

CURRICULUM VITAE

Jason Rife, Ph.D.

Associate Professor
Department of Mechanical Engineering
Tufts University
Medford, MA 02155

office: 617-627-4732
fax: 617-627-3058
email: jason.rife@tufts.edu
web: <http://sites.google.com/a/tufts.edu/asar/>

EDUCATION

- 2004 **Stanford University, Stanford, CA**
Ph.D. in Mechanical Engineering
Thesis: *Automated Robotic Tracking of Gelatinous Animals in the Deep Ocean*
- 1999 **Stanford University, Stanford, CA**
M.S. in Mechanical Engineering
- 1996 **Cornell University, Ithaca, NY**
B.S. in Mechanical and Aerospace Engineering

ACADEMIC APPOINTMENTS

- Tufts University, Medford, MA**
- 2013- Associate Professor, Department of Mechanical Engineering
2014- Secondary Appointment, Department of Electrical Engineering
2015-16 Associate Dean of Undergraduate Education, School of Engineering (Interim)
2007-13 Assistant Professor, Department of Mechanical Engineering

RESEARCH EXPERIENCE

- 2007- **Tufts University, Medford, MA**
- Researching safety enhancement and verification for automated GPS-based aircraft landing
 - Developing automated bug-detection algorithms for aviation software
 - Pursuing novel state-estimation methods and applications
- 2003-07 **Hansen Experimental Physics Laboratories, Stanford University, Stanford, CA**
Research Engineer, Stanford Global Positioning System (GPS) Lab
- Mentored team of graduate student researchers investigating the integrity of the Joint Precision Approach and Landing System (JPALS), a technology for safely landing U.S. military aircraft
 - Researched conservative error bounding approaches, with application to the Federal Aviation Administration's (FAA) Local Area Augmentation System (LAAS). Served as a key technical advisor to the FAA for review of LAAS development by the FAA's industrial partners.
- 1999-03 **Department of Mechanical Engineering, Stanford University, Stanford, CA**
Research Assistant, Stanford Aerospace Robotics Lab and Monterey Bay Aquarium Research Institute (MBARI)
- Innovated visual sensing and control algorithms for robotic animal tracking in the deep-ocean
 - Coordinated technology transfer of research software for field use by MBARI

- 1997-99 **Department of Mechanical Engineering, Stanford University, Stanford, CA**
Research Assistant, Center for Turbulence Research
- Studied reacting flows and numerical methods for fluid dynamics computation
 - Researched numerical methods (1) to minimize dump combustor NO_x emissions and (2) to capture acoustic-chemistry interactions for low Mach number combustor flows
- 1995-96 **Department of Mechanical and Aerospace Engineering, Cornell, Ithaca, NY**
Undergraduate Researcher, Experimental Fluid Mechanics
- Led project team to design and implement a portable water channel for classroom instruction
 - Performed wind tunnel experiments studying scalar field transport in the presence of intense turbulence created by an active grid
- 1995 **Thayer School of Engineering, Dartmouth College, Hanover, NH**
Research Assistant, Mechanical Engineering Department
- Designed and performed wind tunnel experiments to measure the lateral “drift” force on bluff bodies placed in weak shear flows

TEACHING EXPERIENCE

- 2007- **Tufts University, Medford, MA**
- ES-101: Numerical Methods
 - ME-1: Mechanical Design and Fabrication
 - ME-37: Dynamics and Vibrations
 - ME-80: System Dynamics and Control
 - ME-84: Introduction to Robotics and Mechatronics
 - ME-149: Lincoln Lab Research
 - ME-180: Digital Control of Dynamic Systems
 - ME-181: Advanced Dynamics and Vibrations
 - ME-184: Robotics
 - ME-280: Advanced Controls
 - ME-282: Optimal Control and State Estimation
- 2005 **School of Engineering, Santa Clara University, Santa Clara, CA**
Lecturer in Mechanical Engineering
- Developed and taught a master’s level course entitled Vision Systems for Robotic Applications (Course Web Site: <http://www.engr.scu.edu/~jrife/>)
 - Assisted as a guest lecturer in Dynamics and Controls for Ocean Engineering
- Department of Aeronautics and Astronautics, Stanford University, Stanford, CA**
- 2003-07 Research Associate, Stanford GPS Lab
- Supervised the research of six Ph.D. students in the GPS lab
- 2000-02 Student Director of Young Astronauts Program, Sponsored by AIAA
- Coordinated and taught hands-on science classes for local 3rd and 4th grade students
- 1995-96 **Cornell Outdoor Education Program, Cornell University, Ithaca, NY**
Instructor, Cornell Outdoor Education
- Taught undergraduate course, Basic Cross-Country Skiing

