

Ariel Slepyan

Contact Information

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Education

08/2021 –	PhD in Electrical and Computer Engineering Johns Hopkins University Advisor: Professor Nitish Thakor Thesis: “High-Speed Scalable Sensor Arrays through Analog Multi-Tone Multi-Frequency Encoding”	Baltimore, MD, USA
08/2020 – 08/2021	M.S.E in Biomedical Engineering Johns Hopkins University Advisor: Professor Nitish Thakor Dean’s Master’s Fellowship Thesis: “Scalable Tactile Sensing E-Skins Through Spatial Frequency Encoding”	Baltimore, MD, USA
08/2016 – 05/2020	B.S. in Biomedical Engineering Johns Hopkins University Bloomberg Scholarship	Baltimore, MD, USA

Research Experience

06/2020 –	Graduate Student Neuroengineering & Biomedical Instrumentation Lab Johns Hopkins University	Baltimore, MD, USA
Summer 2019	Summer Researcher Singapore Institute for Neurotechnology	Singapore
Summer 2018	Visiting Scholar Interuniversity Microelectronics Centre (IMEC)	Leuven, Belgium
01/2017 – 01/2019	Undergraduate Researcher BioMEMS Lab Johns Hopkins University	Baltimore, MD, USA
Summer 2014/15	Research Intern Groisman Lab University of California, San Diego	La Jolla, CA, USA

Research Interests

Tactile Sensing, E-skin, Compressed Sensing, Neuromorphic Systems, Sensory Feedback, Robotics, Wearable Devices, Microfabrication

Awards & Honors

2022	Invited Participant to the Telluride Neuromorphic Cognition Engineering Workshop
2022	Grand Prize Winner of Johns Hopkins ECE Design Day
2022	Finalist in Johns Hopkins Healthcare Design Competition (\$5,000)
2021	Winner of Johns Hopkins Ignite Grant (\$1,000)
2020	Recipient of Dean's Master's Fellowship (1/2 Tuition Scholarship)
2019	Finalist for FastForward Summer Award (\$10,000)
2018	Winner of Johns Hopkins Spark Grant (\$1,000)
2017	2 nd place overall winner at MedHacks 2017
2017	Winner of Wolfram Award and Contrary Capital Prize at MedHacks 2017
2016	Recipient of Michael R. Bloomberg Scholarship (Full Tuition Scholarship)
2016	2 nd place in Microbiology at Intel ISEF 2016 (International Science and Engineering Fair)
2016	1 st place in Engineering at the New York State Science and Engineering Fair
2015	1 st place in Materials Science at the New York State Science and Engineering Fair

Professional Activities

- Independent Reviewer for 2022 29th IEEE International Conference on Electronics, Circuits & Systems
- Independent Reviewer for 2022 9th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)

Research Grants Awarded

- Space@Hopkins Seed Grant Program 2022 (\$25,000) – “Self-Powered, Electronics-Free Tactile Sensors Immune to the Hazards of Cosmic Radiation”

Teaching Lead

EN.520.299	PCB Design and Microcontroller Programming	Winter 2023
EN.580.113	Prosthesis Instrumentation	Winter 2023

Teaching Assistantships

EN.580.456	Introduction to Rehabilitation Engineering	Fall 2022
EN.580.471	Principles of the Design of Biomedical Instrumentation	Fall 2022, 2020
n/a	BME Design Studio TA	2021 – 2022
EN.580.457	Rehabilitation Engineering: Design Lab	Spring 2021
EN.580.571	Honors Instrumentation	Spring 2021
EN.580.477	Biomedical Data Science Lab	Fall 2019

