

# Nagavenkat Adurthi

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CONTACT INFORMATION Mechanical and Aerospace Engineering  
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EDUCATION **University at Buffalo, The State University of New York**

- **Ph.D.**, Mechanical Engineering, June 2013- October 2015  
Dissertation: “*Conjugate Unscented Transform Based Methods for Uncertainty Quantification, Nonlinear Filtering, Optimal Feedback Control and Dynamic Sensing*”.
- **M.S.**, Mechanical Engineering, August 2010- June 2013

**Indian Institute of Technology at Guwahati**, Guwahati, Assam India

- **B.Tech.**, Mechanical Engineering, August 2006 - May 2010

WORK EXPERIENCE ■ **Assistant Professor, Mechanical and Aerospace Engineering, University of Alabama in Huntsville**

August, 2019 -

Research Areas:

- Orbital Mechanics
- Dynamics, Guidance, Navigation and Control
- Multi-Sensor data fusion, Nonlinear Filtering and Data Association
- Computer Vision and Machine Learning
- Applications: Astrodynamics, Autonomous Systems and Robotics.

■ **Postdoctoral Research Associate, Aerospace Engineering, Texas A&M University, College Station, TX**

May, 2017 - July 2019

■ **Algorithms Engineer, Rithmio, Inc., University of Illinois at Urbana Champaign**

October, 2015 - February, 2017

- Mathematical and computational development of real time filtering.
- Machine learning based classifiers for pattern classification
- Embedded implementation of Feedback Particle filter and the Extended Kalman Filter.

HONORS AND AWARDS **Distinguished Master’s Thesis Award**, from the Northeastern Association of Graduate Schools (NEAGS), for my work on the Conjugate Unscented Transform.

**Excellent Reviewer** for Journal of Guidance, Control and Dynamics for the period 10/1/2015 - 08/30/2016

**Best Presentation Award** for the paper “Conjugate Unscented Transform Rules for Uniform Probability density functions” , 2013 American Control Conference, Washington, DC.

**Best Presentation Award** for the paper “Optimal Information Collection for Nonlinear systems- An Application to Multiple Target Tracking and Localization” , 2013 American Control Conference, Washington, DC.

ACADEMIC EXPERIENCE *Teaching: Texas A&M University, College Station*  
Undergraduate Course AE473(Spring 2018) Orbital Mechanics.

January - May, 2018

*Teaching: University at Buffalo*  
Co-taught the graduate course MAE674(Spring 2013) Stochastic Processes and Optimal Estimation.

January - May, 2012

*Graduate Student Research Assistant*  
Includes Ph.D. research, Ph.D. and Masters level coursework and research projects.

August, 2011 - February 2016

1. **Nagavenkat, A.** & Manoranjan, M., "Uncertain Lambert problem: A Probabilistic Approach", *Journal of Astronautical Sciences* (2019) (*submitted*)
2. **Nagavenkat A.**, Manoranjan, M., "Method of Characteristics based Nonlinear Filter: With Application to Space Object Tracking", (*in preparation for submission to Journal of Guidance, Control, and Dynamics*)
3. **Nagavenkat A.**, Singla P., Manoranjan, M., "Mutual Information based Sensor Tasking with Applications to Space Situational Awareness", (*submitted to Journal of Guidance, Control, and Dynamics*)
4. **Nagavenkat A.**, Manoranjan, M., Singla P., "Quadrature-Based Nonlinear Joint Probabilistic Data Association Filter", *Journal of Guidance, Control, and Dynamics*, American Institute of Aeronautics and Astronautics, 2019 Vol. 0, pp 1-13
5. **Adurthi N.**, Singla P, Singh T., "Conjugate Unscented Transformation: Applications to Estimation and Control". ASME. *Journal of Dynamic Systems, Measurement, and Control*, 140(3), 030907 , 2017
6. **Nagavenkat Adurthi**, Puneet Singla, and Manoranjan Majji. "Sparse ApproximationBased Collocation Scheme for Nonlinear Optimal Feedback Control Design", *Journal of Guidance, Control, and Dynamics*, Vol. 40, No. 2 (2017), pp. 248-264.
7. Zhang B, **Adurthi N.**, Rai R, Singla P. A Novel Sampling Technique for Probabilistic Static Coverage Problems. ASME. *J. Mech. Des.* 2016, vol 138, issue 3, pages 031403-031412.
8. **Nagavenkat A.**, Singla P., Conjugate Unscented Transformation-Based Approach for Accurate Conjunction Analysis, *Journal of Guidance, Control, and Dynamics*, American Institute of Aeronautics and Astronautics, pp 1642-1658, vol 38, 2015.
9. Salerno, Eric, **Nagavenkat Adurthi**, Tarunraj Singh, Puneet Singla, Adnan Bubalo, Maria Cornacchia, Mark Alford, and Eric Jones. "Road network identification by means of the Hough transform with uncertainty analysis." *Journal of Advances in Information Fusion* 10, no. 1 (2015): 58-72.

