Ramchander Bhaskara

PhD · Aerospace Engineering · Texas A&M University

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Education

Texas A&M University *College Station, TX*

PhD in Aerospace Engineering *Jun 2021 - Aug 2025*

- Dissertation: Real-time Signal Processing and State Estimation for Spaceflight Applications
- Committee: Drs. Manoranjan Majji (advisor), Felipe Guzmán, John Junkins, Tim Davis

Texas A&M University *College Station, TX*

MS in Aerospace Engineering *Aug 2019 - May 2021*

- Thesis: Hardware implementation of navigation filters for automation of dynamical systems

National Institute of Technology *Trichy, India*

BTech in Instrumentation and Control Engineering *Aug 2013 - Apr 2017*

- Thesis: Physics-based modeling of selective catalytic reduction system

Professional Experience

2019 - 2025 **Graduate Teaching & Research Assistant**, Land, Air, and Space Robotics Lab, Texas A&M University
- Lead developer of simulation and validation architecture for optical space-scene modeling software.
- Lead researcher of signal processing architecture for interferometric phase measurement system.

2023 **Research Affiliate**, Robotics, NASA Jet Propulsion Lab
Perception for sampling autonomy of Europa Lander. Multi-sensor modeling for passive and active machine vision for lander arm mobility.

2022 **Student Researcher**, Robotics, NASA Jet Propulsion Lab
IMU adaptive noise cancellation, Radar odometry for vehicle velocity state estimation.

2017- 19 **Intellectual Property Associate**, iRunway India
Subject matter specialist on 5G Radio Access Network (RAN) infrastructure.

Publications

Published

Ramchander Bhaskara, Roshan T Eapen, and Manoranjan Majji. 2025. Development and Validation of Velocimeter Lidar Simulator. AIAA SciTech. [Poster][Paper]

Ramchander Bhaskara, Manoranjan Majji, and Felipe Guzman. Quantized State Estimation for Linear Dynamical Systems. Sensors 2024. [Paper]

Ramchander Bhaskara, G Georgakis, J Nash, J Bowkett, M Cameron, A Ansar, P backes, and M Majji. 2024. Icy Moon Surface Simulation and Stereo Depth Estimation for Sampling Autonomy. IEEE Aerospace Conference. [Paper] [Software]

Ramchander Bhaskara, Roshan T Eapen, and Manoranjan Majji. 2023. Differentiable Rendering for Pose Estimation in Proximity Operations. (**Finalist, graduate student papers**) AIAA Scitech Forum. [Paper]

Ramchander Bhaskara, Kookjin Sung, and Manoranjan Majji. 2022. An FPGA framework for Interferometric Vision-Based Navigation (iVisNav). 41^{st} Digital Avionics and Systems Conference. (**Best student research paper**). [Paper]

Ramchander Bhaskara, and Manoranjan Majji. 2022. FPGA Hardware Acceleration for Feature-Based Relative Navigation Applications. 2022 AAS/AIAA Astrodynamics Specialist Conference. [Paper]

Andrew Verras, Roshan T Eapen, Andrew Simon, Manoranjan Majji, **Ramchander Bhaskara**, Carolina I Restrepo, and Ronney Lovelace. 2021. Vision and Inertial Sensor Fusion for Terrain Relative Navigation. AIAA 2021 Scitech Forum. [Paper]

Kookjin Sung, **Ramchander Bhaskara**, and Manoranjan Majji. 2020. Interferometric Vision-Based Navigation Sensor for Autonomous Proximity Operation. 39^{th} Digital Avionics and Systems Conference. [Paper]

In Review

Ramchander Bhaskara, Roshan T Eapen, Manoranjan Majji, and Davis Adams. On applications of high-fidelity visual data synthesis in space mission designs. Journal of Advances in Space Research.

In Preparation

Zach Ulibarri, **Ramchander Bhaskara**, et al. CRISPI Mass Spectrometer Mission Concept for an Astrobiological Flyby of Ariel. Abstract submitted to American Geophysical Union (AGU).

Ramchander Bhaskara, Manoranjan Majji, and Felipe Guzman. All Digital Phase Locked Loop for Optomechanical Accelerometer Sensor.

Ramchander Bhaskara, and Manoranjan Majji. Estimation of Linear System States from Quantized Inputs and Measurements.

Awards, Fellowships, Grants & Committees

2025	**Cornell Mission Design School**, Avionics lead for cubesat mission concept for in-situ exploration of Ariel
2024	**AIAA**, Guidance, Navigation, and Control Graduate Award
2024	**Member of AIAA technical committee**, Sensor Systems and Information Fusion
2023	**Finalist, GNC Conference Graduate student papers**, SciTech Forum 2023
2021-24	**Graduate Excellence Fellowship**, Dept. of Aerospace Engineering, Texas A&M University
2022	**2nd place, Best student research papers**, Digital Avionics Systems Conference (DASC)
2022	**ASIE Scholarship**, American Society of Indian Engineers and Architects, Houston
2021	**NASA TechLeap Prize**, Control systems lead for autonomous sub-orbital plume tracking experiment, NASA Flight Opportunities Program

Talks

Ramchander Rao Bhaskara. 2025 (upcoming). High-fidelity space scene modeling for planetary exploration. University of Wisconsin-Madison.

