THE UNIVERSITY OF TEXAS AT AUSTIN
Cockrell School of Engineering
Resume

FULL NAME: **Renato Zanetti**   **TITLE:**   **Associate Professor**

DEPARTMENT: **Aerospace Engineering and Engineering Mechanics**

EDUCATION:

The University of Texas at Austin	Aerospace Engineering	Ph.D.	2007
Politecnico di Milano, Italy	Aerospace Engineering	Laurea	2003

CURRENT AND PREVIOUS ACADEMIC POSITIONS:

The University of Texas at Austin	Associate Professor	September 2023 to present
The University of Texas at Austin	Assistant Professor	January 2017 to August 2023

OTHER PROFESSIONAL EXPERIENCE:

Blue Origin	Navigation Responsible Engineer	January 2024 to present
NASA Johnson Space Center	Aerospace Engineer	December 2013 to January 2017
Draper Laboratory	Senior Member of the Technical Staff	October 2007 to November 2013

CONSULTING:
- Superior QC, Houston, TX: Consulted on the design of autonomous directional drilling, June 2018 – Dec. 2020
- Blue Origin, Kent, WA: Consulting on the design of onboard navigation systems, April 2022 – Dec. 2023

HONORS AND AWARDS:
- Fellow, American Astronautical Society 2017
  - Citation: "For seminal contributions to the theory and practice of autonomous onboard space navigation."
- Associate Fellow, American Institute of Aeronautics and Astronautics 2016
- Senior Member, Institute of Electrical and Electronics Engineers, 2021
- Plenary Speaker at the 2020 IEEE International Conference on Multisensor Fusion and Integration
- NASA Software of the Year Award for Orion EFT-1 GN&C flight software (2015)
- NASA On The Spot Award for providing exceptional service to the Orion absolute navigation team (2012)
- NASA On The Spot Award for extraordinary efforts in maturing the Orion absolute navigation filter design (2012)
- NASA Technical Excellence Award for outstanding technical achievement in Orion navigation design (2012)
- NASA Group Achievement Award for Orion Optical Navigation design (2019)
- NASA Group Achievement Award for exceptional GN&C algorithm design (2013)
- NASA Group Achievement Award for SOSC closed-loop Orion test (2011)
- NASA Group Achievement Award for performance at the Orion Pad Abort I Delta Critical Design Review (2010)
- NASA Team Excellence Award for Orion Orbit GN&C (2011)
- NASA Certificate of Appreciation from the Orion Project Office (2009)
- 1st overall best paper at the 2024 FUSION conference
- 3rd overall best paper (second runner up) at the 2020 FUSION conference
- Ph.D. supervisor and co-author of Simone Servadio receiving the Breakwell Student Paper Award for the paper titled: "Estimation of the conditional state and covariance with Taylor polynomials" at the 31st AAS/AIAA Space-Flight Mechanics Meeting.
- Ph.D. supervisor and co-author of Sehyun Yun receiving the Breakwell Student Paper Award for the paper titled: "Kernel-Based Ensemble Gaussian Mixture Filtering for Orbit Determination with Sparse Data" at the 2021 AAS/AIAA Astrodynamics Specialist Conference.

MEMBERSHIP IN PROFESSIONAL AND HONORARY SOCIETIES:
Fellow, American Astronautical Society (2017)
Associate Fellow, American Institute of Aeronautics and Astronautics (2016)
Senior Member, Institute of Electrical and Electronics Engineers (2021)
Member, International Society of Information Fusion (2018)

UNIVERSITY COMMITTEES/ADMINISTRATIVE ASSIGNMENTS:
Department of Aerospace Engineering and Engineering Mechanics
- AIAA student chapter faculty advisor: 2023/24, 2022/23, 2021/22, 2020/21, 2019/20
- Sigma Gamma Tau faculty advisor: 2018/19
- Member, Website Committee: 2020/21, 2019/20, 2017/18
- Controls Written Qualifying Exam Committee: 2022, 2021 (committee chair), 2020, 2019, 2018, 2017
- Computational Engineering Curriculum Committee: 2023/24, 2022/23
- Aerospace Engineering Faculty Search Committee: 2023/24, 2022/23

Cockrell School of Engineering
- Member, Engineering Awards Committee, 2017/18

PROFESSIONAL SOCIETY/GOVERNMENT SERVICE AND TECHNICAL COMMITTEES:
Outside Committees
- Member, NASA Engineering and Safety Center (NESC) GN&C Technical Discipline Team, 2018-present
- Member, AIAA Astrodynamics Technical Committee, 2010-2022 (Committee Chair 2020-2022)
- Member, AAS Space-Flight Mechanics (SFM) Technical Committee, 2023-2027, 2013-2017 (Committee Chair 2016-2017)
- Member, AAS Young Astrodynamicist Award Sub-Committee (2023)
- Chair, AAS SFM Awards Sub-Committee (2024)
- Member, American Astronautical Society Executive Committee (2016-2017)
- Member, American Astronautical Society Fellows Selection Committee (2017)
- Reviewer NASA NSTRF/NSTGRO (2023, 2022, 2021, 2020, 2019, 2018, 2017)
- PDR panel member of "Safe and Precise Landing – Integrated Capabilities Evolution (SPLICE)". NASA Johnson Space Center (2023)
- Panel member of "Small Spacecraft Attitude Determination and Control Sensors and Actuators topic -Utilizing Public-Private Partnerships to Advance Tipping Point Technologies". NASA Headquarters (2015)
- Panel member of "Raven GN&C Engineering Peer Review". NASA Goddard Satellite Servicing Capability Office (SSCO) (2014)
- Reviewer of the NASA Technology Roadmap area 5: Communications and Navigation (2014)
- Reviewer of the Osiris-Rex navigation design, NASA engineering and safety center (NESC) Final Assessment Report (2013)
- Reviewer of AFOSR Young Investigator Program proposals (2024)

Conference Activities
- Meta-Reviewer, 2024 IEEE International Conference on Multisensor Fusion and Integration
- Webmaster, 2024 AAS/AIAA Astrodynamics Specialist Conference
- Astrodynamics Topic Chair, 2021 AIAA ASCEND Forum, Las Vegas, NV, November 2021
- AIAA Technical Chair, 2021 AAS/AIAA Space-Flight Mechanics Meeting, January 31– February 4, 2021
- AIAA General Chair, 2019 AAS/AIAA Space-Flight Mechanics Meeting, Maui, HI, January 13–17, 2019
- AAS Technical Chair, 2016 AAS/AIAA Space-Flight Mechanics Meeting, Napa Valley, CA, February 14–18, 2016
- AIAA Technical Chair, 2014 AAS/AIAA Space-Flight Mechanics Meeting, Santa Fe, NM, January 26–30, 2014
- AIAA Associate Editor, American Control Conference 2019, 2018, 2017
- National Chair, Exploring Frontiers - The Moon & Mars Session, 45th annual AAS Guidance, Navigation and Control Conference. Breckenridge, CO. January 31 – February 5, 2023.
- National Chair, Advanced Navigation Applications and Technologies Session, 42nd annual AAS Guidance, Navigation and Control Conference. Breckenridge, CO. January 31 – February 6, 2019.
- Chair of the Attitude Dynamics, Determination and Control I session at the AIAA/AAS Space-Flight Mechanics

