

Puneet Singla, Ph.D.

Assistant Professor

Department of Mechanical & Aerospace Engineering

University at Buffalo, Buffalo, NY-14260

Tel: (716) 575-5355 Fax: (716) 645-2883

Email: psingla@buffalo.edu, Web: <http://lairs.eng.buffalo.edu>

Education

Ph.D., Texas A&M University, May 2006

Major Aerospace Engineering
Dissertation Topic "Multi-Resolution Methods for High Fidelity Modeling and Control Allocation in Large-Scale Dynamical Systems"

M.S., Texas A&M University, August 2002

Major Aerospace Engineering
Thesis Topic "A New Attitude Determination Approach using Split Field of View Star Camera"

B.Tech., Indian Institute of Technology, Kanpur, May 2000

Major Aerospace Engineering

Professional Experience

- Aug. 2006 – Present** Assistant Professor, Department of Mechanical & Aerospace Engineering, University at Buffalo, Buffalo, NY.
- Jan. 2006 – Aug. 2006** Post-Doctorate Research Associate, Department of Aerospace Engineering, Texas A&M University, College Station, TX.
- Aug. 2000 – Dec. 2005** Graduate Research Assistant, Department of Aerospace Engineering, Texas A&M University, College Station, TX.
- May 2004 – Aug. 2004** Summer Intern, StarVision Technologies, Inc., College Station, TX.
- May 1999 – Aug. 1999** Summer Intern, Vikram Sarabhai Space Center, Thiruvananthapuram, Kerala, India.
- May 1998 – Sep. 1998** Undergraduate Research Associate, Indian Institute of Technology, Kanpur, India.

Honors & Awards

NSF Career Award (CMMI Control System Program), August 2011.

Honors & Awards (suite)

2011 AFOSR's Young Investigator Research Award.

2010 University at Buffalo's "Exceptional Scholar" Young Investigator Award.

Elevated to Senior Membership of AIAA, 2009.

Recognized at 2009 UB Authors Recognition Ceremony.

Best student paper award for paper entitled "Decision Based Uncertainty Propagation Using Adaptive Gaussian Mixtures" in 2009 International Conference on Information Fusion.

Best paper award for paper entitled "The Partition of Unity Finite Element Approach to the Stationary Fokker-Planck Equation" in 2006 AIAA/AAS Astrodynamics Specialists Conference.

Best paper award in student research week, Texas A&M University, 2003.

Recognition by Spacecraft Technology Center (a NASA research partnership center), College Station for helping in flight testing of Starnav-I payload for STS-107 mission, 2003.

Academic Excellence Prize for good academic performance (top 5% in Institute) in UG 3rd year, Indian Institute of Technology (IIT), Kanpur, 1999.

ARDB (Aeronautical Research and Development Board, India) scholarship for having 10 hours of flight experience, 1999.

Recognition by Punjab State Education Minister for good academic and extra-curricular activities performance in high-school, 1995.

Professional Affiliations

Senior Member, **American Institute of Aeronautics and Astronautics** (AIAA)

Member, **American Astronautical Society** (AAS)

Member, **Institute of Electrical and Electronics Engineers** (IEEE)

Member, **Society for Industrial and Applied Mathematics** (SIAM)

Services

Departmental Service

Completed course evaluations as a part of MAE ABET team.

Co-Organizer for MAE Graduate Seminar Series, Fall 2007–Fall 2010.

Services (suite)

Member of MAE Undergraduate Committee (UGC) at University at Buffalo, Spring 2008–Fall 2010.

Member of MAE Ph.D qualification Exam Preparation Committee, Fall 2007–Present.

Advised MAE Senior Undergraduate Students, Fall 2007–Present.

Member of department open house committee for in-coming undergraduate students.

School Service

Member of organizing committee for workshop titled **Probabilistic Analysis of Volcanic Hazards: Current Methodologies and Vision for Future Efforts** held at University at Buffalo from 16–19 May, 2011.

Faculty advisor to a group of EE/MAE students participating in Revolutionary Aerospace Systems Concepts Academic Linkage (RASCAL) Exploration Robo-Ops Competition Organized by NASA and NIA.

Member of Extreme Event Faculty Search Committee.

Served as a judge at University at Buffalo Sigma Xi Research Day. (2008, 2009)

Advised UB-Intelligent Ground Vehicle Competition Team for 2008 IGVC.

Co-op advisor (Fall 2008, Spring 2009)

Commencement Marshall (2008)

Community Service

Technical area co-chair for 2011 AIAA Guidance, Navigation & Control (GNC).

Associate Editor for 2011 American Control Conference (ACC).

Served as a chair for 2010 AIAA Guidance, Navigation & Control (GNC) best paper award committee.

Served as a judge for 2009 and 2010 AIAA Guidance, Navigation & Control (GNC) student Award.

Served as a judge for 2009 AIAA Guidance, Navigation & Control (GNC) best paper award.

Services (suite)

Proposer and Session chair of invited session titled “New methods for Uncertainty Characterization and Management in Dynamical Systems,” in 2010 American Control Conference, June 30–July 2, 2010.

Member of AIAA-Guidance, Navigation & Control Technical Committee.

Interviewed by CNN, NPR, NY-Times, National Post, The Associated Press, The Buffalo News, and WROW in Albany for a story about the tragic crash of Continental Flight 3407.

Panel Reviewer for NSF’s CMMI Division.

Served as a judge for student paper competition at 2009 AIAA Guidance, Navigation and Control Conference.

Session Chair, “Estimation, Tracking, and Fault Detection for Unmanned Vehicles,” AIAA Guidance, Navigation, and Control Conference, Aug 10–Aug 13, 2009.

Session Chair, “Attitude Estimation,” F. Landis Markley Astronautics Symposium, June 29–July 2, 2008.

Session Chair, “Optimal Control I,” 2007 IEEE Conference on Decision and Control, December 11–14, 2007.