PROFESSIONAL EXPERIENCE

- 1997 **Pratt & Whitney, East Hartford, CT**
Development Engineer, Turbine Aerodynamics Group
- Analyzed test stand data for PW4098 engine development program
 - Coordinated design and implementation of a software tool to automate information transfer between two existing simulation codes (turbine cooling air and turbine aerodynamics)
- 1994-95 **Solomon Software, Findlay, OH**
Programmer
- Wrote commercial code to support foreign currency management for Solomon's next generation accounting package

HONORS AND AWARDS

- 2018 Invited Speaker, International Technical Symposium on Navigation and Timing (ITSNT 2018), Ecole Nationale de L'Aviation Civile, Toulouse, France.
- 2017 Invited Speaker, Connected & Autonomous Vehicle Summer School (CONAV 2017), Worcester Polytechnic Institute, Worcester, MA.
- 2015 Best of Session Award, Institute of Navigation GNSS Conference (GNSS+ 2015), Tampa, FL.
- 2014 Best of Track Award, ION/IEEE Position, Location, and Navigation Symposium (PLANS 2014), Monterey, CA.
- 2012 Best of Session Award, Institute of Navigation GNSS Conference (ION-GNSS 2012), Nashville, TN.
- 2012 Best of Track Award, ION/IEEE Position, Location, and Navigation Symposium (PLANS 2012), Myrtle Beach, SC.
- 2012 ASME Award of Excellence for Teaching, Tufts Chapter
- 2010 Named Research Associate for Mineta Transportation Institute (DoT)
- 2008 Best of Session Award, ION Global Navigation Satellite Systems (GNSS 2008), Savannah, GA.
- 1997-99 Stanford Graduate Fellow, Stanford School of Engineering
- 1997-99 Graduate Research Fellow, National Science Foundation
- 1994 Van Dyke Book Prize, Cornell University
Awarded to the top student in M&AE 323, *Introduction to Fluid Mechanics*
- 1993 John McMullen Dean's Scholar, Cornell University
- 1993 National Merit Scholar

JOURNAL PUBLICATIONS

Submitted or Accepted

1. **J.H. Rife**, H. Huang, and S.Z. Guyer (submitted, 2018). Applying sensor integrity concepts to detect intermittent bugs in aviation software, submitted to *NAVIGATION*. First published in *Proc. ION GNSS+ 2018*, Miami, Florida.
2. J.S. Parker and **J.H. Rife** (submitted, 2018). Signal and data structure for navigation with a terahertz interferometer, submitted to *NAVIGATION*. First published in *Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2017)*, Portland, OR.