Meeting, AIAA SciTech Forum, January 6–9, 2020.
- Chair of the Relative Motion session at the AAA/AIAA Astrodynamics Specialist Conference, August 20–25, 2017, Stevenson, WA.
- Chair of the Navigation session at the AAS/AIAA Space-Flight Mechanics Meeting, February 5–9, 2017, San Antonio, TX.
- Chair of the Trajectory Optimization II session at the AIAA/AAS Astrodynamics Specialist Conference, September 12–16, 2016, Long Beach, CA.
- Co-chair of the Trajectory Design and Optimization session at the AAS/AIAA Astrodynamics Specialist Conference, August 9–13, 2015, Vail, CO.
- Chair of the Orbit Determination II session at the AAS/AIAA Space-Flight Mechanics Meeting, January 11–15, 2015, Williamsburg, VA.
- Chair of the Attitude Control and Dynamics I session at the AAS/AIAA Astrodynamics Specialist Conference, August 11–15, 2013, Hilton Head, SC.
- Chair of the Attitude Dynamics and Control I session at the AAS/AIAA Space-Flight Mechanics Meeting, February 10–14, 2013, Kauai, HI.
- Chair of the Attitude Dynamics and Control II session at the AAS/AIAA Astrodynamics Specialist Conference, July 31– August 4, 2011, Girdwood, AK.
- Chair of the Navigation and Orbit Determination session at the AAS/AIAA Spaceflight Mechanics Meeting, February 13–17, 2011, New Orleans, LA.
- Co-chair of the Attitude and Parameter Estimation I session at the AIAA Guidance, Navigation and Control Conference and Exhibit, August 18 – 21, 2008, Honolulu, HI
- Chair of the General Theory session at the F. Landis Markley Astronautics Symposium, June 30 – July 2, 2008, Cambridge, MD

Journal Activities
- Associate Editor of IEEE Transactions on Aerospace and Electronic Systems (2024–Present)
- Guest Associate Editor, Journal of the Astronautical Sciences, special issue on Optical Navigation (2019)

Current Review Activities

Excellent Reviewer for the *Journal of Guidance, Control, and Dynamics* 2022, 2020, 2019, 2018, 2017, 2016, 2015, 2014, 2012, 2011, 2010, 2009, 2008.
- IEEE Transactions on Automatic Control
- Journal of Guidance, Control, and Dynamics
- IEEE Transactions on Aerospace and Electronic Systems
- Journal of the Astronautical Sciences
- Journal of Optimization Theory and Applications

PUBLICATIONS:

Refereed Journal Publications

J48. A. A. Popov and R. Zanetti, "Small-Data Reduced Order Modeling of Chaotic Dynamics Through SyCo-AE Synthetically Constrained Autoencoders," *Journal of Machine Learning for Modeling and Computing*, vol. 5, no. 2, pp. 145–162, 2024.
http://doi.org/10.1615/JMachLearnModelComput.2024053321 pdf

J47. F. Giraldo-Grueso, A. A. Popov, and R. Zanetti, "Precision mars entry navigation with atmospheric density adaptation via neural networks," *Accepted for Publication by the Journal of Aerospace Information Systems*, 2024.
https://doi.org/10.2514/1.I011426 pdf

J46. C. L. Marcus and R. Zanetti, "Landing site mapping and selection with a quadtree map using planar elements," *Journal of Guidance, Control, and Dynamics*, vol. 47, pp. 1283–1297, July 2024.
https://doi.org/10.2514/1.G007801 pdf

J45. K. Michaelson, F. Wang, , and R. Zanetti, "Terrain-relative navigation with neuro-inspired elevation encoding," *IEEE Transactions on Aerospace and Electroning Systems*, vol. 60, pp. 3368–3378, June 2024.
https://doi.org/10.1109/TAES.2024.3362760 pdf

J44. A. A. Popov and R. Zanetti, "An adaptive covariance parameterization technique for the ensemble Gaussian mixture filter," *SIAM Journal on Scientific Computing*, vol. 46, no. 3, 2024.

https://doi.org/10.1137/22M1544312 pdf

J43. S. P. A. Ram and R. Zanetti, "Robocentric slam," *Journal of Guidance, Control, and Dynamics*, vol. 47, pp. 742–752, April 2024.
https://doi.org/10.2514/1.G007587 pdf

J42. F. D'Onofrio and R. Zanetti, "A Novel Approach to Autonomous Lunar Localization and Timing," *Journal of Guidance, Control, and Dynamics*, vol. 47, pp. 36–48, January 2024.
https://doi.org/10.2514/1.G007613 pdf

J41. S. P. A. Ram, M. R. Akella, and R. Zanetti, "Angular velocity estimation using rate-integrating gyro measurements," *Journal of Guidance, Control, and Dynamics*, vol. 46, pp. 1513–1525, August 2023.
https://doi.org/10.2514/1.G007344 pdf

J40. B. S. Pogorelsky, R. Zanetti, J. Chen, and S. Jenkins, "Synthetic aperture radar based spacecraft terrain relative navigation," *Journal of Spacecraft and Rockets*, vol. 59, pp. 1412–1424, September 2022.
https://doi.org/10.2514/1.A35067 pdf

J39. S. Yun, R. Zanetti, and B. A. Jones, "Kernel-based ensemble gaussian mixture filtering for orbit determination with sparse data," *Advances in Space Research*, vol. 69, pp. 4179–4197, June 2022.
https://doi.org/10.1016/j.asr.2022.03.041 pdf

J38. S. Servadio, R. Zanetti, and R. Armellin, "Maximum a posteriori estimation of hamiltonian systems with high order taylor polynomials," *The Journal of the Astronautical Sciences*, vol. 69, pp. 511–536, April 2022.
https://doi.org/10.1007/s40295-022-00304-4 pdf

J37. S. Yun and R. Zanetti, "Clustering methods for particle filters with gaussian mixture models," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 58, pp. 1109–1118, April 2022.
https://doi.org/10.1109/TAES.2021.3117655 pdf

J36. S. Servadio and R. Zanetti, "Estimation Of The Conditional State And Covariance with Taylor Polynomials," *Journal of Advances in Information Fusion*, vol. 16, pp. 126–142, December 2021 pdf

J35. S. Servadio and R. Zanetti, "Differential algebra-based multiple gaussians particle filter for orbit determination," *Journal of Optimization Theory and Applications*, vol. 191, pp. 459–485, December 2021.
https://doi.org/10.1007/s10957-021-01934-8 pdf

