

Anway S. Pimpalkar

Cambridge, MA • apimpalkar@seas.harvard.edu • anway.me

EDUCATION

Harvard University PhD, Bioengineering		2025 –
Johns Hopkins University MSE, Biomedical Engineering Thesis: Bridging Perception & Performance: Generating, Calibrating, & Evaluating Multimodal Sensory Feedback Advisor: Jeremy D. Brown, PhD	GPA: 4.00 / 4.00	2023 – 2025
College of Engineering Pune, India BTech, Electronics and Telecommunication Engineering	GPA: 8.24 / 10.00	2019 – 2023

AWARDS & HONORS

Harvard SEAS Prize Fellowship (\$281,796 • 6-yr tuition, 2-yr stipend) • Harvard University	2025 –
National Defense Science & Engineering Graduate Fellowship (\$277,484 • 3-yr tuition & stipend) • DOD	2025 –
GEM Associate Fellowship • National GEM Consortium	2025 –
Best Student Paper Finalist • International Conference on Rehabilitation Robotics (ICORR) [for C2]	2025
National Institute on Aging Start-Up Challenge Finalist (\$10,000) • NIH	2025
Best Paper Award • International Conference on Biomedical Engineering Science and Technology [for C1]	2023
Mitacs Globalink Research Award (\$9,915) • Dalhousie University, Canada	2022
Best Project Award • IEEE National Project Competition, India [for O1]	2021

RESEARCH EXPERIENCE abbreviated; details at the end of CV

Harvard University <i>Doctoral Research Fellow</i>	<i>Cambridge, MA</i> Aug 2025 –
Johns Hopkins University • Haptics and Medical Robotics Lab ↗ <i>Graduate Research Assistant</i> • Advisor: Jeremy D. Brown, PhD	<i>Baltimore, MD</i> Jan 2024 – Jun 2025
<ul style="list-style-type: none">Multimodal Visual-Haptic Neurorehabilitation for Post-Stroke Finger DexterityPneumatactors: Soft Multimodal Haptic Interfaces	
Harvard University • Biohybrid Organs and Neuroprosthetics Lab ↗ <i>Research Fellow</i> • Advisor: Shriya S. Srinivasan, PhD	<i>Cambridge, MA</i> May – Aug 2024
<ul style="list-style-type: none">Peripheral Nerve Stimulation to Modulate Cancer Tumor MetastasisSurgical Approach for Treating Stress Urinary Incontinence	
IIT Bombay • Human Motor Neurophysiology and Neuromodulation Lab ↗ <i>Research Intern</i> • Advisor: Nivethida Thirugnanasambandam, PhD	<i>Mumbai, India</i> Jan – Aug 2023
<ul style="list-style-type: none">Quantifying Prospective Component of Sense of Agency using Machine Learning	
College of Engineering Pune • Departments of Electronics, Applied Sciences ↗ <i>Undergraduate Researcher</i> • Advisor: Mahesh H. Shindikar, PhD	<i>Pune, India</i> Aug 2022 – Aug 2023
<ul style="list-style-type: none">Deep Learning-Based MRI Skull Tissue Segmentation	
Dalhousie University • Agricultural Mechanized Systems Group ↗ <i>Mitacs Globalink Research Intern</i> • Advisor: Travis J. Esau, PhD	<i>Truro, Canada</i> May – Aug 2022
<ul style="list-style-type: none">Automating Harvesters to Reduce Operator Cognitive Load	
Queliz Lifetech • Early Stage Medtech Startup ↗ <i>Research Intern, Electronics Subsystem</i>	<i>Pune, India</i> Jun – Sep 2021
<ul style="list-style-type: none">Point-of-Care Device for Finger Dexterity Rehabilitation in Acute Burn Patients	

