Pranshu Malik

Naturalistic Control — in Humans, also for Robots

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Interests

Sensorimotor Neuroscience · Robotics · Internal Models · Generalizable Control · Perception · Embodied Intelligence

Education

Okinawa Institute of Science and Technology — Okinawa, Japan
Ph.D. in Neuroscience and Robotics — *Jan. '25 — Present*

- Rotation project in the embodied cognitive science unit on investigating the role of noise in the emergence of structure and complex patterns in a wet artificial life setup
- Planned rotations with cognitive neurorobotics and neural computation research units

University of Western Ontario — London, Canada
M.Sc. in Neuroscience; cGPA: 4.0/4.0 — *Sept. '22 — Oct. '24*

- Thesis title: The Nature of Reflexes in Online Planning and Control [link]
- Advisors: Andrew Pruszynski, Paul Gribble
- Recipient of the Vector Scholarship in Artificial Intelligence ($17.5k) and the BrainsCAN Graduate Studentship ($50k)
- Selected coursework: Principles of Neuroscience, Reinforcement Learning

University of Toronto — Toronto, Canada
B.A.Sc. in Electrical Engineering; cGPA: 3.92/4.0 — *Sept. '17 — Apr. '22*

- Engineering International Scholar: received a full tuition fee waiver for the entire duration of the program ($229k)
- Recipient of the Adel S. Sedra Gold Medal for achieving the highest cumulative average in the graduating class
- Graduated with High Honors and Minor in Robotics and Mechatronics; Dean's Honor List in all semesters
- Selected coursework (*graduate-level): Linear Control Systems, Signals and Systems, Fields and Waves, Digital Systems, Digital Signal Processing, Probability, *Random Processes, *Sensory Communication, System Mapping, Machine Learning, Real-time Control Systems, Robot Modeling and Control, Mechatronics, Philosophy of Religion

Selected Research & Professional Experiences

Graduate Student, Western Institute for Neuroscience — London, Canada
Sensorimotor Superlab — *Sept. '22 — Oct. '24*

- Investigated the coupling between feedback and voluntary motor control by carefully estimating update times for both modalities; also tried investigating the reliance of implicit adaptation on motor variability
- Led multiple discussions on motor planning and control; also mentored and trained undergraduate research assistants

Navigation Engineering Intern, Zebra Technologies — Mississauga, Canada
Path-Planning and Control Team — *May '20 — Aug. '21*

- Critiqued, implemented, and tested auto-navigation algorithms from literature for deployment on inventory scanning robots
- Redesigned path planner to improve aisle scan coverage and efficiency by robustly handling obstructions and curved aisles
- Developed tools for rapidly prototyping planners and controllers and benchmarking their performance; written in Julia
- Reviewed and fixed real-life behavior and performance bugs; identified, proposed, and applied planner improvements

Undergraduate Research Assistant, Motion Adaptation Science Lab — Toronto, Canada
Toronto Rehabilitation Institute — *May '18 — Aug. '18*

- Developed finite element models (FEMs) of the lower leg for the computational study of electrostimulation applications
- Streamlined development workflow of bio-electric FEM studies from MRI data using Inventor, Comsol, and Matlab

Invited Talks & Posters

2. Stretch Reflexes Quickly Integrate Spatial Task Constraints During Reaching. Invited talk, Department of Cognitive and Brain Sciences, IIT Gandhinagar, 2024.

1. Computing Error-bounded Inverse Kinematics Solutions in Fixed-time using Low-Power Analog Circuits. Podium presentation, Undergraduate Engineering Research Day, University of Toronto, 2021. [slides]

Technical Skills

Python · Julia · Matlab · C/C++ · Git · Typst · LaTeX · OpenCV · ROS · Graphics Design · 3D Design · Machining

Miscellaneous

Big Ideas Committee: Led a club that is a part of the Society for Neuroscience Graduate Students (SONGS) and historically organized various panel events focussing on broad research trends and journal papers in neuroscience. In my year, we switched our focus by also including graduate students in philosophy and hosted didactic discussions as well as regular share-what-you-read sessions on topics like philosophy of science and consciousness. We also organized a student-led panel discussion on the scientific and philosophical study of consciousness, attended by 40+ graduate students and postdocs.

Hobbies and Side Interests: Photography and painting; systems thinking and citizen science; cognitive architectures; philosophy of mind, memory, and action; Indian philosophy; Sanskrit language; yoga and meditation

Sports and Outdoor Activities: Love playing cricket and badminton, and have also played in local cricket leagues. I also enjoy running, hiking, camping, and long walks in nature.