J34. S. Servadio, R. Zanetti, and B. A. Jones, "Nonlinear Filtering with a Polynomial Series of Gaussian Random Variables," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 57, pp. 647–658, February 2021.
https://doi.org/10.1109/TAES.2020.3028487 pdf

J33. R. Moghe and R. Zanetti, "A deep learning approach to hazard detection for autonomous lunar landing," *Journal of the Astronautical Sciences*, vol. 67, pp. 1811–1830, December 2020. DOI: 10.1007/s40295-020-00239-8 pdf

J32. S. Yun, K. Tuggle, R. Zanetti, and C. D'Souza, "Sensor Configuration Trade Study for Navigation in Near Rectilinear Halo Orbits," *Journal of the Astronautical Sciences*, vol. 67, pp. 1755–1774, December 2020.
https://doi.org/10.1007/s40295-020-00224-1 pdf

J31. S. Yun and R. Zanetti, "Nonlinear filtering of light-curve data," *Advances in Space Research*, vol. 66, pp. 1672–1688, October 2020.
https://doi.org/10.1016/j.asr.2020.06.024 pdf

J30. M. M. de Almeida, D. Mortari, R. Zanetti, and M. Akella, "Quatera: The quaternion regression algorithm," *Journal of Guidance, Control, and Dynamics*, vol. 43, pp. 1600–1616, September 2020.
https://doi.org/10.2514/1.G004375 pdf

J29. S. Servadio and R. Zanetti, "Recursive Polynomial Minimum Mean Square Error Estimation With Applications To Orbit Determination," *Journal of Guidance, Control, and Dynamics*, vol. 43, pp. 939–954, May 2020.
https://doi.org/10.2514/1.G004544 pdf

J28. R. Moghe, R. Zanetti, and M. Akella, "Adaptive Kalman Filter for Detectable Linear Time Invariant Systems," *Journal of Guidance, Control, and Dynamics*, vol. 42, pp. 2197–2205, October 2019.
https://doi.org/10.2514/1.G004359 pdf

J27. S. Yun and R. Zanetti, "Sequential Monte Carlo Filtering with Gaussian Mixture Sampling," *Journal of Guidance, Control, and Dynamics*, vol. 42, pp. 2069–2077, September 2019.
https://doi.org/10.2514/1.G004403 pdf

J26. R. Zanetti, "Rotations, Transformations, Left Quaternions, Right Quaternions?," *Journal of the Astronautical Sciences*, vol. 66, pp. 361–381, September 2019.
https://doi.org/10.1007/s40295-018-00151-2. pdf

J25. C. D'Souza and R. Zanetti, "Information Formulation of the UDU Kalman Filter," *IEEE Transactions on*

Aerospace and Electronic Systems, vol. 55, pp. 493–498, February 2019.
https://doi.org/10.1109/TAES.2018.2850379 pdf

J24. R. Zanetti and K. J. DeMars, "Fully Multiplicative Unscented Kalman Filter for Attitude Estimation," *Journal of Guidance, Control, and Dynamics*, vol. 41, pp. 1183–1189, May 2018.
https://doi.org/10.2514/1.G003221 pdf

J23. K. Tuggle and R. Zanetti, "Automated Splitting Gaussian Mixture Nonlinear Measurement Update," *Journal of Guidance, Control, and Dynamics*, vol. 41, pp. 725–734, March 2018.
https://doi.org/10.2514/1.G003109 pdf

J22. R. Zanetti, G. N. Holt, R. S. Gay, C. D. D'Souza, J. Sud, H. Mamich, and R. Gillis, "Design and Flight Performance of the Orion Pre-Launch Navigation System," *Journal of Guidance, Control, and Dynamics*, vol. 40, pp. 2289–2300, September 2017.
https://doi.org/10.2514/1.G002666 pdf

J21. R. Zanetti, G. N. Holt, R. S. Gay, C. D. D'Souza, J. Sud, H. Mamich, M. Begley, E. King, and F. Clark, "Absolute Navigation Performance of the Orion Exploration Flight Test 1," *Journal of Guidance, Control, and Dynamics*, vol. 40, pp. 1106–1116, May 2017.
https://doi.org/10.2514/1.G002371 pdf

J20. F. De Dilectis, D. Mortari, and R. Zanetti, "Bezier Description of Space Trajectories," *Journal of Guidance, Control, and Dynamics*, vol. 39, pp. 2535–2539, November 2016.
https://doi.org/10.2514/1.G000719 pdf

J19. R. Armellin, P. Di Lizia, and R. Zanetti, "Dealing with uncertainties in angles-only initial orbit determination," *Celestial Mechanics and Dynamical Astronomy*, vol. 125, no. 4, pp. 435–450, 2016.
https://doi.org/10.1007/s10569-016-9694-z pdf

J18. D. Mortari, C. D'Souza, and R. Zanetti, "Image Processing of Illuminated Ellipsoid," *Journal of Spacecraft and Rocket*, vol. 53, pp. 448–456, May–June 2016.
https://doi.org/10.2514/1.A33342 pdf

J17. R. Zanetti and C. D'Souza, "Observability Analysis and Filter Design for the Orion Earth-Moon Attitude Filter," *Journal of Guidance, Control, and Dynamics*, vol. 39, pp. 201–213, February 2016.
https://doi.org/10.2514/1.G001217 pdf

J16. D. Mortari, F. de Dilectis, and R. Zanetti, "Position Estimation using Image Derivative," *Aerospace*, vol. 2, pp. 435–460, September 2015.
https://doi.org/10.3390/aerospace2030435 pdf

J15. R. Zanetti, "Adaptable Recursive Update Filter," *Journal of Guidance, Control, and Dynamics*, vol. 38, pp. 1295–1300, July 2015.
https://doi.org/10.2514/1.G001031 pdf

J14. T. Ainscough, R. Zanetti, J. Christian, and P. D. Spanos, "q-Method Extended Kalman Filter," *Journal of Guidance, Control, and Dynamics*, vol. 38, pp. 752–760, April 2015.
https://doi.org/10.2514/1.G000118 pdf

J13. R. Zanetti and C. D'Souza, "Recursive Implementations of the Schmidt-Kalman Consider Filter," *Journal of the Astronautical Sciences*, vol. 60, pp. 672–685, July–December 2013.
https://doi.org/10.1007/s40295-015-0068-7 pdf

J12. R. Zanetti and K. J. DeMars, "Joseph Formulation of Unscented and Quadrature Filters with Application to Consider States," *Journal of Guidance, Control, and Dynamics*, vol. 36, pp. 1860–1864, November–December 2013.
https://doi.org/10.2514/1.59935 pdf

J11. R. Zanetti and C. D'Souza, "Dual Accelerometer Usage Strategy for Onboard Spacecraft Navigation," *Journal of Guidance, Control, and Dynamics*, vol. 35, pp. 1899–1901, November–December 2012.
https://doi.org/10.2514/1.58154 pdf