Published

3. J. Larson, D. Gebre-Egziabher, and **J.H. Rife** (2019). Multivariate error overbounding with a Gaussian-pareto model. *AIAA J. Aerospace Information Systems*. doi: 10.2514/1.I010675
4. J. Larson, D. Gebre-Egziabher, and **J.H. Rife** (2019). Gaussian-pareto overbounding of DGNS pseudoranges from CORS, *NAVIGATION*, 66(1), pp. 139-150, doi: 10.1002/navi.276
5. **J.H. Rife** (2018). Overbounding risk for quadratic monitors with arbitrary noise distributions, in press by *IEEE Transactions on Aerospace & Electronic Systems*, 54(4), pp. 1618-1627, doi: 10.1109/TAES.2018.2798258.
6. **J.H. Rife** (2018). Cylindrical overbounding for quadratic integrity monitors with non-Gaussian inputs, *GPS Solutions*, 22(1), doi: 10.1007/s10291-017-0692-8.
7. **J.H. Rife** and J.S. Parker (2018). Comparing geometric approximations of heavy-tail effects for chi-square integrity monitors, *NAVIGATION*, 65(3), pp. 363-376, doi: 10.1002/navi.255. First published as "Geometric approximations of heavy-tail effects for chi-square integrity monitors," in *Proc. ION International Technical Meeting (ION ITM 2017)*, Monterey, CA.
8. **J.H. Rife** (2017). Robust chi-square monitor performance with noise covariance of unknown aspect-ratio, *NAVIGATION* 64(3), pp. 377-389. First published in *Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2016)*, Portland, OR.
9. T. Leung and **J.H. Rife** (2017). Refining fault trees using aviation definitions for consequence severity. *IEEE Aerospace and Electronics Magazine*, 32(3), pp. 4-14, doi: 10.1109/MAES.2017.150171.
10. T. Leung, **J.H. Rife**, P. Seiler, and R. Venkataraman (2017). Comparison of fault-tree models for fault detection, isolation, and recovery algorithms. *AIAA J. Aerospace Information Systems*, 14(9), pp. 517-522, doi: 10.2514/1.I010522.
11. **J. Rife** (2016). Convergence of distributed localization with alternating normals. *IEEE Transactions on Robotics*, 32(5):1280-1284. doi: 10.1109/TRO.2016.2593026.
12. **J. Rife** (2016). Overbounding false-alarm probability for a chi-square monitor with natural biases. *NAVIGATION*, 63(4):453-464. First published in *Proc. ION Global navigation Satellite Systems (ION GNSS+ 2015)*, Tampa, FL. **Best of session award (Session C3)**.
13. J.S. Parker, P. Mickelson, J. Yeak, K. Kremeyer, **J. Rife** (2016). Exploiting the terahertz band for radionavigation. *Journal of Infrared, Millimeter, and Terahertz Waves*, 37(10):1021-1042. doi: 10.1007/s10762-016-0291-8.
14. D. Schuldt, **J. Rife**, and B. Trimmer (2015). Template for robust soft-body crawling with reflex-triggered gripping, *Bioinspiration and Biomimetics*, 10(1), doi:10.1088/1748-3190/10/1/016018.
15. **J. Rife** (2015). Comparing performance bounds for chi-square monitors with parameter uncertainty. *IEEE Transactions on Aerospace & Electronic Systems*, 51(3):2379-2389. doi: 10.1109/TAES.2015.140638.
16. O. Osechas and **J. Rife** (2014). Distributed ionosphere monitoring by collaborating mobile receivers, *IEEE Transactions on Aerospace & Electronic Systems*, 50(4), pp. 2860-2869. doi:10.1109/TAES.2014.120843. First published in *Proc. ION Global Navigation Satellite Systems (ION GNSS 2012)*, Nashville, TN.
17. F. Saunders and **J. Rife** (2014). Embedding desired eigenstates into active and passive dynamics of a linear, under-actuated feedback system. *ASME Journal of Mechanical Design*, 136(7), doi:10.1115/1.4025295.
18. F. Saunders, **J. Rife**, V.S. Vaddi, and V. Cheng (2013). Information flow diagram analysis of a model cyber-physical system: conflict detection and resolution for airport surface traffic. *IEEE Aerospace and Electronics Magazine*, 28(12), pp. 26-35. doi: 10.1109/MAES.2013.6693666

19. **J. Rife** (2013). Collaborative positioning for formation flight. *AIAA Journal of Guidance, Control, and Dynamics*, 36(1), pp. 304-307. doi: 10.2514/1.55834.
20. **J. Rife** (2013). The effect of uncertain covariance on a chi-square integrity monitor. *NAVIGATION*, 60(4), pp. 291-304.
21. D. De Lorenzo, S. Lo, P. Enge, and **J. Rife** (2012). Calibrating adaptive antenna arrays for high-integrity GPS. *GPS Solutions*, 16(2), pp. 221-230.
22. C. Mario and **J. Rife** (2012). Integrity and continuity for automated surface conflict-detection monitoring. *IEEE Transactions on Intelligent Transportation Systems*, 13(3), pp. 1179-1187, doi: 10.1109/TITS.2012.2187053. First published in as "Integrity and continuity for automated surface conflict-detection monitoring," *Proc. Integ. Communication, Navigation and Surveillance (ICNS)*, Herndon, VA.
23. O. Osechas, P. Misra, and **J. Rife** (2012). Carrier-phase acceleration RAIM for GNSS satellite clock fault detection. *NAVIGATION, the Journal of the Institute of Navigation*, 59(3), pp. 221-235.
24. **J. Rife** (2012). Collaborative vision-integrated pseudorange error removal: team-estimated differential GNSS corrections with no stationary reference receiver. *IEEE Transactions on Intelligent Transportation Systems*, 13(1), pp. 15-24.
25. **J. Rife** and P. Misra (2012). Impact of time-correlation of monitor statistic on continuity of safety-critical operations. *NAVIGATION, the Journal of the Institute of Navigation*, 59(4), pp. 303-315. First published under the same title in *Proc. ION GNSS 2011*, Portland, OR.
26. **J. Rife** and B. Pervan (2012). Overbounding revisited: discrete-error distribution modeling for safety-critical GPS navigation. *IEEE Transactions on Aerospace and Electronic Systems*, 48(2), pp. 1537-1551. First published as "Overbounding revisited: toward a more practical approach for error modeling in safety-critical applications" in *Proc. ION Global Navigation Satellite Systems (GNSS 2009)*, Savannah, GA.
27. S. Sen and **J. Rife** (2012). Nonlinear filter for ionosphere divergence error in LAAS. *IEEE Transactions on Aerospace and Electronic Systems*, 48(2), pp. 981-990, doi: 10.1109/TAES.2012.6178043. First published under the title "Reduction of ionosphere divergence error in GPS code measurement smoothing by use of a non-linear process" in *Proc. ION/IEEE Position, Location, and Navigation Symposium (PLANS)*, 2008, Monterey, CA.
28. F. Saunders, E. Golden, R. White, and **J. Rife** (2011). Experimental verification of soft-robot gaits evolved using a lumped dynamic model. *Robotica*, 29(6), pp. 823-830. doi: 10.1017/S0263574711000014.
29. F. Saunders, B. Trimmer, and **J. Rife** (2011). Modeling locomotion of a soft bodied arthropod using inverse dynamics. *Bioinspiration and Biomimetics*, 6(1), March 2011, 9 pp., doi: 10.1088/1748-3182/6/1/016001.
30. **J. Rife** (2009). Influence of GNSS integrity monitoring on risk probabilities for single and multiple fault events. *NAVIGATION, the Journal of the Institute of Navigation*, 56(4), Winter 2009, pp. 275-288. First published under the title "Influence of GNSS integrity monitoring on single and multiple fault event probabilities" in the *Proc. ION Global Navigation Satellite Systems (GNSS 2008)*, Savannah, GA, where it won the **BEST of Session Award, Session B1: Integrity of Multi-Constellation RAIM**.
31. **J. Rife** and S. Sen (2009). Limits of linear, single-frequency filter for minimizing ionosphere divergence error. *NAVIGATION, the Journal of the Institute of Navigation*, 56(2), Summer 2009, pp. 123-134. First published under the title "Design of a single-frequency filter that minimizes ionosphere divergence error" in the *Proc. ION Global Navigation Satellite Systems (GNSS 2007)*, Fort Worth, TX.
32. **J. Rife**, S. Khanafseh, S. Pullen, D. De Lorenzo, U. Kim, M. Koenig, T. Chiou, B. Kempny, and B. Pervan (2008). Navigation, interference suppression, and fault monitoring in the sea-based joint