Journal/Conference Manuscript Review

Journal of Astronautical Sciences, International Journal of Applied Mathematics and Computer Science, Celestial Mechanics, AIAA Journal of Guidance, Control and Dynamics, IEEE Transactions on Aerospace and Electronic Systems, Elsevier Aerospace Science and Technology, IEEE Transactions on Robotics, Elsevier Journal for Advances in Space Research, IEEE Transactions on Automatic Control, IFAC Journal Automatica, AIAA Journal of Spacecraft and Rockets, IEEE Transactions on Neural Networks, ASME Journal of Dynamic Systems, Measurement and Control, IEEE Transactions on Vehicular Technology, Transactions on Systems, Man, and Cybernetics–Part B: Cybernetics, IEEE Transactions on Instrumentation & Measurement, IEEE Multi-conference on Systems and Control (2007), IEEE Control and Decision Conference (2008), IEEE International Symposium on Circuits and Systems (2008), AIAA Guidance, Navigation and Control Conference (2008, 2009, 2010), American Control Conference (2008, 2009, 2010).

Courses Taught

University at Buffalo (SUNY), Buffalo, NY, 2006–Present

MAE 502

Sp. Tp.: Multi-Resolution Methods in Dynamics and Control [Fall 06 (5), Fall 07 (6)].

Courses Taught (suite)

- MAE 444/544** Digital Control Systems [Spring 07 (17), Spring 08 (18), Spring 09 (15), Spring 10 (40)].
- MAE 436** Flight Dynamics [Fall 08 (62), Fall 09 (59), Fall 10 (57)].
- MAE 674** Optimal Estimation [Spring 09 (10 officially registered, 5 Audited), Spring 10 (10)].
- MAE 675** Multi-Resolution Approximation Methods [Spring 10 (10)].

Texas A&M University, College Station, TX, 2002 – 2006

- AERO 624** Celestial Mechanics (Spring 06).
- AERO 625** Estimation of Dynamical Systems (co-taught with Dr. J. L. Junkins, Fall 02, Fall 03, Fall 04, Fall 05).
- Special lectures on “Dynamical State Estimation Algorithms,” in graduate-level course, “Attitude Estimation,” Spring-04.
- Special lectures on “Hypergeometric Functions,” in graduate-level course, “Celestial Mechanics,” Spring 04.
- Special lecture on “Probability Concepts for LQG Controller Design,” in graduate-level course, “Digital Control System Design,” Fall 02.

Research Supervision (University at Buffalo)

Ph.D. Dissertation

- Graduated** Mr. Jemin George (Co-Advised with Prof. John Crassidis): Ph.D., Summer 2007-May 2010.
Dissertation Title: *An Adaptive Disturbance Accommodation Approach for Robust Control and Fault Detection in Uncertain Stochastic Systems*
- Current** Mr. Ron Heichman: Ph.D., Fall 2011-Present, Expected Graduation: May 2015.
- Mr. Reza Madankan: Ph.D., Fall 2008-Present, Expected Graduation: Dec. 2012.
Topic: *A Computational Framework for State and Parameter Estimation of Distributed Parameter Systems.*
- Mr. Cheng Jin: Ph.D., Summer 2008-Present, Expected Graduation: May 2012.
Topic: *A Hierarchical Multi-Functional Approach for Scattered-Data Approximation.*

Research Supervision (University at Buffalo) (suite)

Master's Thesis

Graduated

Mr. Asad Ali: M.S., Summer 2008–Aug. 2009.

Thesis Title: *Polynomial Chaos based Approach for State Limited Robust Control of Systems with Parametric Uncertainty.*

Mr. Jonathan Missel: M.S., Presidential Fellow, Summer 2008–Aug. 2009.

Thesis Title: *Design Development and Control of Mobile Biaxial Inverted Pendulum.*

Mr. Chen Lin: M.S., Summer 2008–Aug., 2009.

Thesis Title: *A Global-Local Approach for Optimal Trajectory Generation.*

Mr. S. G. Manyam (Co-Advised with Prof. Tarunraj Singh): M.S., Fall 2006- May 2008.

Thesis Title: *Adaptive Sequential Linear Programming for Optimal Control Profiles.*

Mr. Baro Hyun: M.S., Fall 2006-Summer 2008.

Thesis Title: *State Estimation For Vision-Based Simultaneous Localization and Mapping of Unmanned Vehicles.*

Mr. Subramaniam Iyer: M.S., Fall 2006- Fall 2008.

Thesis Title: *Time Optimal Trajectory Generation for a Differential Drive Robot.*

Current

Mr. Adurthi Nagavenkat: M.S., Fall 2010-Present, Expected Graduation: Dec. 2011.

Topic: *Optimal Data Association and Sensor Management for Space Situational Awareness.*

Mr. Kumar Vishwajeet: M.S., Spring 2010-Present, Expected Graduation: Summer 2011.

Topic: *Bayesian State Estimation for Nonlinear Dynamical Systems using Gaussian Mixture Models.*

Mr. Daniel Giza: M.S., Summer 2008-Present, Expected Graduation: May 2011.

Topic: *Adaptive Gaussian Sum Filter for Orbit Estimation.*

Mr. Thomas Leach: M.S., Spring 2008-Present, Expected Graduation: Dec. 2009.

Topic: *A Nonlinear Control Approach for UAV formation flying*

Master's Project

Graduated

Jooseong Kim: M.S., Mechanical & Aerospace Engineering, University at Buffalo, SUNY, Fall 2008-Summer 2010.

Project Title: *Target Tracking using the Kalman Filter.*

Research Supervision (University at Buffalo) (suite)

Mr. Christopher Wirz: M.S., Mechanical & Aerospace Engineering, University at Buffalo, SUNY, Fall 2006-Summer 2008.

Project Title: *Multi-Input Modeling using Sparsity Constraints with Global-Local Approximation.*

Undergraduate Research Supervision

Mr. Ron Heichman: Zimmer Research Scholarship Program, CSTEP intern, "Study of Stochastic Dynamic Systems," Spring 10–Summer 11.

Mr. Osaka Shepherd: CSTEP intern, "Modeling and Control of 6-DOF Flexible Robotic Arm," Summer 10.

Mr. Carl Javier and Xue Ian Wang: Undergraduate Research Assistant, "Motion Planning for Un-manned Ground Vehicle," Summer 10–Fall 10.