J10. R. Zanetti, "Recursive Update Filtering for Nonlinear Estimation," *IEEE Transactions on Automatic Control*, vol. 57, pp. 1481–1490, June 2012. doi:10.1109/TAC.2011.2178334 pdf

J9. R. Zanetti, D. Woffinden, and A. Sievers, "Multiple Event Triggers in Linear Covariance Analysis for Spacecraft Rendezvous," *Journal of Guidance, Control, and Dynamics*, vol. 35, pp. 353–366, March–April 2012.
https://doi.org/10.2514/1.54965 pdf

J8. R. Zanetti and R. H. Bishop, "Kalman Filters with Uncompensated Biases," *Journal of Guidance, Control, and Dynamics*, vol. 35, pp. 327–330, January–February 2012.

https://doi.org/10.2514/1.55120 pdf

J7. R. Zanetti, "Optimal Glideslope Guidance for Spacecraft Rendezvous," *Journal of Guidance, Control, and Dynamics*, vol. 34, pp. 1593–1597, September–October 2011.
https://doi.org/10.2514/1.54103 pdf

J6. R. Zanetti, K. J. DeMars, and R. H. Bishop, "Underweighting Nonlinear Measurements," *Journal of Guidance, Control, and Dynamics*, vol. 33, pp. 1670–1675, September–October 2010.
https://doi.org/10.2514/1.50596 pdf

J5. R. Zanetti, "A Multiplicative Residual Approach to Attitude Kalman Filtering with Unit-Vector Measurements," *The Journal of the Astronautical Sciences*, vol. 57, pp. 793–801, October–December 2009.
https://doi.org/10.1007/BF03321530 pdf

J4. R. Zanetti, M. Majji, R. H. Bishop, and D. Mortari, "Norm-Constrained Kalman Filtering," *Journal of Guidance, Control, and Dynamics*, vol. 32, pp. 1458–1465, September–October 2009.
https://doi.org/10.2514/1.43119 pdf

J3. R. Zanetti, "Autonomous Midcourse Navigation for Lunar Return," *Journal of Spacecrafts and Rockets*, vol. 46, pp. 865–873, July–August 2009.
https://doi.org/10.2514/1.41769 pdf

J2. R. Zanetti and R. H. Bishop, "A New Method to Introduce *A Priori* Information in QUEST," *The Journal of the Astronautical Sciences*, vol. 55, pp. 451–461, October–December 2007.
https://doi.org/10.1007/BF03256535 pdf

J1. M. R. Akella, D. Seo, and R. Zanetti, "Attracting Manifolds for Attitude Estimation in Flatland and Otherlands," *The Journal of the Astronautical Sciences*, vol. 54, pp. 635–655, July–December 2006.
https://doi.org/10.1007/BF03256510 pdf

Conference Publications

C94. F. Giraldo-Grueso, A. A. Popov, and R. Zanetti, "Adaptive mars entry guidance with atmospheric density estimation," in *AAS/AIAA Astrodynamics Specialist Conference, Broomfield, CO, August 11-15*, 2024

C93. R. Mamich and R. Zanetti, "Applying correlation methods to relative navigation," in *AAS/AIAA Astrodynamics Specialist Conference, Broomfield, CO, August 11-15*, 2024

C92. D. Durant, A. A. Popov, K. J. DeMars, and R. Zanetti, "Processing angles-only tracklets for cislunar multi-target tracking," in *AAS/AIAA Astrodynamics Specialist Conference, Broomfield, CO, August 11-15*, 2024

C91. F. Giraldo-Grueso, A. A. Popov, and R. Zanetti, "Gaussian mixture-based point mass filtering," in *27th International Conference on Information Fusion, Venice, Italy*, 2024

C90. D. Durant, A. A. Popov, and R. Zanetti, "What are You Weighting For? Improved Weights for Gaussian Mixture Filtering," in *27th International Conference on Information Fusion, Venice, Italy*, 2024

C89. K. Michaelson, A. A. Popov, R. Zanetti, and K. J. DeMars, "Particle flow with a continuous formulation of the nonlinear measurement update," in *27th International Conference on Information Fusion, Venice, Italy*, 2024

C88. R. Mamich, K. Michaelson, A. A. Popov, and R. Zanetti, "Burnished flow filter," in *27th International Conference on Information Fusion, Venice, Italy*, 2024

C87. A. A. Popov and R. Zanetti, "Are non-gaussian kernels suitable for ensemble mixture model filtering?," in *2023 26th International Conference on Information Fusion (FUSION)*, 2024

C86. C. Marcus, A. D. Perez, and R. Zanetti, "Guidance, navigation, and control for laser-based non-cooperative target detumbling," in *AAS Guidance, Navigation, and Control Conference*, no. AAS 24-143, 2024

C85. F. Giraldo Grueso, A. A. Popov, and R. Zanetti, "A neural-network-based gaussian nonlinear filter," in *AIAA Scitech Forum*, 8–12 January 2024. https://doi.org/10.2514/6.2024-1671

C84. V. D'Antuono, A. Zavoli, G. D. Matteis, R. Zanetti, S. Pizzurro, and E. Cavallini, "Post flight estimation of aerodynamic angles of a launch vehicle in windy conditions," in *AIAA Scitech Forum*, 8–12 January 2024. https://doi.org/10.2514/6.2024-2121

C83. C. Marcus and R. Zanetti, "MHN-SLAM For Planetary Landing," in *Proceedings of the 2023 AAS/AIAA Astrodynamics Specialist Conference*, American Astronautical Society, 2023. Paper Number AAS 23-319

C82. F. D'Onofrio and R. Zanetti, "A Novel Approach to Autonomous Lunar Localization and Timing," in *Proceedings of the 2023 AAS/AIAA Astrodynamics Specialist Conference*, American Astronautical Society, 2023. Paper Number AAS 23-319

C81. D. Duran, A. A. Popov, and R. Zanetti, "MCMC EnGMF for Sparse Data Orbit Determination," in *Proceedings of the 2023 AAS/AIAA Astrodynamics Specialist Conference*, American Astronautical Society, 2023. Paper

Number AAS 23-356

C80. A. A. Popov and R. Zanetti, "Ensemble gaussian mixture filtering with particle-localized covariances," in *26th International Conference on Information Fusion*, (Charleston, SC), June 27–30 2023

C79. B. L. Reifler, A. A. Popov, B. A. Jones, and R. Zanetti, "Large-scale space object tracking in a proliferated leo scenario," in *26th International Conference on Information Fusion*, (Charleston, SC), June 27–30 2023

C78. K. Michaelson, A. A. Popov, and R. Zanetti, "Ensemble kalman filter with bayesian recursive update," in *26th International Conference on Information Fusion*, (Charleston, SC), June 27–30 2023

