

Anway Pimpalkar

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EDUCATION

MSE, Biomedical Engineering – Johns Hopkins University, USA

Expected May 2025

GPA: 4.0 / 4.0

Focus: Neural Interfaces, Vision and Limb Prosthetics, Rehabilitation Engineering, Haptic Interfaces

BTech, Electronics Engineering – College of Engineering Pune, India

Aug 2019 – May 2023

GPA: 8.24 / 10.00 | First Class with Distinction

Focus: Biosignal Processing, Machine Learning, Embedded Systems Design, Control Systems

RESEARCH EXPERIENCE

Neuroengineering Research Assistant – MUSiC Lab | Johns Hopkins

Oct 2023 – Present

Photoacoustic Retinal Prosthesis | Neuronal Stimulation | Material Characterization

Baltimore, USA

- Developing multiple aspects of a novel implantable photoacoustic retinal prosthesis to stimulate epiretinal tissue.
- Optimizing photoacoustic wave focusing to circumvent neural coding and axonal stimulation challenges.

Rehabilitation Graduate Researcher – HAMR Lab | Johns Hopkins

Sept 2023 – Present

Pneumatic Haptics | Upper-Limb Prosthetics | Stroke Rehabilitation

Baltimore, USA

- Developing a novel pneumatic sleeve to deliver high frequency haptic feedback to upper-limb prosthesis users.
- Advancing richer stroke rehabilitation techniques for motor restoration through neurotraining and feedback.

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 Tech

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.
- 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 $\pm 10\%$ 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 the MCP/DIP/PIP joints.
- Generated computerized models of finger movement paths in flexion-extension cycles and a GUI-based feedback system to calibrate and control a lead-screw actuation mechanism based on STM32.

SKILLS AND PROFICIENCIES

Tools: Python, MATLAB, C, C++, JavaScript, R, CSS, Lua, Arduino, STM, CAD

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](#)

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AWARDS

Best Paper International Conference on Biomedical Engineering Science and Technology	Certificate Feb 2023
Mitacs Globalink Summer Research Award – \$9,000 Mitacs	Certificate May 2022
Best Project 5th IEEE National Level Project Competition	Certificate Jun 2021

PROJECTS

Understanding the Importance of Vibrational Encoding in Upper-limb Prosthetics Haptic Interfaces Multilayer Tactile Sensors Supervisor: Prof. Nitish Thakor <ul style="list-style-type: none">Investigating vibrational vs force-only encoding for sensory feedback in upper-limb prosthetics through innovative device design and user studies.	Nov 2023 – Present
Presurgical Risk Stratification using ECG Waveforms Deep Learning Biomedical Signal Processing Supervisor: Prof. Robert Stevens <ul style="list-style-type: none">Developing a machine learning framework to interpret pre-surgical ECGs and output risk scores predictive of outcomes like myocardial infarction, stroke, and death within 30 days of surgery.	Sep 2023 – Present
TinyMLElevator: Smart Elevator System using Embedded Machine Learning Deep Learning Microcontrollers TinyML Signal Processing <ul style="list-style-type: none">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.	GitHub May 2021
CovPrev: COVID-19 Symptom Checking and Sanitization Unit with App Microcontrollers Internet of Things Web Development <ul style="list-style-type: none">Designed a pandemic-relevant system using physiological sensors with an app to access real-time graphics.	GitHub Mar 2021

TEACHING EXPERIENCE

Mechatronics – Teaching Assistant MechE 530.421	Spring 2024
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PEER-REVIEWED PUBLICATIONS

- [3] 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)
- [2] **Pimpalkar A.**, Niture D., Towards Contactless Elevators with tinyML using Person Detection and Keyword Spotting. *IEEE Micro: Special Issue on TinyML*. (under review)
- [1] **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. *Communications in Computer and Information Science Series*, vol 2003, 2024. (in print) [[Best Paper Award](#)] [[arXiv:2211.16570](#)]

CONFERENCE ACTIVITY

* denotes presenter

- [4] Song H.*, Patterson A., Kang J., Cheng J., Kuethan C., Berlinicke C., Weiler C., Xu K., **Pimpalkar A.**, Lane N., Shrekenhamer D., Gehlbach P., Spicer J.B., Billings S., Zack D.J., Boctor E.M., Towards visual function restoration through photoacoustic stimulation. Oral Presentation to be delivered at *Association for Research in Vision and Ophthalmology Annual Meeting*, May 2024.
- [3] **Pimpalkar A.***, Ameta P., Dalia A.K., Brown, J.D., Pneumatactor Arrays for High Frequency Vibrotactile Feedback. Hands-on Demonstration and Poster to be presented at *IEEE Haptics Symposium*, Apr 2024.
- [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. *JHU WSE/SOM Research Retreat*, Feb 2024. (Poster)
- [1] **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. *No Garland Neuroscience*, Feb 2023. (Oral Presentation and Poster)

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EXTRA-CURRICULARS AND LEADERSHIP ROLES

COEP Rowing Team | 1X and 2X Sculler

Jan 2020 – May 2023

Won multiple race events and awards commending enthusiasm and skill. Represented Pune City at inter-zonal races.

COEP's Data Science and Artificial Intelligence Club | Research Lead & Member

Sept 2020 – May 2023

Led the research activities of the club consisting of 49 members, focused on tracking vehicle plates on campus.

COEP Impressions (Annual Cultural Festival) | Head of Events and Proshows

Aug 2019 – Jun 2022

Led 15 members responsible for planning and executing concerts, competitions, and celebrity management.