Mr. Geoffrey Hahn: Zimmer Research Scholarship Program, NASA Space Grant Fellowship, Senior Design Project, "Dynamic State Estimation," Spring 07–Fall 08.

Mr. Rohan Sood: Zimmer Research Scholarship Program, Senior Design Project, "Adaptive Control of a Quad-Rotor," Spring 08, Summer 08, Fall 08.

Mr. Jonathan Missel: Senior Scholarship Program, Zimmer Research Scholarship Program, NASA Space Grant Fellowship "Design and Control of Balancing Ball Robot," Spring 07–Spring 08.

Mr. Kurt A. Cavalieri: Senior Scholarship Program, "Autonomous Position and Orientation Control of a Helicopter," Spring 08.

Mr. Thomas Leach: Zimmer Research Scholarship Program, NASA Space Grant Fellowship, "Nonlinear Control of Quadrotor," Summer 07, Fall 07.

Mr. Michael Rausch: Zimmer Research Scholarship Program, "Feature Tracking for Autonomous Motion Planning of a Robotic Vehicle," Spring 07.

Mr. Brandon Brown, Mr. David Winchcombe, Miss Melinda Harrison: Senior Design Project, "Design of a Micro Air Vehicle (MAV)," Spring 07.

Mr. Vincent Koomson: SUNY Louis Stokes Alliance for Minority Participation (SUNY LSAMP) sponsored by NSF, Fall 06.

Research Supervision (University at Buffalo) (suite)

Visiting Scholar

Mr. Óscar Pérez Concha, Ph.D., Computer Science, Universidad Carlos III de Madrid, Colmenarejo, Spain, Fall 07–Spring 08.

Project Title: *Development of Adaptive Gaussian Sum Approach for Expectation Maximization.*

Thesis and Dissertation Committees Served

Ph.D.

Sean R. Semper, Ph.D., August 2011.

Dissertation Title: *Optimal and Efficient Geolocation and Path Planning for Unmanned Aerial Vehicles using Uncertainty Measures*

Gabriel Terejanu, Ph.D., Computer Science & Engineering, May 2010.

Dissertation Title: *Towards a Decision-Centric Framework for Uncertainty Propagation and Data Assimilation.*

Umamaheswara Konda, Ph.D., May 2010.

Dissertation Title: *Bayesian Inference and Uncertainty Propagation in Dynamical Systems.*

Hakjae Kim, Ph.D., May 2010.

Dissertation Title: *Nonlinear Filtering using the Complex-Step Derivative Approximation.*

Sebastian Schafer, Ph.D., Dec. 2009.

Dissertation Title: *Filtered Region of Interest Computed Tomography.*

Badr N. Alsuwaidan, Ph.D., Sep. 2008.

Dissertation Title: *Generalized Multiple Model Adaptive Estimation.*

M.S.

J. Thierry Jean Baptiste: M.S., May 2011.

Thesis Title: *Design, Manufacture and Test of a 3 DoF (Degree of Freedom) Haptic End-Effector.*

Christoph Bernhard Hoog Antink: M.S., May 2011.

Thesis Title: *Prediction of Tumor Deformation for Image Guided Radiation Therapy.*

Jeremy M. Marschke: M.S., May 2011.

Thesis Title: *Generalized Multiple Model Adaptive Attitude Estimation Without Rate Gyros.*

Kerk Cheng Kee, M.S., May 2011.

Thesis Title: *Minimax Design of Parallel Multi-Mass Dynamic Vibration Absorbers.*

Research Supervision (University at Buffalo) (suite)

Max Rech: M.S., Feb. 2011.

Thesis Title: *Uncertainty Characterization for Advection/Diffusion Equations.*

Richard Linares: M.S., Feb. 2011.

Thesis Title: *Constrained Relative Attitude Determination for Two Vehicle Formations.*

Shivaswamy Anirudh: M.S., Feb. 2011.

Thesis Title: *Robust Attitude Estimation In The Presence of Magnetic Disturbances.*

Jennifer Haggerty: M.S., May 2010.

Thesis Title: *Minimax Control of Flexible Structures Using Quadratically Constrained Programming.*

Brandon Brown: M.S., Dec. 2009.

Thesis Title: *Global Optimization of Three Dimensional Maneuvers in a Field with Obstacles.*

Ravi Kumar: M.S., Sep. 2009.

Thesis Title: *Tumor Motion Prediction For Image Guided Radiation Therapy.*

Xinyan Li: M.S., Sep. 2009.

S. P. Ailaboni: M.S., Feb. 2009.

Thesis Title: *Modeling of Haptic Attribute Data for Handwriting Skill.*

Matthias Schmid: M. S., Feb. 2009.

Thesis Title: *Robust Reduced Order Control for Nonlinear Distributed Systems of Burgers' Class.*

Qiushi Fu: M.S., Sep. 2008.

Thesis Title: *Kinematics of Articulated Wheeled Robots: Exploiting Reconfigurability and Redundancy.*

Hao Su: M.S., Sep. 2008.

Thesis Title: *Cooperative Control of Nonholonomic Mobile Manipulator Collective.*

Michael S. Andrlé: M.S., June 2008.

Thesis Title: *Deterministic Relative Attitude Determination of Formation Flying Spacecraft.*

William D. Banas: M.S., June 2008.

Thesis Title: *Micro-arcsecond Line-of-Sight Filtered Performance for Spacecraft Formation Flying.*

Research Supervision (University at Buffalo) (suite)

Sean Semper: M.S., June 2008.

Thesis Title: *Decentralized Geolocation and Optimal Path Planning using Unmanned Aerial Vehicles.*

Anand Naik: M.S., Feb. 2008.

Thesis Title: *Role of Vehicle Dynamic Modeling Fidelity with Haptic Collaboration in Steer-by-Wire Systems.*

Matthew L. Vossler: M.S., Sep. 2007.

Thesis Title: *Deformation-Limited Time-Optimal Control of Flexible Structures.*

Jemin George: M.S., June 2007.

Thesis Title: *Kalman Filter Approach to Model-Error Control Synthesis.*

Umamaheswara Reddy: M.S., June 2007.