C77. K. Michaelson, F. Wang, and R. Zanetti, "Terrain-relative navigation with neuro-inspired elevation encoding," in *IEEE/ION Position Location and Navigation Symposium (PLANS)*, (Monterrey, CA), April 24–27 2023

C76. B. Sunderland, S. Takahashi, S. Hesar, A. Garcia, M. Muktoyuk, R. Mamich, R. Zanetti, and M. Jah, "Autonomous Onboard Risk Mitigation for Spacecraft Proximity Operations; A Zero-SWaP Flight Software Enhancement," in *Proceedings of the 2023 AAS Guidance, Navigation, and Control Conference*, American Astronautical Society, 2023. Paper Number AAS 23-126

C75. Z. McLaughlin, B. A. Jones, and R. Zanetti, "Nonlinear Filtering with Intrusive Polynomial Chaos for Satellite Uncertainty Quantification," in *Proceedings of the 2023 AAS/AIAA Spaceflight Mechanics Meeting*, American Astronautical Society, 2023. Paper Number AAS 23-370

C74. K. A. Michaelson, A. A. Popov, and R. Zanetti, "Recursive Update Filtering: A New Approach," in *Proceedings of the 2023 AAS/AIAA Spaceflight Mechanics Meeting*, American Astronautical Society, 2023. Paper Number AAS 23-321

C73. C. D'Souza and R. Zanetti, "The Initial Orbit Determination (IOD) Problem with Range, Range-Rate and Angles," in *Proceedings of the 2023 AAS/AIAA Spaceflight Mechanics Meeting*, American Astronautical Society, 2023. Paper Number AAS 23-304

C72. R. E. Gold, S. G. Catalan, B. A. Jones, and R. Zanetti, "Extending capabilities of crater navigation and timing for autonomous lunar orbital operations," in *3rd Space Imaging Workshop*, Georgia Tech, October 10-12 2022. Paper Number SIW22-30

C71. S. Yun, N. Ravago, B. L. Reifler, R. Zanetti, and B. A. Jones, "Generalized labeled multi-bernoulli filter with kernel-based ensemble gaussian mixture filtering for orbit determination with sparse data," in *Proceedings of the Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference*, (Maui, Hawaii), 27-30 September 2022 pdf

C70. F. G. Grueso, R. Zanetti, and M. R. Simon, "Autonomous Anomaly Detection Via Unsupervised Machine Learning," in *Proceedings of the 2022 AAS/AIAA Astrodynamics Specialist Conference*, no. AAS 22–666, August 2022 pdf

C69. B. Pogorelsky, K. Michaelson, and R. Zanetti, "Particle Filter with LMMSE Importance Sampling," in *Proceedings of the 25th International Conference on Information Fusion*, July 2022 pdf

C68. Z. R. McLaughlin, R. E. Gold, S. G. Catalan, R. Moghe, B. A. Jones, and R. Zanetti, "Crater Navigation and Timing for Autonomous Lunar Orbital Operations in Small Satellites," in *Proceedings of the AAS Guidance and Control Conference*, no. AAS 22-146, 2022 pdf

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ORAL PRESENTATIONS:

P39. *Statistical Estimation for Space Applications*, Mechanical and Aerospace Engineering Seminar, University of California San Diego, 12 February 2024

P38. *Statistical Estimation for Space Applications*, Aerospace Engineering Seminar Series, Texas A&M University, 18 January 2024

P37. *Statistical Estimation for Aerospace Applications*, Mechanical and Space Engineering Seminar, Georgia Tech, 30 January 2023

P36. *Statistical Estimation for Aerospace Applications*, Mechanical and Aerospace Engineering Seminar, University of California Los Angeles, 13 January 2023

P35. *Nonlinear Estimation for Space Applications*, Modeling and Computation Graduate Seminar Series, Carnegie Mellon University, 4 February 2022

P34. *Nonlinear Estimation for Orbit Determination*, Mechanical and Aerospace Engineering Graduate Seminar Series, New Mexico State University, 19 November 2021

P33. *Relative Navigation and Mapping*, Lockheed Martin Space Systems Seminar, 2 August 2021

P32. *Terrain Relative Navigation with NeuroGrids Encoding*, Autonomy for Hypersonics Field Day, Sandia National Lab, 29 July 2021

P31. *SLAM for Navigation*, AutonomyNM Bootcamp, Sandia National Laboratories, 28 June 2021

P30. *Statistical Estimation: Model-Based, Data-Driven, and Hybrid approaches*, Plenary Talk, 2020 IEEE International Conference on Multisensor Fusion and Integration, 16 September 2020

P29. *Closed-Loop Navigation Using SAR*, Autonomy for Hypersonics Field Day, Sandia National Lab, 6 August 2020

P28. *Statistical Estimation: From Kalman Filters to Machine Learning*, Summer PhD Seminar Series, University of Rome, Department of Aerospace Engineering, 17 July 2020

P27. *Statistical Estimation: From Kalman Filters to Machine Learning*, NASA Engineering and Safety Center GNC Technical Discipline Meeting, 15 July 2020

P26. *Statistical Estimation: From Kalman Filters to Machine Learning*, AFRL Summer Seminar Series, 7 July 2020

P25. *Advanced State Estimation*, AutonomyNM Bootcamp, Sandia National Laboratories, 1 July 2020

P24. *UT Aerospace Engineering Contributions to Autonomous GNC for Deep Space Human Exploration* Looking Back, Looking Forward: Apollo at 50, Osher Lifelong Learning Institute at The University of Texas at Austin, 7 November 2019

P23. *UT Aerospace Engineering Contributions to Autonomous GNC for Deep Space Human Exploration*, Looking Back, Looking Forward: Apollo at 50, Osher Lifelong Learning Institute at The University of Texas at Austin, 22 April 2019

P22. *Closed-Loop Navigation Using SAR*, Autonomy for Hypersonics Field Day, Sandia National Lab, 17 April 2019

P21. *Autonomous Orion GN&C*, Space Systems Seminar, Naval Postgraduate School, 7 March 2019

P20. *Orbital Uncertainty Quantification Using Directional Splitting and Gaussian Mixture Models*, Aerospace Engineering Graduate Seminar Series, University of Illinois Urbana-Champaign, 22 October 2018

P19. *Multiplicative Extended Kalman Filter*, invited lecture, Spacecraft Attitude Determination, Texas A&M University, 26 April 2018

P18. *Onboard Navigation of Space Vehicles*, Navigation Seminar, Jet Propulsion Laboratory, 11 October 2017

P17. *A Splitting Gaussian Mixture Formulation for a Nonlinear Measurement Update*, AFRL Summer Seminar Series, Air Force Research Lab, 27 July 2017

P16. *Autonomous Orion GN&C*, Tech Talk Series, Sandia National Lab, 26 July 2017

P15. *Onboard Navigation of Space Vehicles*, Aerospace Engineering Seminar, Politecnico di Milano, 10 July 2017