- precision approach and landing system. *Proceedings of the IEEE*, 96(12), December 2008, pp. 1958-1975.
33. **J. Rife** and R.E. Phelts (2008). Formulation of a time-varying maximum allowable error for ground-based GPS augmentation systems. *IEEE Transactions on Aerospace and Electronic Systems*, 44(2), April 2008, pp. 548-560. First published under the same title in the *Proc. ION National Technical Meeting*, 2006, Monterey, CA.
 34. **J. Rife** and D. Gebre-Egziabher (2007). Symmetric overbounding of correlated errors. *NAVIGATION, the Journal of the Institute of Navigation*, 54(2), Summer 2007, pp. 109-124. First published under the same title in the *Proc. ION Global Navigation Satellite Systems*, 2006, Fort Worth, TX.
 35. **J. Rife**, S. Pullen, B. Pervan, and P. Enge (2006). Paired overbounding for nonideal LAAS and WAAS error distributions. *IEEE Transactions on Aerospace and Electronic Systems*, 42(4), October 2006, pp. 1386-1395. First published under the same title in the *Proc. IEEE Position, Location and Navigation Symposium*, 2004, Monterey, CA.
 36. Y. Yun, C. Kee, **J. Rife**, M. Luo, S. Pullen and P. Enge (2006). Detecting RFI through integrity monitoring at a DGPS reference station. *Journal of Navigation*, 59(3), September 2006, pp. 403-422. First published under the same title in the *Proc. ION Annual Meeting*, 2005, Boston, MA.
 37. **J. Rife** and S.M. Rock (2006). Design and validation of a robotic control law for observation of deep-ocean jellyfish. *IEEE Transactions on Robotics*, 22(2), April 2006, pp. 282-291.
 38. **J. Rife** and S. Pullen (2006). The impact of measurement biases on availability for CAT III LAAS. *NAVIGATION, the Journal of the Institute of Navigation*, 52(4), Winter 2006, pp. 215-228. First published under the same title in the *Proc. ION Annual Meeting*, 2005, Boston, MA.
 39. T. Walter, J. Blanch, and **J. Rife** (2004). Treatment of Biased Error Distributions in SBAS. *Journal of Global Positioning Systems*, 3(1-2), pp. 265-272. First published under the same title in the *Proc. Internat. Symp. On GNSS/GPS*, 2004, Sydney, Australia.
 40. **J. Rife** and S.M. Rock (2003). Segmentation methods for visual tracking of deep ocean jellyfish using a conventional camera. *IEEE Journal of Ocean Engineering*, 28(4), pp. 595-608.
 41. **J. Rife**, J. He, Y. Song, and G.B. Wallis (1997). Measurements of the drift force. *Nuclear Engineering and Design*, 175(1-2), pp. 71-76.