Thesis Title: *Data Assimilation for Dispersion Models.*

Vijay Elavunkal: M.S., Dec. 2010.

Project Title: *Parallel Link Robotic Input/Output Manipulator for Tele-Robotics.*

Brenna Stachweicz: M.S., Sep. 2008.

Project Title: *A Graphical User Interface for Eigenstructure Assignment for Linear Systems.*

Oral Exam

Santiago Walter Balbin: M.S., Feb. 2011.

Hak-Jae Kim: M.S., June 2008.

Grant Support

Current

“CAREER: Uncertainty Propagation and Data Assimilation for Toxic Cloud Prediction,” NSF’s Control System Program, PI: **Puneet Singla**, \$411,982 for 5 years, Aug. 2011– July 2016.

“Information Collection and Fusion for Space Situational Awareness,” AFOSR’s Young Investigator Program, PI: **Puneet Singla**, \$350,652 for 3 years, Jan. 2011–Dec. 2014.

“Synthesis of Road Networks by Data Conflation,” Air Force Research Laboratory, PI: Tarunraj Singh (UB, 55%), Co-PI: **Puneet Singla** (UB, 45%), \$149,959 for 3 years, Oct. 2010–Sep. 2013.

Grant Support (suite)

“Realistic State and Measurement Error Uncertainty Computation and Propagation for Space Surveillance and Reconnaissance,” Air-Force STTR Proposal (Proposal # F09B-T11-0145) in collaboration with Pacific Defense Solutions, HI, PI: **Puneet Singla** (UB, 60%), Co-PI: John Crassidis (UB, 40%), \$40,000 for 9 months, April 2010–Jan. 2011.

“Image Guided Tracking of Internal Organ and Tumor Motion for Conformal Radiation Therapy,” NSF’s Control System Program, PI: **Puneet Singla** (UB, 45%), Co-PIs: Tarunraj Singh (UB, 45%), Matthew Podgorsak (RPCI, 10%), \$299,688, Sep. 2009–Aug. 2012.

“DynSyst Special Topics: Convex Optimization Based Approach for High Fidelity Uncertainty Propagation Through Nonlinear Dynamic Systems,” NSF’s Applied Mathematics Program, PI: **Puneet Singla** (UB, 100%), \$160,067, Aug. 2009–Aug. 2011.

“Reducing Guidance, Navigation and Control System Design for Operational Responsive Space Missions Through Adaptive Estimation and Control,” AFRL, PI: John Crassidis (UB, 55%), Co-PI: **Puneet Singla** (UB, 45%), \$659,158 (Year 1 \$158,897, Year 2 \$191,373, Year 3 \$308,888), July 2009–Oct. 2012.

“A Multiresolution Approach for Modeling and Forecasting of Geospatial Activities,” 2008 NGA University Research Initiatives (NURI) Program, PI: **Puneet Singla** (UB, 40%), Co-PI: Tarunraj Singh (UB, 30%), Peter Scott (UB, 30%) \$448,640 for 3 Years, Aug. 2008–Aug. 2011.

Completed

“Revolutionary Aerospace Systems Concepts Academic Linkage (RASCAL) Exploration Robo-Ops,” Student Rover Competition Organized by NASA and NIA, PI: **Puneet Singla**, \$10,000, Feb. 2011–May 2011.

“Particle Trajectories in Volcanic Plumes: Tracking the 2010 Eyjafjallajökull Plume,” National Science Foundation, PI: M. I. Bursik (UB), Co-PIs: **Puneet Singla**, A. K. Patra, E. B. Pitman, Tracy K. P. Gregg, \$50,000 for a year, June 2010–May 2011.

“Enhancement of Breast Cancer Radiotherapy by Image-Guided Tracking of Tumor Motion,” UB 2020 Interdisciplinary Research Development Fund (IRDF), PI: Puneet Singla (UB, 45%), Co-PIs: Tarunraj Singh (UB, 45%), Matthew Podgorsak (RPCI, 10%), \$32,000, July 2008–July 2009.

“Terrain Guided Automated Precision Landing,” sub-contract from Starvision Technologies Inc. for NASA Phase-II SBIR proposal (Proposal # X6.03-7903), PI: **Puneet Singla** (UB, 100%), \$24,000 for six months, Feb. 08-Sep. 08.

Publications

Books

- B1** P. Singla and J. L. Junkins, "Multi-Resolution Methods for Modeling and Control of Dynamical Systems," CRC press, Aug., 2008.

Journal Publications

- J17** J. George, P. Singla and J. Crassidis, "Adaptive Stochastic Disturbance Accommodating Control," *International Journal of Control*, Vol. 84, Issue 2, Feb. 2011, 310–335, DOI:10.1080/00207179.2010.551142.
- J16** G. Terejanu, P. Singla, T. Singh and P. Scott, "Adaptive Gaussian Sum Filter for Non-linear Bayesian Estimation," *IEEE Transactions on Automatic Control*, vol.PP, no.99, pp.1, DOI: 10.1109/TAC.2011.2141550.
- J15** U. Konda, P. Singla, T. Singh, and P. Scott, "State Uncertainty Propagation in the Presence of Parametric Uncertainty and Additive White Noise," *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 133, Issue 5, Sep. 2011, DOI:10.1115/1.4004072.
- J14** G. Terejanu, P. Singla, T. Singh and P. Scott, "A Decision-Centric Framework for Density Forecasting," *Journal of Advances in Information Fusion*, Vol. 55, No. 2, Dec. 2010.
- J13** U. Konda, T. Singh, P. Singla and P. Scott, "Uncertainty Propagation in Puff-based Dispersion Models using Polynomial Chaos," *Environmental Modelling & Software*, Volume 25 No. 12, December, 2010, DOI:10.1016/j.envsoft.2010.04.005.
- J12** T. Singh, P. Singla, and U. Konda, "Polynomial Chaos based design of Robust Input Shapers," *ASME Journal of Dynamic Systems, Measurement, and Control*, Vol. 132, No. 5, September 2010, DOI:10.1115/1.4001793.
- J11** P. Singla and T. Singh, "Desired Order Continuous Polynomial Time Window Functions for Harmonic Analysis," *IEEE Transactions on Instrumentation and Measurements*, Vol. 59, No. 9, September 2010, DOI:10.1109/TIM.2009.2036400.
- J10** M. Kumar, S. Chakravorty, P. Singla, and J. L. Junkins, "The Partition of Unity Finite Element Approach with h-p refinement to the Stationary Fokker-Planck Equation," *Journal of Sound and Vibration*, Vol. 327, Issues 1-2, 144–162, Oct. 2009, DOI: 10.1016/j.jsv.2009.05.033.
- J9** J. George, G. Terejanu, and P. Singla, "An Adaptive Gaussian Sum Filter for The Spacecraft Attitude Estimation Problem," *The Journal of The Astronautical Sciences*, Vol. 57, No. 1–2, 31–45, Jan.–June 2009.