P14. *Autonomous Orion GN&C*, Invited Tutorial Session, American Control Conference, 25 May 2017

P13. *Consider Estimation for Onboard Navigation*, Space Systems Seminar, Applied Physics Laboratory, 3 May 2017

P12. *Consider Estimation for Onboard Navigation*, Navigation Seminar, NASA Goddard Space Flight Center, 1 May 2017

P11. *A Splitting Gaussian Mixture Formulation for a Nonlinear Measurement Update*, Texas Systems Day, Texas A&M University, 31 March 2017

P10. *Autonomous Navigation for Robotic Space Missions*, Aerospace Engineering Seminar, University of Texas at Austin, 27 March 2016

P9. *Navigation Design and Performance of the First NASA Orion Flight Test*, Graduate Seminar Series, Rice University, 28 October 2015

P8. *Nonlinear Measurement Update for Onboard Navigation*, Guidance and Control Seminar, University of Texas at Austin, 7 November 2013

P7. *Nonlinear Measurement Update for Onboard Navigation*, Aerospace Engineering Sciences Research Seminar, University of Colorado at Boulder, 4 February 2013

P6. *Stochastic Estimation Theory*, four months course for Draper Laboratory employees, September to December 2012

P5. *Dual Accelerometer Usage Strategy for Onboard Spacecraft Navigation*, AIAA Houston Section Annual Technical Symposium, 18 May 2012

P4. *Multiplicative Extended Kalman Filter*, invited lecture, Spacecraft Attitude Determination, Texas A&M University, 23 April 2012

P3. *Nonlinear Update Methodologies for Autonomous Onboard Stochastic Estimation*, The Aerospace Engineering Seminar Series, Texas A&M University, 16 June 2011

P2. *Designing and Validating Proximity Operations Rendezvous and Approach Trajectories for the Cygnus Mission*, AIAA Houston Section Annual Technical Symposium, 20 May 2011

P1. *Autonomous Mid-Course Navigation for Lunar Return*, The Aerospace Engineering Seminar Series, Texas A&M University, 17 April 2008

GRANTS AND CONTRACTS:

Active

AG1. **R. Zanetti (UT PI)**, *xGEO Robust and Adaptive space Domain AwaReness (xRADAR)*. Selected for award by the United States Space Force as part of the Universities Space Research Association (USRA) program. (Virginia Tech serves as Prime Contractor, UT is a sub), 9/1/2023–8/31/2025.

AG2. B. Jones (PI) and **R. Zanetti (Co-PI)**, *Spacecraft for Optimal-based Position Estimation-1*. Awarded Launch

by the National Aeronautics and Space Foundation.

AG3. B. Jones (PI) and **R. Zanetti (Co-PI)**, *Spacecraft for Optimal-based Position Estimation-1*. NASA Small Spacecraft Technology, 9/1/2023–8/31/2027.

AG4. **R. Zanetti (PI)**, *HIVE - Real-Time Linear Covariance Analysis Evaluation for Trajectory Deconfliction*. Sandia National Laboratory, 5/1/2024–1/31/2025.

AG5. **R. Zanetti (PI)** and U. Topcu (Co-PI), *Representations, Theory, and Algorithms for Autonomous Space Domain Awareness in the Cislunar Regime*. Air Force Office of Scientific Research award number FA9550-23-1-0646, 9/1/2023–8/31/2026.

This research collaboration with Texas A&M, Univ. of New Mexico, Univ. of Colorado Boulder, and Univ. of Washington proposes to develop a theoretical and computational foundation to support space situational awareness and autonomous operations in the cislunar regime. The resulting algorithms will support onboard, autonomous navigation, reachability, and control. (UT is the prime).

AG6. **R. Zanetti (UT PI)** and K. Willcox (Co-PI), *Deep Learning Framework for Rapid Deployment of Autonomous Hypersonic Strike Weapons*. Joint Hypersonic Transition Office, 8/1/2022–7/31/2025.

This research collaboration with University of Arizona and Raytheon proposes to develop autonomous guidance and navigation systems for hypersonic systems. (University of Arizona serves as Prime Contractor, Dr. Roberto Furfaro is the overall PI, UT is a sub).

AG7. **R. Zanetti (PI)** and R. Mamich (Key Personnel), *Autonomous Rendezvous and Docking with the Aid of Optical Maneuver Detection*. NASA STMD award number 80NSSC22K1204, 8/29/2022–8/28/2026.

This research investigates navigation technology for spacecraft rendezvous with an uncooperative and maneuvering target. (NASA Space Technology Graduate Research Opportunity).

AG8. K. Willcox (PI) and **R. Zanetti (Co-PI)**, *Predictive Digital Twins at Scale for Space Systems*. Air Force Office of Scientific Research award number FA9550-22-1-0419, 12/1/2021–11/30/2024.

This joint research collaboration with Dr. Karen Willcox supports the Air Force Office of Scientific Research to develop the mathematical and computational framework needed to create predictive digital twins for space systems.

AG9. **R. Zanetti (PI)**, *Autonomous Deep-Space Navigation*. NASA Johnson Space Center award number 80NSSC20M0211, 9/1/2020–8/31/2024.

This research supports the NASA Johnson Space Center to broaden the capabilities of deep-space navigation. The main objectives are lunar crater-relative navigation and everywhere spacecraft rendezvous.

Completed

CG17. **R. Zanetti (UT PI)**, *Dual-Filter Approach to Trust in Hybrid Human-Machine System*. NASA award number 80NSSC23PB444, 10/2/2023–9/4/2024.

This research collaboration with Infinity Labs proposes to develop estimation filters for distributed spacacraft navigation in the presence of faulty or un-trustworty agents. (Phase I STTR, Infinity Labs serves as Prime Contractor, UT is a sub)

CG16. **R. Zanetti (PI)** and C. Marcus (Key Personnel), *Direct Visual-Inertial-LIDAR SLAM and Autonomous Landing Site Selection and Guidance for Unknown Environments*. NASA STMD award number 80NSSC20K1195, 8/28/2020–8/27/2024.

This research investigates the fusion of camera and LIDAR data for autonomous descent and landing navigation and guidance. (NASA Space Technology Graduate Research Opportunity)

CG15. **R. Zanetti (UT PI)** and Moriba Jah (Co-PI), *Autonomous Onboard Risk Mitigation for Spacecraft Proximity Operations*. Space Force award number FA8750-22-C-1018 , 8/20/2022–1/20/2023.

This research collaboration with Dr. Jah investigates guidance and navigation algorithms for spacecraft rendezvous to minimize the risk of impact/collision. (Phase I STTR, Kayhan Space serves as Prime Contractor, UT is a sub)

CG14. U. Topcu (PI), D. Fridovich-Keil (Co-PI), S. Chinchali (Co-PI), and **R. Zanetti (Co-PI)**, *Testbed for Autonomy in Contested Environments*. Air Force Office of Scientific Research award number FA9550-22-1-0096, 3/1/2022–2/28/2024.