JOURNAL PUBLICATIONS

- J4 **Pimpalkar AS**, Brown JD. *Pneumatactors: Soft 3D-printed interface for co-located transient and continuous tactile stimuli*. In preparation. 2025.
- J3 **Pimpalkar AS**, West AM, Rai D, Xu J, Brown JD. *Evaluation of multimodal feedback to augment motor control in precision grip*. In preparation. 2025.
- J2 Harris C, **Pimpalkar AS**, Aggarwal A, Yang J, Chen X, Schmidgall S, Rapuri S, Greenstein JL, Taylor CO, Stevens RD. *Preoperative risk prediction of major cardiovascular events in noncardiac surgery using the 12-lead electrocardiogram: explainable deep learning approach*. Br J Anaesth; 2025 Sep; doi: 10.1016/j.bja.2025.07.085 [↗](#)
Featured in *The Hub at Johns Hopkins*. [Article ↗](#)
- J1 **Pimpalkar AS**, Slepian A, Thakor NV. *Vibrations at First Contact Encode Object Stiffness Before Grasp Completion*. IEEE Sens Lett. 2025 Aug;9(8):1–4. doi: 10.1109/lens.2025.3584860 [↗](#)
Featured in *New Scientist Magazine*. [Article ↗](#)

CONFERENCE PRESENTATIONS † presenter

FULL-LENGTH PAPERS

- C3 West AM †, **Pimpalkar AS**, Xu J, Brown JD. *SenseMatch: Smartphone-based cross-modal matching for accessible perceptual assessments*. 2025 Int IEEE EMBS Conf Neural Eng, 2025 Nov. Accepted.
- C2 **Pimpalkar AS**†, West AM, Xu J, Brown JD. *Optimizing Cross-Modal Matching for Multimodal Motor Rehabilitation*. 2025 IEEE Int Conf Rehabil Robot (ICORR). 2025 May. p. 559–566. doi: 10.1109/icorr66766.2025.11063112 [↗](#)
Best Student Paper Award Finalist.
- C1 **Pimpalkar AS** †, Patole RK, Kamble KD, Shindikar MH. *Performance evaluation of vanilla, residual, and dense 2D U-Net architectures for skull stripping of augmented 3D T1-weighted MRI head scans*. 2023 Int Conf Biomed Eng Sci Tech. 2023 Feb. p. 131–142. doi: 10.1007/978-3-031-54547-4_11 [↗](#) **Best Paper Award**.

ABSTRACTS AND SHORT ARTICLES

- A7 **Pimpalkar AS** †, Rai D, Bartels UJ, Xu J, Brown JD. *Visual-haptic feedback enhances finger individuation in a virtual precision grip neurotraining task*. 2024 Biomed Eng Soc Ann Meet (BMES). 2024 Oct. [Podium Pres, [Abs ↗](#)]
- A6 Song H † et al. [including **Pimpalkar AS**]. *Towards visual function restoration through photoacoustic stimulation*. Invest Ophthalmol Vis Sci. 2024 Jun;65(7):5415. [Podium Pres, [Abs ↗](#)]
- A5 **Pimpalkar AS** †, Ameta P †, Dalia A, Brown JD. *Pneumatactor arrays for high frequency vibrotactile feedback*. 2024 IEEE Haptics Symp. 2024 Apr. [Live Demo, Work-in-Prog Paper]
- A4 **Pimpalkar AS** †, Ameta P †, Dalia A †, Brown JD. *Pneumatactor arrays for high frequency vibrotactile feedback*. 2024 US Senate AI Cauc Robotics Demo Day. Apr 2024. [Live Demo]
- A3 Harris C, **Pimpalkar AS**, Aggarwal A, Yang P, Chen X, Taylor CO, Greenstein J, Stevens RD. *Surgical risk prediction using an explainable deep learning approach applied to pre-operative 12-lead electrocardiograms*. 2024 JH Med & Eng Res Retr. 2024 Feb. [Poster Pres]
- A2 **Pimpalkar AS** †, Patole R, Thirugnanasambandam N. *Demonstrating the prospective component of sense of agency using machine learning*. 2023 COEP ENTIC BTEch Proj Symp. 2023 May. [Poster Pres]
- A1 **Pimpalkar AS** †, Patole R, Kamble K, Shindikar M. *Evaluating U-Nets for skull stripping of augmented T1-weighted MRI scans*. 2023 No Garland Neurosci Conf. 2023 Feb. [Podium Pres]

NON PEER-REVIEWED ARTICLES

- O1 **Pimpalkar AS**, Niture D. *Towards contactless elevators with tinyML using person detection and keyword spotting*. 2024 Jul. **Best Project Award**. doi: arXiv:2405.13051 [↗](#)

TEACHING ENGAGEMENTS

Principles of the Design of Biomedical Instrumentation • Johns Hopkins University 580.771 Fall 2024
Teaching Assistant to Nitish V. Thakor, PhD

- Mentored labs on designing ECG, EMG, EEG circuits and projects including accessible gaming, wearables.

