


Pranshu Malik

Robotics Enthusiast, Inspired by Humans

 pranshumalik14 in pranshu-malik

pranshu.malik@uwo.ca

Interests

Sensorimotor and Visuomotor Control · Cognitive Robotics · Educational Tools and Software · Philosophy

Education

University of Western Ontario

M.Sc. in Neuroscience

London, ON

Sept. '22 — Aug '24 (exp.)

- Trainee at the Sensorimotor Superlab; researching the neural processes underlying control of reaching
- Recipient of the Vector Scholarship in Artificial Intelligence and the BrainsCAN Graduate Scholarship

University of Toronto

B.A.Sc. in Electrical Engineering; cGPA: 3.92/4.0

Toronto, ON

Sept. '17 — June '22

- Engineering International Scholar: received a full tuition fee waiver for the entire duration of the program
- Recipient of the Adel S. Sedra Gold Medal for achieving the highest cumulative academic standing in the 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, Electromagnetism, Fields and Waves, Electronics, 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

Research & Professional Experience

Navigation Engineering Intern, Zebra Technologies

Path-Planning and Control Team

Mississauga, ON

May '20 — Aug. '21

- Critiqued, presented, and tested algorithms in literature for autonomous navigation on the Zebra SmartSight platform
- Redesigned the aisle planner to improve scan coverage and efficiency; robust against 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

Electrical Engineering Lead, aUToronto

UofT's Self-Driving Car Team

Toronto, ON

Feb. '19 — Apr. '20

- Fabricated testing equipment and software switches for the autonomy stack and controllers for safe power distribution
- Won the GM/SAE Autodrive Challenge in 2019; contributed to hardware documentation for conceptual design reports

Teaching Assistant, Department of Mathematics

Calculus 1 (MAT135) and Applied Linear Algebra (MAT188)

Toronto, ON

Fall '18 & Fall '19

- Held weekly tutorials and office hours to help students understand various concepts; used the “ask, not tell” technique
- Graded weekly assignments and midterm exams; involved in invigilation duties for quizzes, midterm, and final exams

Software Engineering Intern, Rocscience Inc.

Geotechnical Software Tools Design

Toronto, ON

May '19 — Aug. '19

- Developed an interactive geometry import tool for file formats external to, and also within, the software suite
- Designed diagnostic tools to perform mesh queries and inspection to identify book-keeping and numerical errors

Undergraduate Research Assistant, Rehab. Engineering Lab, TRI

Advisors: Prof. Kei Masani and Prof. Paul Yoo

Toronto, ON

May '18 — Aug. '18

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

Projects

Intuitive Robot Arm Reach: Final-year design project with the goal of developing a reach control method by combining algorithmic models of human motor-learning processes, such as proximodistal exploration and motor babbling. Designed an interpolation-based method that covered the entire reachable space, contrary to tuning for specific reach targets.

Analog IK Solver: Presents a generic computation method for inverse kinematics of serial robots using a modular and digitally reconfigurable analog circuit. Error-bounded approximate solutions are found in fixed time by continuously evaluating forward kinematics using periodic, phase-locked, and frequency-scaled waveforms of successive joint configurations.

CollabBots: A robotic platform, built from scratch, consisting of 2 robotic arms placed opposite to each other along with cameras, to implement and test visual servoing and collaboration schedulers. Robot driver is ready to pick up and drop blocks.

Object-tracking Robotic Arm: Built and programmed to locate a cup at its center and drop a coin into it. Video from a camcorder mounted on the arm is processed in real-time by an FPGA which communicates with an Arduino to control the robot's actions. The system allows for calibration to suit any environment and cup size.

Talks and Posters

2. **Pranshu Malik**, "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](#)].
1. **Pranshu Malik**, Silviu Agotici, Kei Masani, Paul B. Yoo, "Framework for the Development of a Realistic Finite-Element Model of the Lower Leg." Poster, Undergraduate Summer Research Program, Institute of Biomedical Engineering, University of Toronto, 2018 [[pdf](#)].

Technical Skills

C++ · Julia · Python · Matlab · C · Verilog · OpenCV · ROS · KiCad · LTSpice · LaTeX · SolidWorks · Machining

Miscellaneous

The Bhakti Yoga Club: Initiating co-president; started a weekly reading group around spirituality, yoga, and ancient Vedic philosophy. Helped facilitate discussions and arrange for speakers to share their perspectives on incorporating the tenets of Bhakti yoga in life through practicing meditation, mindfulness, and mental resilience.

Hobbies and Side Interests: Photography; systems thinking in education; Indian philosophy; Sanskrit language

Sports and Outdoor Activities: Love playing cricket, badminton, and squash; also enjoy cycling, hiking, camping, and long nature walks. Have played cricket competitively in local leagues.