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Website Version

Anway Pimpalkar

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EDUCATION

MSE, Biomedical Engineering – **Johns Hopkins University, USA** Expected May 2025
GPA: 4.00 / 4.00 Focus: Neuroengineering, Medical Devices

BTech, Electronics Engineering – **College of Engineering Pune, India** Aug 2019 – May 2023
GPA: 8.24 / 10.00 Merit: First Class with Distinction (equivalent to Magna Cum Laude)

RESEARCH EXPERIENCE

Neural Engineering Research Fellow – **BIONICs Lab ↗ | Harvard University** May 2024 – Present
Cancer Neuroscience | Vagal Nerve Stimulation | Neural Implants Boston, USA

- Developing nerve stimulation paradigms to inhibit the growth of melanoma and glioblastoma multiforme tumors.

Rehabilitation Graduate Researcher – **HAMR Lab ↗ | Johns Hopkins University** Jan 2024 – Present
Pneumatic Haptics | Upper-Limb Prosthetics | Stroke Rehabilitation Baltimore, USA

- Engineering novel pneumatactors (pneumatic vibrotactors) to provide haptic feedback across various applications in medicine and robotics.
- Advancing rehabilitation techniques for stroke patients with motor impairments through neurotraining.

Neuroengineering Graduate Researcher – **MUSiiC Lab ↗ | Johns Hopkins University** Oct 2023 – Feb 2024
Photoacoustic Retinal Prosthesis | Neuronal Stimulation | Material Characterization Baltimore, USA

- Developed multiple optical and control system aspects of a novel photoacoustic retinal prosthesis to restore vision in individuals with vision impairments and intact retinas.

Neural Signal Processing Research Intern – **HMNN Lab ↗ | IIT Bombay** Jan 2023 – Jun 2023
EEG | Machine Learning | Behavioural Neuroscience Mumbai, India

- Examined the electrophysiological correlates of the prospective component of Sense of Agency and intentional binding using machine learning and feature engineering.
- Predicted the consequential outcome probability from short pre-motor EEG data with up to 76.8% accuracy.

Neuroimaging Undergraduate Researcher – **COEP Technological University ↗** Aug 2022 – Jun 2023
MRI Processing | Deep Learning | Neuropsychology Pune, India

- Developed MRI-based skull stripping pipelines robust to the multi-scanner variability issues using U-Net neural network architectures and achieved accuracies of 99.75% on the segmentation; received Best Paper Award.
- Founded the Biomedical Engineering Research Group, led 15 students in neuroengineering research.

Mitacs Globalink Research Intern – **AMS Group ↗ | Dalhousie University** May 2022 – Aug 2022
Precision Agriculture | Point Clouds | Electronic Control Systems Nova Scotia, Canada

- Implemented real-time point cloud segmentation and volumetric analysis of the wild blueberries harvested in bins within a ±10% accuracy range using industrial Time-of-Flight and RGB imaging tools.
- Designed a control system to automate the harvester head height using prescription maps of wild blueberry fields collected using multi-spectral drone data working with latency less than 1sec.

Rehabilitation Research Intern – **Queliz Lifetech ↗** Jun 2021 – Sept 2021
Medical Devices | Digital Control Systems | Computer Vision Pune, India

- Built control systems for a hand rehabilitation device to aid patients with acute burns to finger joints.
- Generated models of finger movement paths in flexion-extension cycles and a GUI-based feedback system.

AWARDS

Best Paper | International Conference on Biomedical Engineering Science and Technology Feb 2023

Mitacs Globalink Summer Research Award ($9,915) | Mitacs May 2022

Best Project | 5th IEEE National Level Project Competition Jun 2021

TEACHING EXPERIENCE

Teaching Assistant – Mechatronics (EN. 530.421) Jan 2024 – May 2024

- Responsibilities include developing a communication platform protocol for student robot projects, conducting labs, and grading.

