
Department of Mechanical and Aerospace Engineering, Gainesville, FL

- Classes: Control Systems (Fall 08), Dynamics (Fall 09), Controls Lab (Fall 12, Spring 13)
- Instructed undergraduate students one-on-one during office hours
- Developed final controls project for class
- Assisted student with control related experiments

Undergraduate Research Assistant, Dr. Steve LaValle May 2006 - Dec. 2007
University of IL. at Urbana-Champaign, Computer Science Department, Urbana, IL

- Use iRobots's Roomba as a platform for testing localization and path planning algorithms.
- Design new circuits to interface the with the Roomba through serial, Bluetooth and Wi-Fi

Summer Intern, Monsanto, Automation Department, Saint Louis, MO May 2005 - Aug. 2005

- Assembled and programmed pneumatic non-destructive soybean testing robot
- Created an ordering and inventory database program

RESEARCH INTERESTS

Multi-Robot Systems, Localization, Estimation, Statistics, Computer Vision, Manifold Optimization, Algorithm Design, Control Theory

PUBLICATIONS

Journal Articles:

J. Knuth and P. Barooah, "Distributed Collaborative 3D Pose Estimation of Robots from Heterogeneous Relative Measurements: an Optimization on Manifold Approach", submitted to Robotica, 2013.

J. Knuth and P. Barooah, "Error Growth in Position Estimation from Noisy Relative Pose Measurements", Robotics and Autonomous Systems, January 2013.

In Conference:

J. Knuth and P. Barooah, "Maximum-likelihood localization of a camera network from heterogeneous relative measurements", to appear in American Control Conference, June 2013.

J. Knuth and P. Barooah, "Collaborative localization with heterogeneous inter-robot measurements by Riemannian optimization", to appear in IEEE International Conference on Robots and Automation, 2013.

J. Knuth and P. Barooah, "Collaborative 3D localization of robots from relative pose measurements using gradient descent on manifolds", IEEE international Conference on Robots and Automation, 2012.

J. Knuth and P. Barooah, "Distributed collaborative localization of multiple vehicles from relative pose measurements", 47th Annual Allerton Conference on Communication, Control and Computing, September 30- October 2, 2009, Urbana-Champaign, IL.

L. Erickson, J. Knuth, J. O'Kane, and S. LaValle, "Probabilistic localization with a blind robot," in IEEE International Conference on Robotics and Automation, pp. 1821–1827, May 2008.

All papers are available at <http://plaza.ufl.edu/knuth/Publications/>

SKILL PROFICIENCIES

Software/OS: Matlab, Mathematica, Windows, Mac, Linux

Programing Languages: Assembly, C, C++, Objective-C, VHDL, HTML, LaTeX

Relevant Coursework:

Major: Nonlinear/Adaptive Control Theory, Stochastic Control, Robot Geometry, Dynamics, Random Dynamical Systems

Mathematics: Analysis, Measure Theory, Probability Theory, Partial Differential Equations, Optimal Estimation, Theoretical Statistics, Differential Geometry

Computer Science: Algorithms, Artificial Intelligence, Machine Learning & Pattern Recognition

HONORS AND AWARDS

University of Florida Alumni Graduate Award, University of Florida
Department of Mechanical and Aerospace Engineering

2008 - Present