Ramchander Rao Bhaskara. 2023. Scratching the Surface of Europa and Enceladus. Jet Propulsion Laboratory, Caltech.

Ramchander Rao Bhaskara. 2023. Study of Topology of Icy Moons. Jet Propulsion Laboratory, Caltech.

Ramchander Rao Bhaskara, Roshan T Eapen, Andrew Verras and Manoranjan Majji. 2021. Texas A&M ScORE: Space Object Rendering Engine. Lunar Surface Innovation Consortium, Applied Physics Laboratory, John Hopkins University.

Teaching

2024	**AERO 423:Orbital Mechanics**, Teaching Assistant [Course work]	*Spring & Fall*
2023	**Digital Signal Processing**, Seminar talk	*Fall*

Mentoring

2024-25	**Team Lunatyx**, 2 graduate students, Lunar Autonomy challenge 2025	*TAMU*
2024	**Omar Mohmand**, undergraduate student, Trajectory Design for Mars rendezvous	*TAMU*
2024	**Marco Peredo**, undergraduate student, Trajectory Design for Jupiter rendezvous	*TAMU*

Funding Proposals

High-Fidelity Terrain and Sensor Simulation Pipeline for Planetary Surface Exploration. Jet Propulsion Laboratory - Strategic University Research Program. 2024. [Not selected]
Ramchander Bhaskara, Manoranjan Majji (TAMU), Georgios Georgakis (JPL), Kevin Hand (JPL), Adnan Ansar (JPL).

Event-Based Optical Sensors for Meteoroid Tracking. NASA Postdoctoral Program. 2025.
Ramchander Bhaskara, Paul Abell (NASA JSC).

Select Projects

Optimal Control

- Model predictive control for thrust vector control rocket landing., safe-landing of dual-rotor drones [Code].
- Select problems on optimal spacecraft maneuvers and attitude control [Project document].
- Onboard PID control for gimbal lock of sub-orbital imaging payload for plume tracking [Video: Scaled-down model, News].

Sensing and Navigation

- Numerically robust Kalman filters for inertial navigation [Poster].
- Velocimetry using Lidar, visual sensor simulations., point-cloud registration, and 6-DoF pose estimation [Paper, Poster].
- Drone state estimation via GNSS-IMU fusion using extended Kalman filter and unscented Kalman filter algorithms [code].
- Realistic sensor simulations using ray-tracing. Spacecraft pose estimation using convolutional neural nets [Document].

Digital Signal Processing

- Digital phase-locked loop circuit for high precision phase measurement from laser interferometry [PhD thesis].
- Developed FPGA embedded IPs that include digital filters (FIR/IIR), digital controllers (PID), signal analysis tools (FFT).
- Adaptive filtering for active noise cancellation from accelerometers for velocity state estimation [JPL RACER program].

Service

2024 - 26 **American Institute of Aeronautics and Astronautics**, Member of technical committee
2023-25 **Aerospace Engineering Graduate Student Association**, Professional Development Chair
2020-25 **Texas A&M University Science Festival**, Volunteer
2017 - 19 **Bhumi (NGO)**, Volunteer Teacher of Physics *Bangalore*

REVIEWED: Transactions on Computers, IEEE Control Systems Letters, American Control Conference, AIAA SciTech Forum, Journal of Astronautical Sciences (JAS), Journal of Guidance, Control, and Navigation (JGCD).

References

Prof. Manoranjan Majji — Texas A&M University
Professor, Dept. of Aerospace Engineering — mmajji@tamu.edu

Prof. Felipe Guzman — University of Arizona
Professor of Optical Sciences — felipeguzman@arizona.edu

Prof. John Junkins — Texas A&M University
Professor, Dept. of Aerospace Engineering — junkins@tamu.edu

Prof. Roshan Eapen — Penn State University
Assistant Professor, Dept. of Aerospace Engineering — reapen@psu.edu

Dr. Georgios Georgakis — Jet Propulsion Laboratory
Robotics Technologist — georgios.georgakis@jpl.nasa.gov

Skills

Programming	MATLAB/Simulink, C++, C, Python, Verilog.
Focus Areas	Computer vision, computer graphics, optical sensors, embedded systems, robotics.
Platforms	Robot Operating System, Simulink, Blender, Mitsuba, CARLA, FPGAs, Microcontrollers.