Sumant Sharma

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WORK EXPERIENCE

Wisk Aero LLC
2023 – Present

Manager, Conflict Detection & Resolution — 2700 Broderick Way, Mountain View, CA

- Leading a team of eleven software, autonomy, and systems engineers. Setting and communicating team priorities that support the aircraft and onboard autonomy objectives.
- Developing long term technical vision and roadmap within and often outside the scope of my team.
- Overseeing CD&R system's requirements and design development, reviewing code and requirements to solve ambiguous problems.

Autonomy Systems Architect — 2021 – 2023

- Led an integrated product team of ten software engineers, hardware engineers, and pilots to define the autonomy system architecture for Wisk's next generation electric vertical takeoff and landing (eVTOL) aircraft. Allocating autonomy functions between aircraft and ground segments.
- Led trade studies in the areas of autonomous hazard detection and contingency decision making to inform onboard and ground autonomous system design.
- Leverage GPS, computer vision, radar, and IMU sensor insights to architect the first prototype autonomy system at Wisk. Led a team of five flight test, hardware, and software engineers to demonstrate collision avoidance onboard a Bell 206 helicopter.

Senior Computer Vision Engineer — 2019 - 2021

- Led research and development on computer vision algorithms and navigation software to enable autonomous aircraft operations. Use of MATLAB, Python, and C++.
- Defined key engineering requirements for the aircraft navigation architecture and the optical sensing subsystem.

Open Space Labs Inc.
2017 – 2018

Computer Vision Engineer — 333 Kearny St., San Francisco, CA 94108

- Contracted to research and develop algorithms for a camera-based 3D mapping software used to document construction sites.
- Developed image registration tools for imagery from multiple 360-degree cameras. Experimented with feature detector, descriptor, and matching algorithms using the OpenCV library in C++.
- Developed temporal and spatial analysis pipeline to detect and measure construction progress between image datasets. Use of convolutional networks, TensorFlow library in Python.

NASA Ames / Millennium Engineering & Integration Company
2017 – 2018

Systems Engineer III — 1400 Crystal Drive, Suite 800, Arlington VA 22202

- Contracted to work at NASA Ames Research center for qualifying computer vision-based navigation architectures for future small satellite mission concepts.
- Developed software-based validation tools and test cases to characterize the performance of deep learning and image processing-based computer vision algorithms. Use of MATLAB and Python.
- Wrote technical reports documenting the results of the performance characterization for use by engineering staff at NASA Ames Research Center.

Stanford University

Research Assistant

496 Lomita Mall, Room 250, Stanford CA 94305

- Designed, developed, and validated multiple computer vision-based navigation architectures to enable aerospace applications such as on-orbit servicing of defunct satellites. Use of MATLAB, Python, C++.
- Created the first-ever large-scale image dataset to validate computer-vision algorithms and predict performance margins and robustness in anticipated flight conditions.
- Integrated prototype algorithms with existing navigation algorithms on a robotic hardware testbed to validate and qualify the navigation architecture for use in future commercial on-orbit servicing missions of Infinite Orbits (Private Limited).

EDUCATION

Stanford University

Doctor of Philosophy (PhD), Aeronautics and Astronautics

09/21/2015 – 09/26/2019

Stanford, CA

Stanford University

Master of Science (MS), Aeronautics and Astronautics

09/23/2013 – 01/07/2016

Stanford, CA

Georgia Institute of Technology

Bachelor of Science (BS), Aerospace Engineering

08/23/2009 – 05/05/2013

Atlanta, GA

SKILLS

- Programming Languages: Python, C++, MATLAB & Simulink, Fortran, R, HTML, LaTeX
- Software: TensorFlow, PyTorch, Robot Operating System, OpenCV, Docker, OpenGL
- FAA Private Pilot Certificate

Patents

- "Ground Installation for Accurate Terminal Guidance" – (pending) US Patent Application No. 63/116,121

PUBLICATIONS

Cited 1048 times, as reported by Google Scholar in June 2024.