Publications (suite)

- J8** M. Demirbas, Xuming Lu and **P. Singla**, "An In-Network Querying Framework for Wireless Sensor Networks," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 20, No. 8, 1202–1215, Aug. 2009, [DOI:10.1109/TPDS.2008.217](https://doi.org/10.1109/TPDS.2008.217).
- J7** **G. Terejanu**, **P. Singla**, T. Singh, and P. D. Scott, "Uncertainty Propagation for Non-linear Dynamical Systems using Gaussian Mixture Models," *AIAA Journal of Guidance, Control and Dynamics*, Vol. 31, No. 6, 1623-1633, Nov. 2008, [DOI:10.2514/1.36247](https://doi.org/10.2514/1.36247).
- J6** D. Mortari, F. L. Markley and **P. Singla**, "Optimal Linear Attitude Estimator," *AIAA Journal of Guidance Control and Dynamics*, Vol.30, No.6, pp. 1619-1627, 2007, [DOI:10.2514/1.29568](https://doi.org/10.2514/1.29568).
- J5** **P. Singla**, T. D. Griffith, A. Katake and J. L. Junkins, "Attitude and Interlock Angle Estimation Using Split-Field-of-View Star Tracker," *The Journal of The Astronautical Sciences*, Volume, 55, No. 1, Jan 2007.
- J4** **P. Singla**, K. Subbarao and J. L. Junkins, "Direction Dependent Learning for Radial Basis Function Networks," *IEEE Transaction on Neural Networks*, Vol. 18, pp. 203-222, Jan. 2007, [DOI:10.1109/TNN.2006.881805](https://doi.org/10.1109/TNN.2006.881805).
- J3** **P. Singla**, K. Subbarao, and J. L. Junkins, "Adaptive Output Feedback Control for Spacecraft Rendezvous and Docking under Measurement Uncertainty," *AIAA Journal of Guidance Control and Dynamics*, Vol. 29, No. 4, pp. 892-902, 2006, [DOI:10.2514/1.17498](https://doi.org/10.2514/1.17498).
- J2** D. Mortari and **P. Singla**, "Optimal Cones Intersection Technique," *Journal of Acta Astronautica*, Vol. 59, No. 6, pp. 474-482, Sep. 2006, [DOI:10.1016/j.actaastro.2006.04.004](https://doi.org/10.1016/j.actaastro.2006.04.004).
- J1** J. L. Junkins and **P. Singla**, "How Nonlinear Is It? - A Tutorial on Nonlinearity of Orbit and Attitude Dynamics," *The Journal of Astronautical Sciences*, Vol 52, No. 1-2, Keynote Paper, 7-60, 2004.

Under Review

- U1** C. Verlohren, T. Singh, & **P. Singla**, "Optimal Control Design using Sequential Linear Programming," *Optimal Control, Applications and Methods*, February 2010.
- U2** **J. George**, **P. Singla**, & W. Stannat, "Higher-Order Statistical Approach to Nonlinear Stochastic Optimal Control Problem," *Automatica*, March 2011.
- U3** **J. George**, **P. Singla**, & J. Crassidis, "Adaptive Disturbance Accommodating Control for Stochastic Systems with Control Saturation," *IEEE Transactions on Automatic Control*, May 2011.

Publications (suite)

- U4** M. Bursik, M. Jones, S. Carn, K. Dean, A. Patra, M. Pavolonis, E. B. Pitman, T. Singh, **P. Singla**, P. Webley, H. Bjornsson, and M. Ripepe "Polynomial Chaos Weighted Ensemble modeling of the Eyjafjallajokull plume of 14–18 April 2010," *Science*, May 2011.

Invited/Keynote Publications

- K4** J. L. Junkins, **P. Singla**, D. Mortari, W. Bottke, and D. Durda "A Study of Six Near-Earth Asteroids Having One Year Periods," *International Conference on Computational & Experimental Engineering and Sciences*, Keynote Paper, Dec. 1-6, 2005.
- K3** J. L. Junkins, **P. Singla**, A. Sinclair, and J. Hurtado, "On Coordinate Choices, Regularization, and Degree of Nonlinearity for Dynamical Systems," *International Conference on Computational & Experimental Engineering and Sciences*, Keynote Paper, Dec. 1-6, 2005.
- K2** J. L. Junkins, **P. Singla**, T. D., Griffith, and T. Henderson, "Orthogonal global/Local approximation in N-Dimensions: Applications to I/O Approximation," Invited Paper, *6th Conference on Dynamics and Control of Systems and Structures in Space*, Cinque Terre, Italy, July-2004.
- K1** J. L. Junkins and **P. Singla**, "How Nonlinear Is It? - A Tutorial on Nonlinearity of Orbit and Attitude Dynamics," *Advances in Astronautical Sciences, John L. Junkins Astrodynamics Symposium*, Vol. 115, Keynote Lecture, 3-53, May 23-24, 2003.

