Nahid Kalantaryardebily

Blacksburg-USA NahidKalantary@vt.edu nahid-Kalantaryardebily

Research Interest

Wearable Technology; Robotics and Automation; Neuroengineering and Sensorimotor Neural Interfaces; Physiological Signal Processing; Human-Subject Experimental Research in Stroke; Haptics and Human–Robot Interaction; Machine Learning for Robotic Control and Perception; System Identification and State Estimation; Dynamics, Control, and Whole-Body Motion Planning; Autonomous Navigation and Guidance Systems.

Education

Ph.D Engineering Mechanics (GPA: 4/4) - PhD Candidate — 2022–2026(Expected)
Virginia Polytechnic Institute & State University, Blacksburg, Virginia, United States

M.Sc Engineering Mechanics (GPA: 4/4, Non-thesis) — 2022 – 2025
Virginia Polytechnic Institute & State University, Blacksburg, Virginia, United States

M.Sc Automation and Control Engineering (GPA: 110/110) — 2016 – 2018
Polytechnic University of Milan, Milan, Italy
Thesis: Design and Development of a Hardware-in-the-Loop Test Platform for Powertrain

M.Sc Flight Mechanics (GPA: 18.6/20) — 2009 – 2011
Amirkabir University of Technology, Tehran, Iran
Thesis(in persian): Integrated Guidance and Control of UAVs Using Sliding Mode Control and Constrained Curves

B.Sc. Electrical Engineering - Control (GPA: 17.2/20) — 2005 – 2013
Amirkabir University of Technology, Tehran, Iran

B.Sc. Aerospace Engineering (GPA: 17.8/20) — 2005 – 2009
Amirkabir University of Technology, Tehran, Iran

Publications

———————————————— Peer-Reviewed Journal Publications ————————————————

Kahak A.*, Ahmed M. S.*, **Kalantaryardebily N***, Kulkarni H., Gurari N., Shahab S., Li S. "High-Precision Fluidic Kirigami Metasurface for Ultrasonic Holographic Lensing and Haptic Interfacing" *Extreme Mechanics Letters*, 81, 102424 (2025)

- Tirrell E. M., **Kalantaryardebily N**, Hocker J., Bowles C., Parcetich K., Gurari N. "Impact of an Auditory Cognitive Load on Consciously Perceiving Electrotactile Stimuli in Young Adults" *Behavioral Brain Research*, 496, 115841 (2026)
- **Kalantaryardebily N***, Feldbush A. C.*, Faubion-Trejo R., Lisinski J., Reddy N. A., Bright M. G., LaConte S. M., Gurari N. "Development and Testing of an MR-Compatible Tactile Stimulator System: Application for Individuals with a Brain Injury" *Journal of Neuroscience Methods*, 424, 110583 (2025)
- Tirrell E. M., **Kalantaryardebily N**, Feldbush A. C., Sydnor L. C., Grubb C., Parcetich K., Gurari N. "Considerations for Tactile Perceptual Assessments: Impact of Arm Dominance, Nerve, Location, and Sex in Young and Older Adults" *Experimental Brain Research*, 243, 92 (2025)
- Paul A. P., Nayak K., Sydnor L., **Kalantaryardebily N**, Parcetich K. M., Miner D. G., Wafford Q. E., Sullivan J. E., Gurari N. "A Scoping Review on Examination Approaches for Identifying Tactile Deficits at the Upper Extremity in Individuals with Stroke" *Journal of Neuroengineering and Rehabilitation*, 21, 99 (2024)
- Hamedi B., **Kalantaryardebily N**, Alipanahi A., Taheri S. "Estimating Tire Forces using MLP Neural Network and LM Algorithm: A Comparative Study" *Universal Journal of Mechanical Engineering*, 11(3), 64–81, (2023)

