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 finding and modelling necessary principles for the emergence of an interactional sense of self and non-self in artificial embodied agents
- Planned rotations with cognitive neurorobotics and neural computation research units
- Selected coursework: Cognitive Neural Dynamics, Brain Computation, Neurorobotics, Embodied Cognitive Science

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) at Western University, which historically organized panel events focusing on broad research trends or functioned as a neuroscience journal club. In my year, we pivoted the club's focus by also including graduate students in philosophy and hosted didactic discussions as well as regular share-what-you-read sessions on topics like creativity, 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; 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.