Peer-Reviewed Conference Proceedings

- RC32** G. Terejanu, **P. Singla**, T. Singh and P. Scott, "Approximate Propagation of both Epistemic and Aleatory Uncertainty through Dynamic Systems," *The 13th International Conference on Information Fusion, Edinburgh, UK, July 2010*.
- RC31** C. Jin, **P. Singla** and T. Singh, "A Multi-Resolution Approach with Sparseness Property for Input-Output Approximation," *AIAA-2010-8156, 2010 AIAA Guidance, Navigation and Control Conference, Toronto, ON, Aug. 2–Aug. 5, 2010*.
- RC30** U. Konda, **P. Singla**, T. Singh and P. Scott, "State Uncertainty Propagation in the Presence of Parametric Uncertainty and Additive White Noise," *2010 American Control Conference, Baltimore, MD, June 30–July 2, 2010*.
- RC29** G. Terejanu, **P. Singla**, T. Singh and P. Scott, "Approximate Interval Method for Epistemic Uncertainty Propagation using Polynomial Chaos and Evidence Theory," *2010 American Control Conference, Baltimore, MD, June 30–July 2, 2010*.
- RC28** C. Verlohren, T. Singh and **P. Singla**, "Optimal Control Design using Sequential Linear Programming," *2010 American Control Conference, Baltimore, MD, June 30–July 2, 2010*.

Publications (suite)

- RC27** R. Kumar, T. Singh and P. Singla, "Modeling and Uncertainty Quantification of Motion of Lung Tumors for Image Guided Radiation Therapy," *2010 American Control Conference, Baltimore, MD, June 30–July 2, 2010.*
- RC26** C. Jin, P. Singla, and T. Singh, "A Multi-Resolution Approach for Tumor Motion Modeling," *2010 American Control Conference, Baltimore, MD, June 30–July 2, 2010.*
- RC25** X. Li, G. Srimathveeravalli, T. Kesavadas, and P. Singla, "Using Polynomial Chaos Expansion to Model Human Motor Skill," *International Conference on Multimodal Interfaces for Skills Transfer, Bilbao, Spain, 15-16 December, 2009.*
- RC24** G. Srimathveeravalli, X. Li, P. Singla, and T. Kesavadas, "A Novel and Robust Algorithm to Model Handwriting Skill for Haptic Applications," *2009 IEEE International Conference on Systems, Man & Cybernetics, San Antonio, Oct. 11-14, 2009.*
- RC23** C. Lin, P. Singla and T. Singh, "A Global-Local Approach for Trajectory Generation on Rough Terrain," *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC22** P. Singla and T. Singh, "A Probabilistic Approach for Robust Input Shapers Design for Precise Point-to-Point Control," *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC21** D. Giza, P. Singla and M. Jah "An Approach for Nonlinear Uncertainty Propagation: Application to Orbital Mechanics," *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC20** J. George and P. Singla, "Higher Order Statistical Approach to Nonlinear Stochastic Optimal Control Problem," *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC19** J. George, P. Singla and J. L. Crassidis, "Disturbance Accommodating Controller for Uncertain Stochastic Systems with Controller Saturation," *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC18** M. Marwaha, J. Valasek and P. Singla, "Nonlinear System Identification of Discrete Systems using GLO-MAP," Accepted for *2009 AIAA Guidance, Navigation and Control Conference, Chicago, Aug. 10-Aug. 23, 2009.*
- RC17** U. Konda, T. Singh, P. Singla and P. D. Scott, "Uncertainty propagation in puff-based dispersion models using polynomial chaos," *2009 International Fusion Conference, Seattle, WA, July 6-July 9, 2009.*

Publications (suite)

- RC16** G. Terejanu, P. Singla, T. Singh, and P. D. Scott, "Decision Based Uncertainty Propagation Using Adaptive Gaussian Mixtures," *2009 International Fusion Conference, Seattle, WA, July 6-July 9, 2009.*
- RC15** R. Madankan, P. Singla, T. Singh and P. D. Scott, "A Multiresolution Approach for Modeling of Diffusion Phenomenon," *2009 International Fusion Conference, Seattle, WA, July 6-July 9, 2009.*
- RC14** J. George, P. Singla and J. L. Crassidis, "Adaptive Disturbance Accommodating Controller for Uncertain Stochastic Systems," *2009 American Control Conference, St. Louis, Missouri, June 10-12, 2009*
- RC13** G. Terejanu, P. Singla, T. Singh, and P. D. Scott, "Uncertainty Propagation for Nonlinear Dynamical Systems using Gaussian Mixture Models," *AIAA-2008-7472, 2008 AIAA Guidance, Navigation and Control Conference, Honolulu, HI, Aug. 18-Aug. 21, 2008.*
- RC12** P. Singla and T. Singh, "An Adaptive Attitude Control Formulation under Velocity Constraints," *AIAA-2008-6779, 2008 AIAA Guidance, Navigation and Control Conference, Honolulu, HI, Aug. 18-Aug. 21, 2008.*
- RC11** M. Marwaha, J. Valasek and P. Singla, "GLO-MAP Approach for Nonlinear System Identification of Aircraft Dynamics Using Flight Data," *AIAA-2008-6895, 2008 AIAA Guidance, Navigation and Control Conference, Honolulu, HI, Aug. 18-Aug. 21, 2008.*
- RC10** J. George, P. Singla and John Crassidis, "Adaptive Disturbance Accommodating Control using Kalman Filter Estimator," *AIAA-2008-6478, 2008 AIAA Guidance, Navigation and Control Conference, Honolulu, HI, Aug. 18-Aug. 21, 2008.*
- RC9** G. Terejanu, P. Singla, T. Singh, and P. D. Scott, "A Novel Gaussian Sum Filter Methods for Accurate Solution to Nonlinear Filtering Problem," *2008 International Conference on Information Fusion, Cologne, Germany, June 30-July 03, 2008.*
- RC8** P. Singla and K. Subbarao, "Stable Adaptive Reference Trajectory Modification for Saturated Control Applications," *2008 American Control Conference, Seattle, Washington, June 11 - 13, 2008.*
- RC7** P. Singla, T. Singh and S. G. Manayam, "Input Shaping Design Using Sequential Linear Programming for Non-Linear Systems," *2008 American Control Conference, Seattle, Washington, June 11 - 13, 2008.*
- RC6** T. Singh and P. Singla, "Sequential Linear Programming for Design of Time-Optimal Controllers," *2007 IEEE Conference on Decision and Control, New Orleans, LA, Dec. 12-14, 2007.*

Publications (suite)