REFEREED CONFERENCE PUBLICATIONS

Excluding papers subsequently submitted to refereed journals (see above)

1. H. Huang, S.Z. Guyer, and **J.H. Rife** (2017). Improving run-time bug detection in CPS software using program slicing, *Proc. IEEE-Cyber 2017*, Waikiki Beach, HI, doi: 10.1109/CYBER.2017.8446584.
2. J.S. Parker and **J.H. Rife** (2017). Relative position estimates from terahertz observables, *Proc. ION International Technical Meeting (ION ITM 2017)*, Monterey, CA.
3. **J.H. Rife** (2017). Derivation of spherical overbounding for quadratic integrity monitors with non-Gaussian random inputs, *Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2017)*, Portland, OR.
4. H. Huang, S. Guyer, and **J. Rife** (2016). Applying machine learning for run-time bug detection in aviation software. *Proc. AIAA Infotech @ Aerospace, AIAA Science and Technology Forum and Exposition 2016*, San Diego, CA, doi: 10.2514/6.2016-0482.
5. Z. Serlin, **J. Rife**, and M. Levin (2016). A level set approach to simulating *Xenopus laevis* tail regeneration, *Proc. Int. Conf. on Synthesis and Simulation of Living Systems (ALIFE XV)*, Cancun, Mexico.

6. L. Yang and **J. Rife** (2016). Estimating Covariance Models for Collaborative Integrity Monitoring, Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2016), Portland, OR
7. **J. Rife** (2015). Design of a distributed localization algorithm to process angle-of-arrival measurements. *Proc. IEEE Technologies for Practical Robot Applications (TEPRA)*, Woburn, MA.
8. G. Vukasin and **J. Rife** (2015). Decentralized position and attitude estimation using angle-of-arrival measurements, in *Proc. ION Global navigation Satellite Systems (ION GNSS+ 2015)*, Tampa, FL.
9. D. Schuldt and **J. Rife** (2014). Generation of limit cycles in hybrid systems consisting of two linear subsystems. *Proc. American Control Conference (ACC) 2014*, Portland, OR.
10. **J. Rife** and D. Schuldt (2014). Minimum volume ellipsoid scaled to contain a tangent sphere, with application to integrity monitoring. *Proc. IEEE/ION Position, Location, and Navigation Symposium (PLANS 2014)*, Monterey, CA.
11. **J. Rife** (2014). Simultaneous position estimation & ambiguity resolution (SPEAR) for high-integrity carrier phase navigation with robustness to tracking loss. *Proc. IEEE/ION Position, Location, and Navigation Symposium (PLANS 2014)*, Monterey, CA.
12. Q. Liu, O. Osechas, and **J. Rife** (2012). Optical flow measurement of human walking. *Proc. IEEE/ION Position, Location, and Navigation Symposium (PLANS 2012)*, Myrtle Beach, SC.
13. **J. Rife** (2012). Collaboration-enhanced receiver integrity monitoring with common residual estimation. *Proc. IEEE/ION Position, Location, and Navigation Symposium (PLANS 2012)*, Myrtle Beach, SC. **BEST of track award (Track D)**.
14. F. Saunders and **J. Rife** (2011). Defining shapeability in eigenstate specification for linear systems. *Proc. ASME Dynamic Systems and Control Conference 2011*, Arlington, VA.
15. **J. Rife** (2011). Collaboration-Enhanced Receiver Integrity Monitoring (CERIM). *Proc. Intelligent Transportation Systems Conference (ITSC) 2011*, Washington, DC.
16. S. McHugh, F. Saunders, and **J. Rife** (2009). Dynamics-based design of a soft robot. *Proc. ASME 2009 International Mechanical Engineering Congress & Exposition (IMECE 2009)*, Lake Buena Vista, FL.
17. F. Saunders, J. Rieffel, **J. Rife** (2009). A method of accelerating convergence for genetic algorithms evolving morphological and control parameters for a biomimetic robot. *Proc. International Conference on Autonomous Robots and Agents 2009*, Wellington, New Zealand.