SKILLS AND PROFICIENCES

Tools:	Python, MATLAB, C, C++, JavaScript, R, CSS, Lua, Arduino, STM, CAD (Fusion/Shapr3D)
Fields:	Signal Processing, Human Subject Experimentation, Neural Stimulation, Medical Devices, Sensor Development, Machine Learning, Embedded Systems
Certifications:	Deep Learning, TinyML, Neuroscience for Neuroimaging All Certificates

CONFERENCE ACTIVITY

* presenter

[8] **Pimpalkar A.***, Rai D., Bartels J.U., Xu J., Brown J.D., "Visual-haptic feedback enhances finger individuation in a virtual precision grip neurotraining task," Submitted to *Biomedical Engineering Society Annual Meeting*, Oct 2024.

[7] **Pimpalkar A.***, Ameta P.*, Dalia A.*, Brown J.D., "Pneumatactor Arrays for High Frequency Vibrotactile Feedback," *United States Senate Artificial Intelligence Caucus Robotics Demo Day*, Apr 2024.

[6] Song H.* et al. [MUSiiC and Applied Physics Lab Collaboration, including **Pimpalkar A.**], "Towards visual function restoration through photoacoustic stimulation," *Association for Research in Vision and Ophthalmology Annual Meeting*, May 2024. Abstract ↗

[5] **Pimpalkar A.***, Ameta P., Dalia A., Brown J.D., "Pneumatactor Arrays for High Frequency Vibrotactile Feedback," *IEEE Haptics Symposium*, Apr 2024. Demonstration ↗ Work-in-Progress Paper ↗

[4] Harris C.*, **Pimpalkar A.**, Aggarwal A., Yang P., Chen X., Overby-Taylor C., Greenstein J., Stevens R.D., "Surgical risk prediction using an explainable deep learning approach applied to pre-operative 12-lead electrocardiograms," *JHU WSE/SOM Research Retreat*, Feb 2024. Poster ↗

[3] **Pimpalkar A.***, Patole R., Thirugnanasambandam N., "Demonstrating the Prospective Component of Sense of Agency using Machine Learning," *COEP Electronics and Telecommunication BTech Project Symposium*, May 2023. Poster ↗

[2] **Pimpalkar A.***, Patole R., Kamble K., Shindikar M., "Performance Evaluation of Vanilla, Residual, and Dense 2D U-Net Architectures for Skull Stripping of Augmented 3D T1-weighted MRI Head Scans," *2nd International Conference on Biomedical Engineering Science and Technology*, Feb 2023. Best Paper Award Paper ↗

[1] **Pimpalkar A.***, Patole R., Kamble K., Shindikar M., "Evaluating U-Nets for Skull Stripping of Augmented T1-weighted MRI Scans," *No Garland Neuroscience*, Feb 2023. Oral Presentation ↗ Poster ↗

IN-PROGRESS JOURNAL PUBLICATIONS

[3] **Pimpalkar A.**, Mathur S., Hassan S., Slepyan A., Thakor N.V., Vibration sensing in prosthetic grasp is informative of object stiffness, texture, and required grip force at first contact. *In preparation for IEEE Transactions on Medical Robotics and Bionics.*

[2] Harris C., **Pimpalkar A.**, Aggarwal A., Yang P., Chen X., Overby-Taylor C., Greenstein J., Stevens R.D., Surgical risk prediction using an explainable deep learning approach applied to pre-operative 12-lead electrocardiograms. *In preparation for Nature-Portfolio Journal: Digital Medicine*.

[1] **Pimpalkar A.**, Niture D., Towards Contactless Elevators with tinyML using Person Detection and Keyword Spotting. *In review at Smart and Sustainable Built Environment*. Best Project Award Project ↗

ACADEMIC PROJECTS

Somatosensory Neural Implant Simulation with Tactile Glove Mar 2024 – Present

Neural Implants & Interfaces | Tactile Sensing | Supervisor: Prof. Gene Fridman ↗

- Simulating the operation of a somatosensory stimulation implant for five individual fingers based on a tactile force sensing glove in MATLAB and Simulink.