Neural Network-Based Pose Estimation for Noncooperative Spacecraft Rendezvous   2020
S Sharma, S D'Amico
IEEE Transactions on Aerospace and Electronic Systems 56 (6), 4638-4658

Satellite Pose Estimation Challenge: Dataset, Competition Design and Results (Best Paper Award)   2020
M Kisantal, *S Sharma*, TH Park, D Izzo, M Märtens, S D'Amico
IEEE Transactions on Aerospace and Electronic Systems 56 (5), 4083 - 4098

Pose Estimation For Non-Cooperative Spacecraft Rendezvous Using Neural Networks   2019
S Sharma, S D'Amico
AAS/AIAA Astrodynamics Specialist Conference, Ka'anapali, Maui HI, USA

Towards Robust Learning-Based Pose Estimation of Noncooperative Spacecraft (Best Paper Award)   2019
TH Park, *S Sharma*, S D'Amico
AAS/AIAA Astrodynamics Specialist Conference

Robust Model-Based Monocular Pose Initialization for Noncooperative Spacecraft Rendezvous   2018

S Sharma, J Ventura, S D'Amico
Journal of Spacecraft and Rockets 55 (6), 1414-1429

Pose Estimation for Non-Cooperative Spacecraft Rendezvous Using Convolutional Neural Networks	2018

S Sharma, C Beierle, S D'Amico
IEEE Aerospace Conference, Big Sky MT, USA

Generative Adversarial Networks for High-Fidelity Simulation of Spacecraft Proximity Operations	2018

S Sharma, C Beierle, S D'Amico
Technical Note, Stanford Space Rendezvous Lab (SLAB)

Towards Pose Determination for Non-Cooperative Spacecraft Rendezvous using Convolutional Neural Networks	2017

S Sharma, C Beierle, S D'Amico
1st IAA Conference on Space Situational Awareness, Orlando FL, USA

Reduced-dynamics pose estimation for non-cooperative spacecraft rendezvous using monocular vision	2017

S Sharma, S D'Amico
38th AAS Guidance and Control Conference, Breckenridge CO, USA

Comparative assessment of techniques for initial pose estimation using monocular vision	2016

S Sharma, S D'Amico
Acta Astronautica 123, 435-445

Automated point cloud correspondence detection for underwater mapping using AUVs	2016

M Hammond, A Clark, A Mahajan, *S Sharma*, S Rock
OCEANS 2015, Washington DC, USA

Comparative Assessment of Techniques for Initial Pose Estimation using Monocular Vision	2015

S Sharma, S D'Amico
Proceedings of International Workshop on Satellite Constellations and Formation Flying, Delft, Netherlands

Wall effect on fluid–structure interactions of a tethered bluff body	2013

S Sharma, V Raghav, N Komerath, M Smith
Physics Letters A 377 (34-36), 2079-2082

Efficient modeling of dynamic blockage effects for unsteady wind tunnel testing	2013

S Sharma, V Raghav, N Komerath, M Smith
The American Helicopter Society's 69th Annual Forum and Technology Display, Phoenix AZ, USA

Aerodynamic instability modes for a load slung from a helicopter	2012

S Sharma, N Komerath, M Smith, V Raghav
The American Society of Mechanical Engineers' International Mechanical Engineering Congress and Exposition

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AWARDS

IEEE Barry Carlton Award
2024

Awarded for the paper on "Satellite Pose Estimation Challenge: Dataset, Competition Design, and Results". Over the span of four years this paper was deemed to be the most impactful paper publised in IEEE Transactions on Aerospace and Electronic Systems in the year 2020.

Best Paper Award
2019

For paper on "Towards Robust Learning-Based Pose Estimation of Noncooperative Spacecraft" at the 2019 Astrodynamics Specialist Conference hosted by the American Astronautical Society (AAS) and American Institute for Aeronautics & Astronautics (AIAA).

DJI Developer Challenge

2016

Second place in an international competition with 200 teams. Built and developed an unmanned aerial vehicle that autonomously performs search-and-rescue activities, takes-off, and lands from a moving Ford F-150 truck.

Best Creative Project

2016

For developing software that creates a computer-generated video of a spacecraft orbiting in low Earth orbit. Part of the CS 148 course at Stanford University.

CETL/BP Outstanding Teaching Assistant Award

2013

For organizing recitation sessions of the Calculus II course at Georgia Institute of Technology.

American Helicopter Society Lichten Competition

2013

Southern region winner for developing a physics-based simulation of a slung bluff body in a wind tunnel.

Vertical Flight Foundation Barry J. Baskett Scholarship

2012

Scholarship awarded to support vertical flight research projects at the John Harper wind tunnel at Georgia Institute of Technology.

President's Undergraduate Research Award

2012

Scholarship awarded to support vertical flight research projects at the John Harper wind tunnel at Georgia Institute of Technology.