Amogh S. Joshi

Graduate Research Assistant • Center for Co-Design of Cognitive Systems (CoCoSys)

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🌐https://amoghj98.github.io/

Education

PhD in **Electrical Engineering** Purdue University
GPA: 3.82/4 *2021-present*
B.Tech in **Electronics Engineering** University of Mumbai
GPA: 9.34/10 *2016-2020*

Graduate Research/Teaching Experience

Graduate Research Assistant *Summer 22-present*
Center for Co-Design of Cognitive Systems (CoCoSys), Purdue University

– FEDORA: A Flying Event Dataset fOr Reactive behAviour (IROS 2024)

  – Created a fully synthetic event dataset for autonomous aerial navigation and control

  – Developed an integrated synthetic dataset generation pipeline

  – Dataset contains temporally dense events, along with richly annotated ground truth for depth, optical flow, and ego-motion estimation at data rates that are between 2x and 5x the state of the art across modalities

– SHIRE: Enhancing Sample Efficiency using Human Intuition in REinforcement Learning (ICRA 2025)

  – Developed a human intuition-guided framework for enhancing sample efficiency in Reinforcement Learning

  – Framework uses task-specific human intuition to accelerate RL training and enhance explainability

  – Achieved upto 78% and 76% sample efficiency and training time improvements respectively over vanilla PPO

– Real-Time Neuromorphic Navigation: Integrating Event-Based Vision and Physics-Driven Planning on a Parrot Bebop2 Quadrotor (extended abstract, ICRA@40)

  – Real-time demonstration of online Neuromorphic Planning on a Bebop2 quadrotor

  – Video available here: https://youtu.be/9Gnjpb1k2Lo

– Neuro-LIFT: A Neuromorphic, LLM-based Interactive Framework for Autonomous Drone FlighT at the Edge (IJCNN 2025)

  – Developed an end-to-end system to execute feasible human maneuver commands on a robot.

  – Designed an LLM agent to determine maneuver feasibility

  – Implemented a Neuromorphic Navigation Stack to execute maneuvers deemed feasible by the LLM agent

Graduate Teaching Assistant *Fall 21-Summer 22*
Department of Mathematics, Purdue University

– Mentored a group for 120+ undergraduate freshmen

– Delivered 4 weekly lectures on Calculus to a class of 30-40 students each

Work Experience

Project Research Assistant *Jan 2021 - Aug 2021*
Indian Institute of Technology, Bombay

– Published research on automatic sizing and design of a mini-aerostat system

– Designed and tested various payloads meant for use on Tethered Aerostats

– Designed and implemented a complete sensory avionics suite for a medium-weight class UAV

– Implemented on-board image processing for autonomous docking of the UAV

– Supervised the summer projects of two interns, and one undergraduate thesis

Undergraduate Research/Internship Experience

Undergraduate Thesis, University of Mumbai *Fall 2019-Summer 2020*
Active Stabilisation System for a tethered Aerostat

– Designed a stabiliser to keep the aerostat within a predefined 'safe' zone.

– System used active propulsion to maintain an aerostat's flight characteristics.

– Device activates safety devices in case of emergency.

Undergraduate Researcher, IIT Bombay   *Summer 2019*
Emergency Rapid Deflation Device (ERDD) for a tethered Aerostat

– Developed a fully autonomous safety system to deflate the aerostat envelope in case of tether breakage

– On-board solar cells reduce energy demands on battery

– System endurance of 15-16 days, 1.5x state of the art

Publications

Amogh Joshi, Adarsh Kosta, Kaushik Roy, "SHIRE: Enhancing Sample Efficiency using Human Intuition in REinforcement Learning", accepted in the 2025 International Conference on Robotics and Automation (ICRA) DOI: `https://arxiv.org/abs/2409.09990`

Amogh Joshi, Adarsh Kosta, Wachirawit Ponghiran, Manish Nagaraj, Kaushik Roy, "FEDORA: Flying Event Dataset fOr Reactive behAvior", 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) DOI: `https://ieeexplore.ieee.org/document/10801807`

Amogh Joshi, Sourav Sanyal, Kaushik Roy, "Real-Time Neuromorphic Navigation: Integrating Event-Based Vision and Physics-Driven Planning on a Parrot Bebop2 Quadrotor", extended abstract, 2024 40th Anniversary of the IEEE Conference on Robotics and Automation (ICRA@40) DOI: `https://doi.org/10.48550/arXiv.2407.00931`

Amogh Joshi, Sourav Sanyal, Kaushik Roy: "Neuro-LIFT: A Neuromorphic, LLM-based Interactive Framework for Autonomous Drone FlighT at the Edge", 2025 International Joint Conference on Neural Networks (IJCNN) DOI: `https://doi.org/10.48550/arXiv.2501.19259`

Saurabh V. Bagare, **Amogh S. Joshi**, and Rajkumar S. Pant, "A Methodology for Sizing of a Mini-Aerostat System", AIAA Aviation Forum 2021, Analytical Studies, Modeling, and Simulation of Lighter-Than-Air Systems Session, August 2021. DOI: `https://doi.org/10.2514/6.2021-2986`

Technical Skills

Areas of Expertise: Computer Vision, Event-based Vision, Reinforcement Learning, Deep Learning
Programming Languages: C, C++, Python, MATLAB
Hardware Description Languages and FPGA: VHDL, Verilog, SystemVerilog, RTL Design and Verification
Software and Tools: Pytorch, OpenCV, Gazebo sim, Robot Operating System (ROS), Autodesk Fusion360, Autodesk Eagle

Graduate Courses

System-on-Chip Design (Fall '21), MOS VLSI Design (Fall '21), Embedded Systems (Spring '22), Numerical Analysis (Spring '22), Computer Design and Prototyping (Fall '22), Digital System Design Automation (Spring '23), Computational Models and Methods (Fall '23), Programmable Accelerator Architectures (Spring '24), Reinforcement Learning (Fall '24), AI Hardware (Spring '25)

Academic Achievements

– Secured **Gold Medal** in IIT-Bombay TechConnect 2019 for Emergency Rapid Defaltion Device (ERDD) project

– **First Rank holder**, Department of Electronics Engineering, K. J. Somaiya College of Engineering, University of Mumbai

– **Offered INSPIRE scholarship** for securing a position in top 1 percentile of the Maharashtra state HSC exam.

Co-curricular Activities

Sports

– **Silver Medallist**, 10m Air Rifle National Championships, 2012, representing Maharashtra State

– Competed at the Maharashtra State swimming championships, 2008

Other

– Working proficiency in the German language. **Cleared** A1, A2 and B1 levels of the German Language from Goethe Institut **with Distinction.**

– **Won** the Maharashtra Inter-School Quiz Contest, 2013 and the Nerul Gymkhana Sports Quiz, 2014

– Competed at the Indian National Spelling BEE contest, 2007-08