———————————————— Under Review with Peer-Reviewed Journals ————————————————

- Tirrell E. M., **Kalantaryardebily N**, Hocker J., Bowles C., Parcetich K., Gurari N. "Perceiving Auditory Stimuli Impacts Conscious Perception of Electrotactile Stimuli in Older Adults" (In Revision at *Journal of Neurophysiology*)
- **Kalantaryardebily N**, Feldbush A. C., Kahak A., Li S., Gurari N. "Novel Compact Tactile Stimulator with Sensing: Application for Individuals with a Brain Injury and MRI" (In Revision at *IEEE Transactions on Medical Robotics and*

Bionics)

- Feldbush A. C., **Kalantaryardebily N**, Reddy N. A., Soldate J., Faubion-Trejo R., Lisinski J., Bright M. G., LaConte S. M., Gurari N. "Tactile Pressure Evokes a Biphasic BOLD Response in Ipsilateral Primary Somatosensory Cortex" (Submitted to *Imaging Neuroscience*)

———————————————— Peer-Reviewed Conference Publications ————————————————-

- Rekabi-Ban F., Saadat M., **Kalantaryardebily N**, Pan H., Stefanec M., Fedotoff L. A., Krajnik T., Arvin F. "Active Vibration Reduction for the RoboRoyale Autonomous Robotic Observation Mechanism" *2024 IEEE Conference on Control Technology and Applications (CCTA)*, Newcastle upon Tyne, United Kingdom, (2024)
- Basaeri H., Yousefi-Koma A., **Kalantaryardebily N**. "Design and Modeling of a Ducted Fan Manned Aerial Vehicle" *21st Annual International Conference on Mechanical Engineering – ISME2013*, Iran, (2013)
- **Kalantaryardebily N**, Mortazavi M., Babai A. "Integrated Guidance and Control of UAVs Using Sliding Mode Control and Constrained Curves" *11th Iranian Aerospace Conference*, Tehran, Iran, (2012) - in Persian

————————————————————- Intellectual Property ————————————————————-

- **Kalantaryardebily N.**, Gurari N., Kahak A., Li S. “MR-Compatible Force Stimulation Device Featuring Kirigami, Real-Time Sensing, and Force Estimation” Provisional Patent Application, Virginia Tech Intellectual Property (VTIP Docket No. 222207-8210), 2025 (Under consideration)

———————————————————— Hands-On Demonstrations ————————————————————

- Rathore S., Kim A., Segal J., Hollar R., Smith N., Rios J., **Kalantaryardebily N.**, Feldbush A. C., Todd J., Parcetich K., Gurari N. “MR-Compatible Tactile Stimulator for Individuals with Stroke” World Haptics Conference (WHC), 2023

Peer-Review Service

- IEEE Transactions on Haptics (IEEE)
- Data in Brief (Elsevier)
- IEEE International Conference on Intelligent Robots and Systems (IROS)
- IEEE Conference on Control Technology and Applications (CCTA)

Teaching Experience

Amirkabir University of Technology, Department of Aerospace Engineering — Iran, Tehran, 2009 – 2013

- Developed and delivered **problem-solving lectures** for undergraduate courses in Dynamics I, Dynamics II, and Vibrations as a teaching assistant.
- Assisted course instructors with lecture preparation, graded assignments and exams, and provided one-on-one support during office hours.

Virginia Tech, Department of Mechanical Engineering — USA, Blacksburg, 2022 – Present

- Assisted course instructors with graded assignments and exams, and provided one-on-one support during office hours for two courses: Statics and Deformable Bodies.

Mentoring Experience

Master Students Biomedical - Scotty Mahany	2025 – Present
Undergrad Students Neuroscience - Nithya ramani	2025 – Present
Undergrad Students Biomedical - Katie Minutillo	2023 – 2024
Undergrad Students Biomedical - Anwitha Sanivarapu	2023 – 2024
Undergrad Students Biomedical - Rishit Vijay	2023 – Present
Incoming Engineering Science and Mechanics Graduate students	2023 – Present

Work Experience

Virginia Tech Robotics and Sensorimotor Control Lab

USA, Blacksburg
2022 – Present

Job title: • Research Assistant

- Assisted in the preparation of three grant proposals, including 4-VA (Virginia state collaboration

grant), NIH R21, and NSF submissions.