Haptic Interface Design for Human-Robot Interaction • Johns Hopkins University 530.691 Fall 2024
Class Researcher with Jeremy D. Brown, PhD

- Helped pilot an online learning platform to provide self-paced lectures incorporating live instructor interaction.

- Solved a 3-year challenge in real-time location polling of autonomous air hockey robots using CV-based ArUco tag detection and ZigBee mesh networking. Led labs on building autonomous robots. [GitHub ↗](#)

INVITED LECTURES

T1 Neural & Rehabilitation Engineering Course, Johns Hopkins University. (Nitish V. Thakor, PhD) [*Haptics: Neural Basis, Applications, Future Avenues*], Sep 2024.

ACADEMIC SERVICE

IEEE Haptics Symposium • Student Volunteer 2024
Canadian Society of Bioengineering Annual Meeting • Student Volunteer 2022

LEADERSHIP AND TEAMWORK

Johns Hopkins India Institute • Operations Team 2024 – 2025

- Managed on-day operations and logistics for university's first Hopkins-India Conference.

 Johns Hopkins Biomedical Engineering • Master's Program Representative 2024 – 2025
 COEP Impressions Cultural Festival • Head of Events (2021), Volunteer 2019 – 2021

- Led the planning and execution of 28 annual events with 10k attendees, managing a ₹2m budget and coordinating with an overall team of 126 members to execute concerts, competitions, and international celebrity engagements.
- Built and led a team of 15, working with 2 co-heads to build a platform from the ground up, fostering opportunities for budding artists across India and uniting them under a shared vision. Placed an emphasis on the inclusion of unconventional art forms.

 Rowing Team • COEP, Pune City • Competitive 1X, 2X, 4X Sculler 2020 – 2022

- Won multiple race events and an institutional award. Represented city at regional races.

 COEP Mental Health & Wellness Center • Student Volunteer 2020 – 2022
 COEP Data Science & AI Club • Research Lead (2020-21), Member 2020 – 2022

SKILLS AND CERTIFICATIONS

Medical Research Human participant studies (non-invasive devices), rodent studies (invasive devices, mice/rats), human perception experiment design, IRB protocols

Electronics Analog and digital circuit design, microcontroller programming (Arduino/Teensy/ESP/STM), high-speed and high-current PCB design (KiCAD/Altium), closed-loop control systems, DAQ design, FPGA, RF design, precision soldering (THT/SMT), mechatronic integration, communication protocols

Software Tools Python, MATLAB, C/C++, data analysis, VR rendering, machine and deep learning, TinyML, TensorFlow (+lite/micro), computer vision, LaTeX

Design & Fab CAD (Autodesk, Shapr3D), FDM 3D printing (rigid/flexible), SLA resin printing, silicone molding

Certifications (15 total)
Harvard Online • TinyML Certificate (3 courses), Python for Research, CS50 Web Development
MIT Online • Aeronautics and Human Spaceflight
Johns Hopkins Online • Human Subject Research, Neuroimaging, Neurohacking
DeepLearning.AI • Deep Learning Specialization (5 courses)
AICTE • Computer Science & Biology (faculty development program)

RESEARCH EXPERIENCE detailed

Harvard University • Biohybrid Organs and Neuroprosthetics Lab [↗](#) Cambridge, MA
 Doctoral Researcher • Advisor: Shriya S. Srinivasan, PhD 2025 –
Ingestible Bioelectronics and Neural Interfacing for the GI Tract

Johns Hopkins University • Haptics and Medical Robotics Lab [↗](#)

Baltimore, MD

Graduate Research Assistant • Advisor: Jeremy D. Brown, PhD

2024 – 2025

Multimodal Visual-Haptic Neurorehabilitation for Post-Stroke Finger Dexterity

Developed and evaluated a multimodal feedback framework for motor rehabilitation. Integrated cross-modal perceptual calibration to optimize sensory feedback delivery to individual thresholds. Implemented on ubiquitous devices to support smartphone-based rehabilitation outside the lab. *Publications:* [J3](#), [C2](#) (Best Student Paper Finalist at ICORR 2025), [C3](#), [A7](#)