NON-REFEREED CONFERENCE PROCEEDINGS

Excluding papers subsequently submitted to refereed journals (see above)

1. J. Lueck, **J. Rife**, S. Swarup, and N. Uddin (in preparation, 2019). Who goes there? Using an agent-based simulation for tracking population movement. *Proc. 2019 Winter Simulation Conference*, National Harbor, MD.
2. B. Weaver, T. Bogner, J.A. Soltz, and **J. Rife** (submitted, 2019). GPS-Based attitude determination of a rotating body using single-antenna subject to phase wind-up. *Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2019)*, Miami, FL.
3. L. Xu and **J. Rife** (submitted, 2019). NLOS and multipath detection using Doppler shift measurements. *Proc. ION Global Navigation Satellite Systems+ (ION GNSS+ 2019)*, Miami, FL.
4. L. Xu and **J.H. Rife** (2018). Doppler-aided line-of-sight identification and localization in future cellular networks, accepted to *Proc. ION GNSS+ 2018*, Miami, Florida.
5. P. Misra and **J. Rife** (2013). RAIM with non-Gaussian errors. *Proc. ION Global Navigation Satellite Systems (ION GNSS+ 2013)*, Nashville, TN. **Best of session award (Session C5)**.
6. O. Osechas and **J. Rife** (2013). Tightening DGNSS protection levels using direct position-domain bounding. *Proc. ION Global Navigation Satellite Systems (ION GNSS+ 2013)*, Nashville, TN.

7. J.S. Parker and **J. Rife** (2013). Precise bearing determination for formation flight using terahertz signals. *Proc. ION Pacific PNT Meeting 2013*, Honolulu, HI.
8. **J. Rife** (2012). Overbounding missed-detection probability for a chi-square monitor. *Proc. ION Global Navigation Satellite Systems (ION GNSS 2012)*, Nashville, TN. **BEST of session award (Session C3)**.
9. C. Mario and **J. Rife** (2010). Integrity monitoring of vision-based automotive lane detection methods. *Proc. ION Global Navigation Satellite Systems (GNSS 2010)*, Portland, OR. **BEST of Session Award, Session C1a: Autonomous Vehicles**.
10. **J. Rife** and X. Xiao (2010). Estimation of spatially correlated errors in vehicular collaborative navigation with shared GNSS and road-boundary measurements. *Proc. ION Global Navigation Satellite Systems (GNSS 2010)*, Portland, OR.
11. K. O'Brien and **J. Rife** (2010). Rigorous bounding of position error estimates for aircraft surface movement. *Proc. Integration Communication, Navigation and Surveillance (ICNS)*, Herndon, VA, where it was awarded **BEST Student Paper of the Conference**.
12. K. O'Brien and **J. Rife** (2009). Propagating integrity bounds in nonlinear state estimation. *Proc. ION Global Navigation Satellite Systems (GNSS 2009)*, Savannah, GA.
13. J. Rieffel, F. Saunders, S. Nadimpalli, H. Zhou, S. Hassoun, **J. Rife** and B. Trimmer (2009). Evolving soft robotic motion in PhysX. *Proc. Genetic and Evolutionary Computation Conference (GECCO)*, Montreal, Canada.
14. **J. Rife**, S. Pullen, and P. Enge (2007). Evaluating fault-mode protection levels at the aircraft in Category III LAAS. *Proc. ION Annual Meeting*, Cambridge, MA.
15. D.S. De Lorenzo, **J. Rife**, P. Enge, and D. Akos (2006). Navigation accuracy and interference rejection for an adaptive GPS antenna array. *Proc. ION Global Navigation Satellite Systems (GNSS 2006)*, Fort Worth, TX.
16. H. Konno, S. Pullen, **J. Rife**, and P. Enge (2006). Ionosphere monitoring methodology for hybrid dual-frequency LAAS. *Proc. ION Global Navigation Satellite Systems (GNSS 2006)*, Fort Worth, TX.
17. G. Phanomchoeng, D. Gebre-Egziabher, and **J. Rife** (2006). A numerical procedure for approximating overbounds on navigation systems error distributions. *Proc. ION Global Navigation Satellite Systems (GNSS 2006)*, Fort Worth, TX.
18. **J. Rife**, S. Pullen, T. Walter, E. Phelts, B. Pervan and P. Enge (2006). WAAS-based threat monitoring for a local airport monitor (LAM) that supports category I precision approach. *Proc. ION/IEEE Position, Location, and Navigation Symposium (PLANS)*, San Diego, CA.
19. S. Pullen, **J. Rife** and P. Enge (2006). Prior probability model development to support system safety verification in the presence of anomalies. *Proc. ION/IEEE Position, Location, and Navigation Symposium (PLANS)*, San Diego, CA.
20. J. Seo, **J. Rife**, S. Pullen, T. Walter, and P. Enge (2006). Field Data Analysis for a Range-Based Local Airport Monitor for WAAS. *Proc. ION National Technical Meeting*, Monterey, CA.
21. H. Konno, S. Pullen, **J. Rife**, and P. Enge (2006). Evaluation of two types of dual-frequency differential GPS techniques under anomalous ionosphere conditions. *Proc. ION National Technical Meeting*, Monterey, CA.
22. D.S. De Lorenzo, J. Gautier, **J. Rife**, P. Enge, and D. Akos (2005). Adaptive array processing for GPS interference rejection. *Proc. ION Global Navigation Satellite Systems (GNSS 2005)*, Long Beach, CA.
23. M. Koenig, **J. Rife**, S. Pullen, and P. Enge (2005). Optimizing channel selection for the JPALS' Land-Based Integrity Monitor. *Proc. ION Global Navigation Satellite Systems (GNSS 2005)*, Long Beach, CA.