- Created experimental control and analysis software with graphical user interfaces (GUIs) to support tactile extinction studies.
- Developed custom software and an experimental system to measure peripheral nerve responses to tactile/electrical stimuli, enabling the assessment of somatosensory function.
- Conducted reliability analysis on median and ulnar nerve excitability and nerve conduction to evaluate consistency and validity of measures.
- Applied threshold tracking techniques to assess nerve excitability in individuals with stroke.
- Designed and developed a novel, compact MRI-compatible haptic device incorporating a fiber-optic displacement sensor and a pressure sensor.
- Implemented applied force estimation for the developed tactile stimulator using two approaches: steady-state physical modeling and neural networks.
- Designed and conducted calibration procedures for physical modeling-based force estimation of the tactile stimulator by performing offline tests to identify device parameters.
- Engineered an offline data acquisition framework utilizing force, displacement, and pressure sensors to enable neural network-based force estimation.
- Enhanced Python-based software by developing a GUI and modifying data acquisition features.

SEGULA Technologies ,

Italy, Turin
2019 – 2022

Job title: • Software Integration Engineer

- Created an active thermal management model and updated sensor and actuator models for diesel engines within a real-time Software-in-the-Loop (SiL) framework.
- Developed automatic validation software to ensure robust and functional SiL package release to calibrating team.
- Critically analyzed system errors to troubleshoot embedded vehicle systems integration.
- Enhanced the integrated real-time operating system for diesel engine SiL software to ensure compatibility with the Functional Mock-up Interface (FMI) standard.

TUMCREATE ,

Singapore,Singapore
03/2018 – 09/2018

Job title: • Research Assistant

- Designed, prepared, and executed the Hardware-in-the-Loop (HiL) platform using dSPACE.
- Undertook modeling, simulation implementation, and validation of a 14-degree-of-freedom (DoF) real-time simulation.
- Configured TCP/IP ethernet communications between testbench and dSPACE.
- Designed Control-Desk human machine interface for real-time data acquisition and testing.
- Created urban environment visualization in Motion-Desk software for a driving simulator.

Center of Advanced Systems and Technologies ,

Iran, Tehran
2011 – 2015

Job title: • Research Assistant

- Conducted comprehensive modeling and design verification for a manned ducted fan aerial vehicle (Jetpack).
- Formulated and implemented simulation-driven gain scheduling PID controller design.
- Executed intricate modeling, simulation, and control tasks for underwater vehicles and quadrotors.

Iranian Space Research Center,

Iran, Tehran
2010 – 2011

Job title: • ADCS Engineer

- Executed modeling, simulation, and feedback linearizing control of CubeSats.

- Conducted safety testing of attitude determination and control algorithms through SiL and HiL evaluations.
- Designed satellite test facilities: sun simulator and mass balancing for a 3-DoF air bearing test platform.

Amirkabir University of Technology,

Iran, Tehran
06/2008 – 09/2008

Job title: • Internship

- Identified methods, assumptions, and procedures for sun sensor and magnetometer calibration (Summer internship with AUTSAT1 (Amirkabir University of Technology (AUT) microsatellite))

Media Coverage

- **Researching how stroke affects sense of touch**
  Virginia Tech News | May 31, 2024

Computer Skills

Programming	C/C++, Python(PyTorch, NumPy, Pandas), R
Engineering Software	MATLAB&SIMULIK, Eclipse, ETAS (INCA), Mathematica, GMSim, AutoVal, LabVIEW, CATIA, SOLIDWORKS, Git
General	Windows, MS Office, LaTeX
Familiar with	Linux, PLC Programming Languages