- RC5** P. Singla, T. Singh and A. Schweikard, "A Multiresolution Adaptive Approach for Respiratory Motion Modeling," *3rd IEEE-NIH Life Science Systems and Applications (LISSA'07)*, Bethesda, Maryland, Nov. 8-9, 2007.
- RC4** P. Singla and J. L. Junkins, "A Hierarchical Control Distribution Approach for Large Scale Over Actuated Systems," *2007 American Control Conference*, New York, NY, July 11-13, 2007.
- RC3** R. Bhattacharya and P. Singla, "Nonlinear Trajectory Generation Using Global Local Approximations," *IEEE Conference on Decision and Control*, San Diego, CA, Dec. 13-15, 2006.
- RC2** S. Chakravorty, M. Kumar, and P. Singla, "A Quasi-Gaussian Kalman Filter," *2006 American Control conference*, Minneapolis, MN, June 14-16, 2006.
- RC1** J. Devis, P. Singla and J. L. Junkins, "Identifying Near-term Missions and Impact Keyholes for Asteroid 99942 Apophis," *7th International Conference On Dynamics and Control of Systems and Structures in Space (DCSSS)*, London, England, July 16-20, 2006.

Conference Proceedings

- C29** R. Linares, K. Vishwajeet, P. Singla and J. Crassidis, "Information Theoretic Space Object Data Association Methods using an Adaptive Gaussian Sum Filter," *AAS-11-148, 2011 AAS/AIAA Spaceflight Mechanics Conference, New Orleans, LA, Feb. 13–Feb. 17, 2011*.
- C28** M. I. Bursik, S. A. Carn, K. G. Dean, A. K. Patra, M. J. Pavolonis, E. B. Pitman, P. Singla, T. Singh, P. Webley, "Ensemble modeling of the Eyjafjallajokull plume of 15-20 April 2010," *American Geophysical Union, Fall Meeting 2010, abstract #V41E-2324*.
- C27** D. Giza, P. Singla, J. Crassidis, R. Linares, P. Cefola, and K. Hill, "Entropy-Based Space Object Data Association Using an Adaptive Gaussian Sum Filter," *AIAA-2010-7526, 2010 AIAA/AAS Astrodynamics Specialist Conference, Toronto, ON, Aug. 2–Aug. 5, 2010*.
- C26** R. Linares, J. Crassidis, and P. Singla, "On-Orbit Gyro Calibration for Operationally Responsive Space Systems," *AIAA-2010-7517, 2010 AIAA/AAS Astrodynamics Specialist Conference, Toronto, ON, Aug. 2–Aug. 5, 2010*.
- C25** R. Linares, P. Singla, and J. Crassidis, "Nonlinear Sequential Methods for Impact Probability Estimation," *AAS-10-151, 2010 AAS/AIAA Spaceflight Mechanics Conference, San Diego, CA, Feb. 14–Feb. 17, 2010*.
- C24** D. Giza, P. Singla, and M. Jah, "An Adaptive Gaussian Sum Filtering Approach for Orbit Uncertainty Estimation," *AAS-10-132, 2010 AAS/AIAA Spaceflight Mechanics Conference, San Diego, CA, Feb. 14–Feb. 17, 2010*.

Publications (suite)

- C23** P. Singla and T. Singh, "A Novel Coordinate Transformation for Obstacle Avoidance and Optimal Trajectory Planning," AIAA-2008-6274, 2008 AAS/AIAA Astrodynamics Specialist Conference and Exhibit, Honolulu, HI, Aug. 18-Aug. 21, 2008.
- C22** G. Terejanu, J. George, and P. Singla, "An Adaptive Gaussian Sum Filter for The Spacecraft Attitude Estimation Problem," F. Landis Markley Astronautics Symposium, Cambridge, MD, June 29–July 2, 2008.
- C21** P. Singla, "Multi-Resolution Modeling of Large Scale Data Sets," First Annual Conference of Center for GeoHazards Studies, Natural Disasters in Small Communities: How Can We Help?, Mar. 29-30, 2008.
- C20** P. Singla, T. Singh, P. Scott, G. Terejanu, Y. Cheng and U. K. V. Reddy, "Accurate Uncertainty Propagation through Nonlinear Systems," First Annual Conference of Center for GeoHazards Studies, Natural Disasters in Small Communities: How Can We Help?, Mar. 29-30, 2008.
- C19** T. Singh, P. Singla, P. Scott, U. K. V. Reddy, G. Terejanu and Y. Cheng, "Data Assimilation for Forecasting Plume Dispersion," First Annual Conference of Center for GeoHazards Studies, Natural Disasters in Small Communities: How Can We Help?, Mar. 29-30, 2008.
- C18** P. Singla and T. Singh, "A Gaussian function Network for Uncertainty Propagation through Nonlinear Dynamical System," 18th AAS/AIAA Spaceflight Mechanics Meeting, Galveston, TX, January 27-31, 2008.
- C17** B. Hyun and P. Singla, "Autonomous Navigation Algorithm for Precision Landing on Unknown Planetary Surfaces," 18th AAS/AIAA Spaceflight Mechanics Meeting, Galveston, TX, January 27-31, 2008.
- C16** P. Singla and S. S. Vaddi, "A Multiresolution Approach for Statistical Mobility Prediction," 44th Annual Technical Meeting of the Society of the Engineering Science, College Station, TX, Oct. 21-24, 2007.
- C15** P. Singla and Tarunraj Singh, "A Review of Polynomial Window Functions," 44th Annual Technical Meeting of the Society of the Engineering Science, College Station, TX, Oct. 21-24, 2007.
- C14** M. Marwaha, J. Valasek and P. Singla, "Nonlinear System Identification of Aircraft Dynamics Using Global-Local Mapping Approximation (GLO-MAP)," 44th Annual Technical Meeting of the Society of the Engineering Science, College Station, TX, Oct. 21-24, 2007.
- C13** M. Kumar, P. Singla, S. Chakravorty, and J. L. Junkins, "The Partition of Unity Finite Element Approach to the Stationary Fokker-Planck Equation," 2006 AIAA/AAS Astro-dynamics Specialist Conference and Exhibit, Keystone, CO, Aug. 21-24, 2006.