24. T. Walter, S. Pullen, **J. Rife**, P. Enge, and J. Seo (2005). The advantages of local monitoring and VHF data broadcast for SBAS. *Proc. European Navigation Conference GNSS 2005*, Munich, Germany.
25. **J. Rife**, S. Pullen, T. Walter, and P. Enge (2005). Vertical protection levels for a local airport monitor for WAAS. *Proc. ION Annual Meeting*, Cambridge, MA.
26. M. Koenig, **J. Rife**, J. Gautier, S. Pullen, and P. Enge (2005). Development of the JPALS land-based integrity monitoring system. *Proc. ION National Technical Meeting*, San Diego, CA.
27. **J. Rife**, T. Walter, and J. Blanch (2004). Overbounding SBAS and GBAS error distributions with excess-mass functions. *Proc. 2004 Internat. Symp. On GNSS/GPS*, Sydney, Australia.
28. **J. Rife**, S. Pullen and B. Pervan (2004). Core overbounding and its implications for LAAS integrity. *Proc. ION Global Navigation Satellite Systems (GNSS 2004)*, Long Beach, CA.
29. **J. Rife** and S.M. Rock (2002). Field experiments in the control of a jellyfish tracking ROV. *Proc. IEEE/MTS OCEANS 2002*, Biloxi, MS, vol. 4.
30. **J. Rife** and S.M. Rock (2001). A pilot aid for ROV based tracking of gelatinous animals in the midwater. *Proc. IEEE/MTS OCEANS 2001*, Honolulu, HI.
31. **J. Rife** and S.M. Rock (2001). A low-energy sensor for AUV-based jellyfish tracking. *Proc. of the 12th International Symposium on Unmanned Untethered Submersible Technology*, Hanover, NH.
32. **J. Rife** and S.M. Rock (2001). Visual tracking of jellyfish *in situ*. *Proc. Intl. Conf. Image Processing*, IEEE, Thessaloniki, Greece.

PATENTS

1. **J. Rife** (2017). System and method for wireless collaborative verification of global navigation satellite system measurements. *U.S. Patent No. 9,720,095*. Washington, DC: U.S. Patent and Trademark Office. <https://patents.google.com/patent/US9720095B2/en>

OTHER ARTICLES

1. **J. Rife** and S. Pullen (2009). Aviation applications. *GNSS Applications and Methods*, S. Gleason and D. Gebre-Egziabher, Eds. Artech House.
2. S. Pullen and **J. Rife** (2009). Differential GNSS: accuracy and integrity. *GNSS Applications and Methods*, S. Gleason and D. Gebre-Egziabher, Eds. Artech House.
3. **J. Rife**, C. Tomlin, and P. Enge (2008). Scanning the issue: special issue on aviation information systems. *Proceedings of the IEEE*, 96(12), December 2008, pp. 1898-1901.
4. **J. Rife** (2008). GNSS Solutions: Do GNSS augmentation systems certified for aviation use, such as the GPS Wide Area Augmentation System (WAAS), have a function other than improving the accuracy of user navigation? *Inside GNSS*, 3(4), May/June 2008, pp. 18-22.

STUDENT PAPERS

5. L. Xu (2017). A compact, lightweight sensor to measure bearing angle to a radio transmitter. *Proc. ION Global Navigation Satellite Systems+ (GNSS+ 2017)*, Portland, OR. **Student Paper Award.**
6. J.S. Parker (2016). Interferometry for bearing angle measurement. *Proc. ION Global Navigation Satellite Systems+ (GNSS+ 2016)*, Portland, OR. **Student Paper Award.**
7. O. Osechas (2011). GPS satellite clock excessive acceleration detection for DCPS users of GBAS. *Proc. ION Global Navigation Satellite Systems (GNSS 2011)*, Portland, OR. **Student Paper Award.**

UNPUBLISHED WORK

8. D. Guri, J.R. Caccamo, and **J.H. Rife** (2017). Tuning Automated Deceleration to Support Intermittently Distracted UAV Operators, report for *Center for Applied Brain and Cognitive Sciences*.
9. D. Schuldt and **J. Rife** (2015). Allocation of a swarm of robots to a chain of sequentially interdependent tasks of arbitrary length, report for *National Science Foundation – Control Systems*.
10. F. Saunders and **J. Rife** (2013). Modal/Eigenstate Determination for Reoccurring Dynamics. Released online at:
https://sites.google.com/a/tufts.edu/asar/Home/Saunders_MEDFRD_Overview.pdf?attredirects=0.