This DURIP grant (Defense University Research Instrumentation Program) is for the purchase of equipment to experimentally demonstrate and validate the investigators' algorithms to enable autonomy of vehicles in contested environments.

CG13. **R. Zanetti (PI)**, *Autonomous Threat Detection via Supervised Machine Learning*. Air Force Research Labora-

tory award number FA9453-21-1-0045, 9/1/2021–12/31/2022.

This work supports the Air Force Research Laboratory to investigate autonomous, data-driven approaches to detection of system faults and external threats using indirect measurements.

CG12. **R. Zanetti (UT PI)** and B. Jones (Co-PI), *Sparse Information Orbit Estimation for Proliferated LEO*. DARPA award number W31P4Q-21-C-0032, 3/18/2021–9/7/2023.

This research collaboration with Dr. Brandon Jones and Tau Technologies proposes to address ground tracking of proliferating LEO constellations/objects using novel estimation algorithms without the need to expand or improve the current Space Surveillance Network configuration. (Phase II STTR, Tau Technology serves as Prime Contractor, UT is a sub)

CG11. **R. Zanetti (PI)** and M. Jah (Co-PI), *Autonomous Onboard Angles-Only Orbit Determination*. Ball Aerospace sponsored research agreement number UTA20-000950, 1/16/2021–12/30/2021.

This joint research collaboration with Dr. Moriba Jah supports Ball Aerospace to investigate how to use images derived from star trackers for autonomous onboard navigation.

CG10. **R. Zanetti (PI)**), *Autonomous Localization in GPS-Denied Environments with SAR-Aided Inertial Navigation*. Sandia National Laboratory, 1/6/2021–9/30/2023.

This research supports Sandia National Lab in the developing a terrain relative navigation system using ranging measurements in GPS-denied environments.

CG9. **R. Zanetti (UT PI)**, *GPU-Enabled Large Scale State Estimation*. Air Force Research Laboratory award number FA9302-20-C-0009, 11/5/2020–12/30/2022.

This joint research collaboration with Lynntech supports the Air Force Research Lab in the developing a parallel batch estimation algorithm deployed to a Graphic Processor Unit for use in dynamic systems with a large number of states. (Phase II SBIR, Lynntech serves as Prime Contractor, UT is a sub)

CG8. **R. Zanetti (UT PI)** and B. Jones (Co-PI), *Sparse Information Orbit Estimation for Proliferated LEO*. DARPA contract number 140D0420C0062, 6/1/2020–1/15/2021.

This research collaboration with Dr. Brandon Jones and Tau Technologies proposes to address ground tracking of proliferating LEO constellations/objects using novel estimation algorithms without the need to expand or improve the current Space Surveillance Network configuration. (Phase I STTR, Tau Technology serves as Prime Contractor, UT is a sub)

CG7. **R. Zanetti (PI)**, *Navigation and Mapping for Autonomous Satellite Servicing*. Air Force Research Laboratory award number FA9453-20-1-0001 , 5/1/2020–5/31/2023.

This research supports the AFRL Space Vehicle Directorate to develop the capabilities of relative navigation and mapping in support of autonomous satellite servicing.

CG6. B. Jones (PI) and **R. Zanetti (Co-PI)**, *On-Orbit Demonstration of Surface Feature-Based Navigation and Timing*. NASA Small Spacecraft Technology award number 80NSSC20M0087, 7/1/2020–8/31/2025.

The goal of this research collaboration with Dr. Brandon Jones is to develop the technology required to provide absolute navigation and timing services in lunar orbit via optical-based tracking of surface features.

CG5. **R. Zanetti (UT PI)**, *GPU-Enabled Large Scale State Estimation*. Air Force Research Laboratory, 4/12/2019–12/31/2019.

This joint research collaboration with Lynntech supports the Air Force Research Lab in the developing a parallel batch estimation algorithm deployed to a Graphic Processor Unit for use in dynamic systems with a large number of states. (Phase I SBIR, Lynntech serves as Prime Contractor, UT is a sub)

CG4. **R. Zanetti (PI)**, *RSGS Navigation Algorithm Design and Development*. Draper Laboratory, 9/1/2018–1/30/2020.

This research supports Draper in the design and development of the relative navigation system for DARPA's Robotic Servicing of Geosynchronous Satellites (RSGS). The goal of RSGS is to research technologies to enable cooperative inspection and servicing in GEO and demonstrating these technologies on orbit. Originally the project was supposed to last until 1/31/2020; the RSGS mission and the grant were cancelled in January 2019.

CG3. **R. Zanetti (PI)** and J. Chen (Co-PI), *Synthetic Aperture Radar Image Formation and Feedback to Navigation Subsystem in Global Position System Denied and Degraded Environments*. Sandia National Laboratory, 10/1/2018–9/30/2020.

This joint research collaboration with Dr. Ann Chen supports Sandia National Lab in the developing a terrain relative navigation system able to generate and use Synthetic Aperture Radar images in GPS-denied environments.

CG2. M. Jah (PI) and **R. Zanetti (Co-PI)**, *Refinement and Validation of Radiation Pressure Models for High Area-To-Mass Ratio Space Objects for Improved Characterization, Tracking, and Orbit Prediction*. Air Force Office

of Scientific Research award number FA9550-18-1-0351, 5/1/2018–8/31/2021.

This joint research collaboration with Dr. Moriba Jah supports the Air Force Office of Scientific Research to investigate how to model high area-to-mass ratio space objects and to develop nonlinear estimation techniques to track them.

CG1. **R. Zanetti (PI)**, *Autonomous Onboard Space Navigation in the Absence of GPS*. NASA Johnson Space Center award number NNX17AI35A, 3/16/2017–7/31/2020.

This research supports the NASA Johnson Space Center to broaden the capabilities of autonomous nonlinear onboard space navigation in the absence of GPS. One of the main goals is the support of the relative navigation system development of the NASA Orion vehicle.

PH.D. SUPERVISION COMPLETED:

6. Corey Marcus, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: Spacecraft Navigation and Decision Making in Uncertain Environments. August 2024. Following graduation joined Blue Origin in Kent, WA.
5. Arjun Ram S.P., Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: Onboard Control, Tracking and Navigation for Autonomous Systems. May 2023. Co-advised with Dr. Maruthi Akella. Following graduation joined Apple Maps in Cupertino, CA.
4. Rahul Moghe, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: Adaptive Algorithms for Identification of Symmetric and Positive Definite Matrices. May 2021. Co-advised with Dr. Maruthi Akella. Following graduation joined Amazon Robotics in Seattle, WA.
3. Sehyun Yun, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: Sequential Monte Carlo Filtering with Gaussian Mixture Models for Highly Nonlinear Systems. May 2021. Following graduation continued as a Post-Doctoral Fellow.
2. Simone Servadio, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: New Developments In Nonlinear Filtering Using Differential Algebra. May 2021. After graduation joined MIT as a PostDoc in Cambridge, MA, followed by a tenure track faculty position at Iowa State University in Ames, Iowa.
1. Kirsten Tuggle, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: Model Selection for Gaussian Mixture Model Filtering and Sensor Scheduling. August 2020. Co-advised with Dr. Maruthi Akella. Following graduation joined Draper in Cambridge, MA.