### *Conferences*

1. **N. Adurthi**, Majji, M., "Method of Characteristics based Nonlinear Filter: Applications to Space Object Tracking," paper AAS-18-321, AAS/AIAA Astrodynamics Specialist Conference, August 19-23, 2018
2. **N. Adurthi**, Mishra, U. R., Majji, M., Singla, P. "Multiple Hypothesis Tracking and Joint Probabilistic Data Association Filters for Multiple Space Object Tracking," paper AAS-18-451, AAS/AIAA Astrodynamics Specialist Conference, August 19-23, 2018
3. **Adurthi, N.**, Majji, M., Mishra, U. R., & Singla, P. "Conjugate unscented transform based joint probability data association", *Astrodynamics 2017* (Vol. 162, pp. 537-552). Univelt Inc.
4. M. Mercurio, **N Adurthi**, P. Singla and M. Majji, "A collocation-based approach to solve the finite horizon Hamilton-Jacobi-Bellman equation," 2016 American Control Conference (ACC), Boston, MA, 2016, pp. 3322-3327.
5. **Adurthi, N.**, P. Singla and M. Majji, "Conjugate Unscented Transform based approach for dynamic sensor tasking and Space Situational Awareness," 2015 American Control Conference (ACC), Chicago, IL, 2015, pp. 5218-5223.
6. **N. Adurthi**, Puneet Singla, and Manoranjan Majji. "Conjugate Unscented Transformation Based Orbital State Estimation and Sensor Tasking for Efficient Space Surveillance," AIAA/AAS Astrodynamic Specialist Conference, AIAA Space Forum, (AIAA 2014-4168)
7. **N. Adurthi**, Singla P., "Principle of Maximum Entropy for Probability Density Reconstruction: An Application to the Two Body Problem," AAS/AIAA Astrodynamics Specialist Conference, August 13-15, 2013
8. **N. Adurthi**, Singla P., "Information Driven Optimal Sensor Control for Efficient Target Localization and Tracking," 2014 American Control Conference, Portland, OR, 2014, pp. 610-615.
9. **N. Adurthi**, Singh T., "Minimum Entropy open loop Control for Linear Dynamical Systems with Uncertain Parameters," 2014 American Control Conference, Portland, OR, 2014, pp. 4274-4279.
10. **N. Adurthi**, Singla P., Singh T., "Conjugate Unscented Transform Rules for Uniform Probability density functions," 2013 American Control Conference, Washington, DC, 2013, pp. 2454-2459.

11. **N. Adurthi**, Singla P., Singh T., “Optimal Information Collection for Nonlinear systems- An Application to Multiple Target Tracking and Localization,” Proceedings of the American Control Conference, Washington , June 17-June 19, 2013
12. **N. Adurthi**, Singla P., Singh T., “The Conjugate Unscented Transform and its Application to Filtering and Stochastic Integral Calculation,” 2012 AIAA Guidance, Navigation and Control Conference, Montreal, QC, August 12-August 16, 2012
13. **N. Adurthi**, Singla P., Singh T., “The Conjugate Unscented Transform-An Approach to Evaluate Multi-Dimensional Expectation Integrals,” 2012 American Control Conference (ACC), Montreal, QC, 2012, pp. 5556-5561. *CUT Quadrature Points*: <https://github.com/nadurthi/CUTpoints>

WORKSHOPS: **IEEE CASE 2016**, Conference on Automation Science and Engineering

*Uncertainty Quantification: Methods and Application to Dynamical Systems*

**August, 2016**

<http://case2016.org/workshops-and-tutorials/>

Organized and co-chaired the workshop on Uncertainty Quantification. Topics of my talk included:

- Quadrature methods and Filtering methods,
- Space Object density and moments estimation
- Data Assimilation and Uncertainty Propagation
- Numerical methods and Approximations theory