Publications (suite)

- C12** M. Kumar, **P. Singla**, S. Chakravorty, and J. L. Junkins, "A Multi-Resolution Approach for Steady State Uncertainty Determination in Nonlinear Dynamical Systems," *38th Southeastern Symposium on System Theory*, Mar. 5-7, 2006.
- C11** **P. Singla**, T. Henderson, J. L. Junkins and J. Hurtado, "A Robust Nonlinear System Identification Algorithm using Orthogonal Polynomial Network," *Advances in Astronautical Sciences, 2005 AAS/AIAA Spaceflight Mechanics Meeting*, Copper Mountain, CO, Vol. 120, Part I, 983-1002.
- C10** **P. Singla**, D. Mortari, and J. L. Junkins, "How to Avoid Singularity for Euler Angle Set?," *Advances in Astronautical Sciences, 2004 Spaceflight Mechanics Meeting Conference*, Maui, Hawaii, Vol. 119, Part II, 1409-1426.
- C9** **P. Singla**, T. D. Griffith and J. L. Junkins, "Attitude and Interlock Angle Estimation for the GIFTS Mission," *Advances in Astronautical Sciences, 2004 AAS/AIAA Spaceflight Mechanics Meeting*, Maui, Hawaii, Vol. 119, Part I, 301-324.
- C8** **P. Singla**, K. Subbarao, T. D. Griffith and J. L. Junkins, "Autonomous Focal Plane Calibration by an Intelligent Radial Basis Function Network," *Advances in Astronautical Sciences, 2004 AAS/AIAA Spaceflight Mechanics Meeting*, Maui, Hawaii, Vol. 119, Part I, 275-300.
- C7** **P. Singla**, K. Subbarao, O. Rediniotis, and J. L. Junkins, "Intelligent Multi-Resolution Modeling: Application to Synthetic Jet Actuation and Flow Control," Paper # AIAA-2004-0774, *42nd AIAA Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, Jan. 5-8 2004.
- C6** L. Traub, A. Miller, **P. Singla**, M. Tandale, J. L. Junkins and O. Rediniotis, "Distributed Hingeless Flow Control and Rotary Synthetic Jet Actuation," Paper # AIAA-2004-0224, *42nd AIAA Aerospace Sciences Meeting and Exhibit*, Reno, Nevada, Jan. 5-8 2004.
- C5** **P. Singla**, K. Subbarao, D. Hughes and J. L. Junkins, "Structured Model Reference Adaptive Control For Vision Based Spacecraft Rendezvous and Docking," *Advances in Astronautical Sciences, 2003 AAS/AIAA Spaceflight Mechanics Meeting*, Ponce, Puerto-Rico, Vol. 114, 55-75.
- C4** **P. Singla**, J. L. Crassidis and J. L. Junkins, "Spacecraft Angular Rate Estimation Algorithms for Star-Tracker Based Attitude Determination," *Advances in Astronautical Sciences, 2003 AAS/AIAA Spaceflight Mechanics Meeting*, Ponce, Puerto-Rico, Vol. 114, 1303-1317.
- C3** **P. Singla**, T. D. Griffith, J. L. Crassidis and J. L. Junkins, "Attitude Determination and Autonomous On-orbit Calibration of Star Tracker for GIFTS Mission," *Advances in Astronautical Sciences, 2002 AAS/AIAA Spaceflight Mechanics Meeting*, San Antonio, TX, Vol. 112, Part I, 19-39.

Publications (suite)

- C2** T. D. Griffith, **P. Singla** and J. L. Junkins, "Autonomous On-orbit Calibration Approaches for Star Tracker Cameras," *Advances in Astronautical Sciences, 2002 AAS/AIAA Spaceflight Mechanics Meeting*, San Antonio, TX, Vol. 112, Part I, 39-51.
- C1** M. Samaan, T. D. Griffith, **P. Singla** and J. L. Junkins, "Autonomous On-orbit Calibration of Star Trackers," *2001 Core Technologies for Space Systems Conference*, Colorado Springs, CO, Nov. 28-30 2001.

Invited Talks/Seminar

- **P. Singla**, "Certain Thoughts on Uncertainty Analysis for Dynamical Systems," Workshop for Probabilistic Analysis of Volcanic Hazards: Current Methodologies and Vision for Future Efforts, University at Buffalo, 16-19 May, 2011.
- **P. Singla**, "Certain Thoughts on Uncertainty Analysis for Dynamical Systems," Department of Mechanical & Aerospace Engineering, University of Florida, April 5th, 2011.
- **P. Singla**, "High Fidelity Modeling and Forecasting of Geospatial Activities ," National Geospatial-Intelligence Agency, Reston, VA, June 2010.
- **P. Singla**, "No More Gambling With Monte Carlo Methods," Space & Defense Group, Moog Inc., Buffalo, NY, Jan 15th, 2010.
- **P. Singla**, "Uncertainty Propagation Through Nonlinear Dynamical Systems," Department of Mechanical and Aerospace Engineering, University at Buffalo, Oct 17th, 2006.
- J. L. Junkins, **P. Singla** and J. Davis, "Impact Keyholes and Collision Probability Analysis for Resonant Encounter Asteroids," NASA NEO Workshop, Vail, CO, 2006.
- **P. Singla**, "Multi-Resolution Methods for Modeling of Dynamical Systems," Department of Mechanical and Aerospace Engineering, University of Florida, March 30th, 2006.
- **P. Singla**, "Multi-Resolution Methods for Modeling of Dynamical Systems," Department of Mechanical and Aerospace Engineering, University at Buffalo, March 24th, 2006.
- **P. Singla**, "Multi-Resolution Methods for Modeling of Dynamical Systems," Department of Mechanical Engineering and Material Sciences, Duke University, March 9th, 2006.
- **P. Singla**, "Multi-Resolution Methods for Modeling of Dynamical Systems," Department of Mechanical Engineering, Worcester Polytechnic Institute, March 3rd, 2006.
- **P. Singla**, "A Multi-Resolution Approach for High Fidelity Modeling and Control Allocation in Large-Scale Dynamical Systems," Texas A&M University, November 1, 2005.