PH.D. SUPERVISION IN PROGRESS:

1. Kristen Michealson, Ph.D. Candidate.
2. Rachel Mamich, completed Ph.D. Written Qualifying Exam.
3. Felipe Giraldo Grueso, completed Ph.D. Written Qualifying Exam.
4. Dalton Durant, completed Ph.D. Written Qualifying Exam.
5. Fabio D'Onofrio, completed Ph.D. Written Qualifying Exam.
6. Andrea Rigato.
7. Jack Joshi, co-advised with Dr. Ryan Russell.

M.S. SUPERVISION COMPLETED:

6. Felipe Giraldo Grueso, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: "Autonomous Anomaly Detection Via Physics-Regularized Machine Learning". May 2023. Following graduation continued as a Ph.D. student.
5. Dalton Durant, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: "A Nonlinear Batch Information Filter with Auto-tuning". December 2022. Following graduation continued as a Ph.D. student.
4. Corey Marcus, M.S. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: "Direct Monocular SLAM Augmented with LIDAR Range Measurements". December 2020. Following graduation continued as a Ph.D. student.
3. Kristen Michealson, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: "A Multiplicative Multi-State Constraint Kalman Filter". December 2020. Following graduation continued as a Ph.D. student.
2. Bryan Pogorelsky, M.S. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: "Spacecraft Terrain Relative Navigation with Synthetic Aperture Radar". August 2020. Co-advised with Dr. Ann Chen.

Following graduation joined Northrop Grumman in Dulles, VA.

1. James Bell, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: "Estimation for Spacecraft Docking with a Known Target". May 2019. Co-advised with Dr. Maruthi Akella. Following graduation joined Tau Technologies in Albuquerque, NM.

POST DOCTORAL FELLOWS SUPERVISION IN PROGRESS:

1. Alberto Fossa, April 2024–Present.

POST DOCTORAL FELLOWS SUPERVISION COMPLETED:

2. Andrey Popov, September 2022–July2024. Upon completion joined University of Hawaii Manoa as an Assistant Professor of Computer Science.
1. Sehyun Yun, June 2021–April 2022. Upon completion joined Hyundai in Seul, South Korea.

OTHER STUDENT COMMITTEES:

16. Enrico Zucchelli, Ph.D in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Bayesian Approaches to Low-Thrust Maneuvering Spacecraft Tracking*; December 2023.
15. Siddarth Kaki, Ph.D in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Computationally Efficient Algorithms for Spacecraft Relative Navigation and Rendezvous*; August 2023.
14. Sean McArdle, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Gravity Modeling for Lunar Orbits. August 2022.* August 2022.
13. Nicholas Ravago Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Applications of Random Finite Set-Based Multi-Target Filters in Space Situational Awareness*. August 2022.
12. Alaa Abdulghafoor, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Distributed Coverage Control, Motion Coordination and Path Planning for multi-Agent Networks and Multi-Target Tracking in Complex and Dynamic Environments*. May 2022.
11. Alaa Abdulghafoor, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: *Distributed Control of Multi-Agent Networks*. December 2020.
10. Siddarth Kaki, M.S. in Aerospace Engineering, The University of Texas at Austin. Report Title: *On-Orbit Pose and Angular Velocity Estimation*; December 2020
9. Arjun Ram S.P., M.S. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Uniform Exponential Stability Results for the Rigid–Body Attitude Tracking Control Problem*. May 2020.
8. Marcelino Almeida, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Quaternion Regression and Finite-Time Controllers for Attitude Dynamics*; December 2019
7. Dimitrios Pylorof, Ph.D. in Aerospace Engineering, The University of Texas at Austin. Thesis Title: *Optimization-Based Feedback Control of Nonlinear Systems Subject to Input Constraints*; December 2018
6. Jacob Darling, Ph.D. in Aerospace Engineering, Missouri University of Science and Technology. Thesis Title: *Manifold-based Bayesian inference for rigid-body pose estimation*; December 2016.
5. Thomas Ainscough, M.S. in Mechanical Engineering, Rice University. Thesis title: *Spacecraft Attitude Estimation Integrating the Q-Method into an Extended Kalman Filter*, May 2013. (Mentored thesis' research performed at Draper Laboratory)
4. Eric Herbort, M.S. in Mechanical Engineering, Rice University. Thesis title: *Trade Study of Decommissioning Strategies for the International Space Station*, May 2012. (Mentored thesis' research performed at Draper Laboratory)
3. Adam Sievers, M.S. in Mechanical Engineering, Rice University. Thesis title: *Multiple Event Triggers in Linear Covariance Analysis for Spacecraft Rendezvous*, May 2010. (Mentored thesis' research performed at Draper Laboratory)
2. Matthew Fritz, M.S. in Aerospace Engineering, Texas A&M University. Thesis title: *A Comparative Study of Kalman Filter Implementations for Relative GPS Navigation*, December 2009. (Mentored thesis' research performed at Draper Laboratory)
1. Brian Crouse, M.S. in Mechanical Engineering, Rice University. Thesis title: *Autonomous Optical Navigation for Lunar Missions*, May 2009. (Mentored thesis' research performed at Draper Laboratory)

Renato Zanetti, Associate Professor

The University of Texas at Austin
Department of Aerospace Engineering and Engineering Mechanics

   Dr. Renato Zanetti specializes in estimation of complex dynamical systems and autonomous onboard navigation. He joined the UT faculty in 2017. Prior to joining UT he worked at the C.S. Draper Laboratory and at the NASA Johnson Space Center for more than nine years, where he contributed to the successful design and flight of numerous autonomous space navigation systems. His current research includes on-board image processing and optical navigation, non-linear estimation of non-Gaussian/non-linear systems, simultaneous localization and mapping, and autonomous spacecraft GN&C. Dr. Zanetti is a Fellow of the American Astronautical Society (AAS), an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA), a Senior Member of the Institute of Electrical and Electronics Engineers, a former chair of both the AIAA Astrodynamics Technical Committee and the AAS Space-Flight Mechanics Technical Committee. His work contributed to a successful NASA Orion EFT-1 flight and the selection of the Orion EFT-1 GN&C flight-software as the recipient of the 2015 NASA software of the year award. He also received a NASA Technical Excellence Award (2012), several NASA Group achievement awards, and two NASA On The Spot Awards. His work also contributed to a successful Orion Artemis I mission.