SHREYA MAHAJAN

shm310@pitt.edu

EDUCATION

University of Pittsburgh, PA, USA
PhD in Bioengineering (Neural Engineering track)   *started: September 2023*

University of Michigan, Ann Arbor, MI, USA
Master of Science in Electrical and Computer Engineering   *December 2020*
Specialization in MEMS (Micro Electromechanical Systems) and Microsystems

University of Mumbai (Dwarkadas J. Sanghvi College of Engineering), India
Bachelor of Engineering in Electronics Engineering   *May 2017*

PUBLICATIONS

- Mahajan, S., Sharkins, J.A., Hunter, A.H., Avishai, A., Ereifej, E.S. Focused Ion Beam Lithography to Etch Nano-architectures into Microelectrodes. J. Vis. Exp. (155), e60004, doi:10.3791/60004 (2020).
- Mahajan S, Hermann JK, Bedell HW, Sharkins JA, Chen L, Chen K, Meade SM, Smith CS, Rayyan J, Feng H, Kim Y, Schiefer MA, Taylor DM, Capadona JR and Ereifej ES (2020) Toward Standardization of Electrophysiology and Computational Tissue Strain in Rodent Intracortical Microelectrode Models. Front. Bioeng. Biotechnol. 8:416. doi: 10.3389/fbioe.2020.00416

EXPERIENCE

University of Pittsburgh, PA, USA
Graduate Student Researcher, Laboratory of Dr. Helen Schwerdt   *Aug 2023 – present*
- Developing neural electrodes for dopamine sensing in macaques to study reinforcement learning and how it is affected in neurological disorders.

Massachusetts Institute of Technology, Cambridge, MA, USA
Technical Associate I, Laboratory of Dr. Mriganka Sur   *Aug 2021 – June 2023*
- Studied temporal expectation and observational learning in the context of Autism Spectrum Disorder using behavioral experiments and electrophysiological recording (intracranial EEG) in marmosets
- Built behavior testing setup, assisted with experiment design, trained marmosets, analyzed recorded videos using DeepLabCut, used neural signal processing techniques to analyze iEEG data.
- Presented iEEG analysis results at the 2022 Marmoset Bioscience Symposium, and gave a talk about it at the Simons Center for the Social Brain (SCSB) Lunch Series.

NeuroNexus Technologies, Inc., Cambridge, MA, USA
Microfabrication Engineer   *Jan 2021 – July 2021*
- Developed an improved process for microfabrication of a polyimide device on 8" wafers at MIT.nano
- Measured electrode impedance over a range of frequencies using Electrochemical Impedance Spectroscopy
- Performed experimental short loops to design microfabrication steps for their next generation neural probes

University of Michigan, Ann Arbor, MI, USA
Graduate Student Research Assistant, Laboratory of Dr. Karl Grosh   *Jun 2019 – Jan 2021*
- Developed an optimized coil design to maximize efficiency based on computational analysis, for a MEMS high-density multi-layered coil-based speaker
- Designed an innovative microfabrication process flow, fabricated and characterized coils using this process

University of Michigan, Ann Arbor and Veterans Affairs Ann Arbor Healthcare System, MI, USA
Research Assistant, Laboratory of Dr. Evon Ereifej   *Nov 2018 – Dec 2019*
- Analyzed the impact of brain micromotion on implanted microelectrodes in rodent brain models *(published)*
- Studied microfabrication methods for etching nanopatterns on intracortical microelectrodes *(published)*
- Learned and practiced cell culture techniques to understand neuron reaction to implanted device surfaces
- *In vivo* testing of neural electrodes in rats to gauge neuroinflammatory response, signal processing of data

Backyard Brains, Inc. Ann Arbor, MI, USA
Research Fellow   *Jun 2017 – Dec 2017*
- Developed a device to detect and identify weakly electric fish species in water and track them for behavioral studies, tested it with elephant nose fish, wrote software to deduce distance of the fish from the device
- Presented the device as a poster at the University of Michigan UROP Summer Symposium.

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Indian Institute of Technology Bombay (IIT), Mumbai, India

Research Intern, Laboratory of Dr. Santosh Noronha   *Apr 2015 – Jun 2017*

- Ported signal processing libraries from MATLAB, Python to Java for ECG and PPG data processing on Android
- Designed and synthesized a fifth-order Butterworth filter on an FPGA for ECG (electrocardiogram) processing
- Used the Point Cloud Library and a Microsoft Kinect for 3D spatial reconstruction to 3-D print custom casts
- Final undergraduate project- Processed 12 lead ECG data using MATLAB to filter out noise, correct baseline wander, normalize it, detect beats, segment the ECG signal. Implemented feature extraction algorithms.

ACADEMIC PROJECTS

University of Michigan, Ann Arbor, MI, USA

Integrated Microsystems Laboratory (EECS 425)   *Jan 2019 – Apr 2019*

- Developed 2 devices: An electrothermal microinjector to automate the process of injecting genes into cells for developmental cell biology research, and a cell compression device to automate exertion of precise piconewton-range forces on cells while observing them
- Designed, microfabricated and characterized MEMS devices and accompanying circuits on 2mm x 2mm dies.
- Microinjector device specifications achieved- displacement: 24um, insertion force: 1.2mN
- Tested the cell compression device with polystyrene beads in saline, and red blood cells in blood plasma to demonstrate its use for studying RBC membrane elasticity which is tied to hemolytic disorders.

VOLUNTEER EXPERIENCE

Graduate Student Advisory Committee, University of Michigan

ECE MS student representative   *Nov 2018 –April 2020*

Contributed to discussion of ideas, concerns pertaining to issues faced by graduate students, development of quality programs, advocating for improvements, and creating a sense of community in the College of Engineering.

IEEE Student Chapter, D. J. Sanghvi College of Engineering- University of Mumbai

Editorial Head   *Oct 2015 – Sept 2016*

Developed a new website using JavaScript and HTML, designed posters for events, compiled weekly newsletters about tech news, prepared presentations to promote events, assisted students during practical workshop events.

SKILLS

Design and Finite Element Analysis of MEMS devices (COMSOL), Microfabrication, Characterization of MEMS devices, Photolithography mask layout design (L-Edit, KLayout, Cadence, PHIDL), MATLAB, Analog circuit design (Cadence), Machine learning for electrophysiological signals, Programming (python, java, C, HTML), Cell viability assay, Video analysis using deep learning algorithms (DeepLabCut), Printed Circuit Board design (EagleCAD), Digital circuit design (VHDL), Embedded software development (C, Arduino), Basic rodent surgery, Electrophysiological recording (rats), Documentation and presentation of projects, Behavioral training (non-human primates)