FUNDING PROFILE

- PI, *CPS: Small: Software-State Observability in CPS*, NSF. \$499,986. From 1/1/2019-12/31/2021.
- PI, *Draper Lab Fellowship (Weaver)*, Draper. \$49,092. From 9/1/2018-5/31/2019.
- PI, *CPS: Synergy: Collaborative Research: Managing Uncertainty in the Design of Safety-Critical Aviation Systems*, NSF. \$396,719. 10/1/2013-3/31/2018.
- PI, *Gift in Support of Automated Systems and Robotics Lab*, Mitsubishi Electric Research Laboratories (MERL). \$45,000. From 4/6/2015-4/5/2018.
- PI, *GBAS Continuity and Integrity of SDM, IGM, and GAST-D*, FAA. \$287,032. From 10/1/2015-12/31/2017.
- PI, *Evaluation of Continuously Adjustable Autonomy for Line-of-Site Navigation of a Small Quadrotor*, Tufts CABCS. \$59,234. From 06/01/2016-05/31/2017.
- PI, *Limit-Cycle Control for Soft, Caterpillar Inspired Robots*, NSF. \$272,990. From 2/1/2012-1/31/2015.
- PI, *Risk Analyses to Enhance GBAS Performance for NextGen Applications*, FAA. \$439,946. From 6/1/2010-11/27/2014.
- PI, *Intel Galileo University Donation*, Intel. \$1,116. Hardware donation.
- PI, *Draper Lab Fellowship (Kline)*, Draper. \$80,246. From 9/1/2012-8/31/2014.
- PI, *Draper Lab Fellowship (Alexander)*, Draper. \$79,437. From 9/1/2011-5/31/2013.
- PI, *Vision-based Automation for Automotive Safety*, BMW. \$5,000. From 6/30/2009-12/31/2009.
- Institutional PI, *Blue Line Power Storage Analysis*, Massachusetts Clean Energy Center (MassCEC). Subcontract through Helix Power Corporation. \$17,426. 10/1/2017-6/30/2018.
- Institutional PI, *SBIR: Improved Station Keeping Equipment*, DoD-AFRL. Subcontract through PM&AM Research, LLC. Phase I: \$25,000. From 1/1/2011-9/30/2011. Phase II: \$179,735. From 3/1/2012-10/23/2014.
- Institutional PI, *SBIR: Safety Enhancement Technologies for Airport Ramp Area Operations*, NASA. Subcontract through Optimal Synthesis, Inc. \$20,000. From 3/1/2012-8/30/2012.
- Institutional PI, *Surface Conflict Detection and Resolution with Emphasis on Trajectory-Based Operations*, NASA. Subcontract: Optimal Synthesis, Inc. \$176,074. From 6/24/2010-6/23/2012.
- Institutional PI, *Laser-Based Aircraft Diversion*, DoD-Joint Nonlethal Weapons Program. Subcontract through PM&AM Research, LLC. \$128,154. From 9/1/2010-4/26/2011.
- Co-I, *CPS: An Adaptive System Identification Approach Using Mobile Sensors*, NSF. \$449,900. From 6/1/2019-5/31/2022. PI: Babak Moaveni, Tufts University.

Participant, *Enabling Trusted Human-Like Artificial Teammates*. AFOSR. \$4,994,571. From 9/1/2018-8/31/2023. PI: Matthias Scheutz, Tufts University.

Participant, *IGERT: Soft Robotics*. NSF. \$ 2,721,439. From 7/1/2012-6/30/2017. PI: Barry Trimmer, Tufts University.

Participant, *Awards to Enhance Collaborative Research: Soft Tissue Measurement and Modeling for Surgical Simulation and Visualization*. Tufts School of Engineering. \$5,000. 6/15/2008-6/14/2009. PI: Caroline Cao, Tufts University.

Participant, *Chemical Robots: Morphing, soft-material robots for covert access*. DARPA. \$3,298,209. From 2/15/2008 to 8/14/2010. PIs: Barry Trimmer and David Kaplan, Tufts University.

PROFESSIONAL MEMBERSHIPS

Institute of Electrical and Electronic Engineers (IEEE)

Institute of Navigation (ION)

Tau Beta Pi, The National Engineering Honor Society