Pneumatactors: Soft Multimodal Haptic Interfaces

Engineered “*pneumatactors*” – a novel pneumatic tactor haptic interface designed for co-located stimulation of fast and slow adapting mechanoreceptors, enhancing cognitive salience. 3D-printed with flexible TPE to match mechanical impedance of human skin for intuitive interaction. *Publications:* [J4](#), [A4](#), [A5](#)

Harvard University • Biohybrid Organs and Neuroprosthetics Lab [↗](#)

Cambridge, MA

Research Fellow • Advisor: Shriya S. Srinivasan, PhD

Summer 2024

Peripheral Nerve Stimulation to Modulate Cancer Tumor Metastasis

Developed non-invasive peripheral nerve stimulation strategies to modulate tumor growth and metastasis in murine models, revealing frequency-dependent effects on tumor innervation. Designed and conducted pilot studies on melanoma-bearing mice. Engineered miniaturized, RF-powered vagus nerve stimulators for freely moving rodents to study glioblastoma–nervous system interactions. Devices delivered monophasic pulses up to 1 kHz via custom PCB oscillators, enabling targeted parasympathetic modulation in vivo.

Surgical Approach for Treating Stress Urinary Incontinence

Innovated and tested a fully endogenous muscle graft-based surgical technique for treating stress urinary incontinence, featuring a 30-minute procedure with potential for fully laparoscopic implementation and superior efficacy compared to urethral devices. Conducted pilot surgeries on rat models, synchronizing bladder pressure, flow, and tension using a custom-designed PCB to assess and analyze urodynamic parameters.

IIT Bombay • Human Motor Neurophysiology and Neuromodulation Lab [↗](#)

Mumbai, India

Research Intern • Advisor: Nivethida Thirugnanasambandam, PhD

Spring, Summer 2023

Quantifying Prospective Component of Sense of Agency using Machine Learning

Characterized pre-movement EEG signatures underlying the Sense of Agency using a modified Libet clock task with probabilistic auditory feedback. Applied spectral, time-series, and machine learning analyses to identify spatiotemporal patterns predictive of intentional binding. Demonstrated distinct neural correlates in pre-SMA and centroparietal regions, supporting a prospective model of agency. *Publications:* [A2](#), Bachelor's Dissertation

College of Engineering Pune • Departments of Electronics, Applied Sciences [↗](#)

Pune, India

Undergraduate Researcher • Advisor: Mahesh H. Shindikar, PhD

2022 – 2023

Deep Learning-Based MRI Skull Tissue Segmentation

Developed and benchmarked vanilla, residual, and dense 2D U-Net architectures for skull stripping in neuroimaging, achieving 99.75% accuracy with a dense model optimized for feature reuse. Implemented data augmentation to improve generalizability across multi-scanner datasets. Demonstrated utility of open deep learning pipelines for replacing proprietary tools in MRI workflows. *Publications:* [C1](#) (Best Paper Award at ICBEST 2023), [A1](#)

Dalhousie University • Agricultural Mechanized Systems Group [↗](#)

Truro, Canada

Mitacs Globalink Research Intern • Advisor: Travis J. Esau, PhD

Summer 2022

Automating Harvesters to Reduce Operator Cognitive Load

Engineered a closed-loop control system to automate bin switching and dynamic harvester head height adjustment, reducing operator load. Used RGBD sensing for volumetric bin fill estimation ($\pm 10\%$ accuracy), and integrated crop height and GPS data to actuate harvester head in real time.

Queliz Lifetech • Early Stage Medtech Startup [↗](#)

Pune, India

Research Intern, Electronics Subsystem

Summer 2021

Point-of-Care Device for Finger Dexterity Rehabilitation in Acute Burn Patients

Designed an affordable, portable rehabilitation device to restore MCP, DIP, and PIP joint mobility in burn patients. Developed a precision actuation system with adaptive feedback to enable customized therapy in low-resource clinical settings.