ACADEMIC PROJECTS CONTINUED

Estimating Stiffness & Grasp Force at First Contact in Prosthetic Hand using Vibrations Oct 2023 – Present
Tactile Sensing | Machine Learning | Supervisor: Prof. Nitish Thakor ↗

- Investigating vibrational vs force encoding for sensory feedback in upper-limb prosthetics to estimate the stiffness and required grasp force for optimum grip within the first 10ms of contact.

Presurgical Risk Stratification using ECG Waveforms Sep 2023 – Present
Deep Learning | Signal Processing | Supervisor: Prof. Robert Stevens ↗

- Developing a deep learning framework to interpret pre-surgical electrocardiograms and output risk scores predictive of outcomes like myocardial infarction, stroke, and death within 30 days of surgery.

Infantastic: Infant Wearable Cardiovascular Monitor Oct 2023 – Dec 2023
Medical Devices | Signal Processing | Supervisor: Prof. Nitish Thakor ↗

- Built and deployed a wearable baby monitor, incorporating real-time monitoring of heartbeat and breathing with alerts for unusual movements, significantly enhancing caregiver peace of mind and child safety.

ContROLLcraft: Gaming Interface for Individuals with Upper-Limb Disabilities Sep 2023 – Oct 2023
Gaming Controls | Sensor Interfaces | Supervisor: Prof. Nitish Thakor ↗

- Developed and tested a novel game controller that uses foot movements to replicate mouse and keyboard actions for Minecraft, successfully demonstrating performance improvement across experimental trials.

TinyMLevator: Smart Elevator System using Embedded Machine Learning GitHub | Jan 2021 – May 2021
Deep Learning | Microcontrollers | TinyML | Signal Processing

- Constructed a novel multi-tenant TinyML based device capable of detecting a person standing in front of an elevator and identifying a number spoken, indicating the floor number the user would like to reach.

CovPrev: COVID-19 Symptom Checking and Sanitization Unit with App GitHub | Jan 2021 – Mar 2021
Microcontrollers | Internet of Things | Web Development

- Designed a pandemic-relevant system using physiological sensors with an app to access real-time graphics.

LEADERSHIP, SERVICE, TEAMWORK

Student Ambassador – **Gupta-Klinsky India Institute at Johns Hopkins** ↗ Mar 2024 – Present

- Bringing the best of Johns Hopkins to India through directions in research, education, policy, and practice.
- Building collaborations with alma mater, Indian government, academia, civil society, and the private sector.

Program Representative – **Johns Hopkins Biomedical Engineering** ↗ Feb 2024 – Present

- Sole Master's student representative collaborating directly with the program directors in promoting the department through various channels, including information sessions and conferences.

Ambassador – **Mitacs Globalink** ↗ Jan 2023 – Jan 2024

- Provided comprehensive mentorship to Mitacs Globalink research interns, guiding them through their academic pursuits and adapting to life in Canada, including logistics like travel and accommodation.

Sculler – **COEP Rowing Team, Pune Zonal Team** Jan 2020 – May 2023

- Won multiple race events and awards commending skill and enthusiasm in sculling (1X/2X/4X) and rowing.

Head of Events and Proshows, Member – **COEP Impressions (Cultural Festival)** ↗ Aug 2019 – Jun 2022

- Organized 25+ events every year with 10k attendees, coordinating a team of 150 members.
- Responsible for planning and executing concerts, competitions, celebrity management, and expenditures.

Co-Founder, Director of Public Relations – **YOUmanity Pune** Jan 2015 – Jan 2018

- Founded a social organisation which aimed to spread humanity around Pune, India through numerous ventures and fundraisers, and a network of a 100+ volunteers.