Publications/presentations

1. Z. Ou, Y. Guo, P. Gharibani, **A. Slepyan**, et al “Time-frequency analysis of somatosensory evoked high-frequency (600 Hz) oscillations as an early indicator of arousal recovery after hypoxic-ischemic brain injury” Brain Sciences. 2022. *Submitted*
2. Y. Tian, **A. Slepyan**, et al, “Real-Time, Dynamic Sensory Feedback Using Neuromorphic Tactile Signals and Transcutaneous Electrical Nerve Stimulation” 2022 IEEE Biomedical Circuits and Systems Conference (BioCAS), 2022. <https://ieeexplore.ieee.org/abstract/document/9948609>
3. S. Sankar, **A. Slepyan**, et al, “Flexible Biomimetic Tactile Sensing on a Soft Robotic Fingertip” 2022 IEEE Sensors, 2022. *Accepted*
4. A. Aug, **A. Slepyan**, E. Levenshus, N. Thakor, “Haptic Touch: A retrofittable tactile sensing glove and haptic feedback armband for scalable and robust tactile sensory feedback”, 2022 9th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), Seoul, Korea, 2022. <https://ieeexplore.ieee.org/document/9925475>
5. **A. Slepyan**, S. Sankar, and N. Thakor, “Texture Discrimination Using a Neuromimetic Asynchronous Flexible Tactile Sensor Array with Spatial Frequency Encoding”, 10th International IEEE/EMBS Conference on Neural Engineering, 2021 <https://ieeexplore.ieee.org/document/9441136>

6. M. Iskarous, S. Sankar, **A. Slepyan**, and N. Thakor, "Scalable, Biomimetic Sensory Solutions for Dexterous Robotics Hands" 2021 NRI & FRR Principal Investigators' Meeting, 2021
7. **A. Slepyan** and N. Thakor, "*Towards scalable soft e-skin*: Flexible event-based tactile-sensors using wireless sensor elements embedded in soft elastomer", 2020 8th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob), New York, 2020
<https://ieeexplore.ieee.org/document/9224353>
8. **A. Slepyan**, R. Acharya, A. Silva, D. Kumar, and N. Thakor, "A Biomimetic Soft Finger for Palpation Applications", Do Good Robotics Symposium, Maryland, 2019
9. **A. Slepyan**, N. Ribeiro, A. Saad-Eldin, A. Blakney, "Rapid development of paper-based microfluidic devices using crayons and coffee filters", Baltimore Innovation Week Science Conference, 2017

Technical Skills

Prototyping/Instrumentation: Sensors, Hardware, Circuit Design, Microcontrollers, i2c/SPI, Bluetooth

Programming: Python, C++, MATLAB, Machine Learning/Data Science

Computer Programs: AutoCAD, LTSpice, KiCAD, 3D Printing

Microfabrication: Photolithography, Etching, Thin Film Deposition, Bonding, Mask Design, PDMS

Major projects (see more on my [webpage](#))

1. "Robotic contour following through tactile sensing and a recurrent neural network" **2022**
2. "Multi-Dimensional Sum Compression for Large Sensor Arrays" **2022**
3. "A Frequency Multiplexed Tactile Sensor Without Electronics Using Piezoelectric Cantilevers" **2022**
4. "A Miniaturized Joule Thief to Extend the Life of AAA Batteries" **2022**
5. "Wavelet Decomposition and Reconstruction of High-Frequency Oscillations in Somatosensory Evoked Potentials during Ischemia" **2021**
6. "Proper Covid Mask-Fit Detection Using Thermal Imaging" **2021**
7. "Predicting 2D motion of primate hands with a KNN classifier using data from sensorimotor cortex implanted electrode arrays" **2021**
8. "Scalable tactile sensing e-skins through spatial frequency encoding" **2020-21** **Master's Thesis**
9. "A flexible tactile sensing glove and haptic feedback armband connected by Bluetooth for facile tactile feedback in prosthetic hands" **2020-21**
10. "Teleoperation of a UR5 robotic arm with an attached prosthetic hand (3D printed), with soft fingertips and flexible, fabric-based force sensors" **2020**
11. "A Monte Carlo Simulation of the spectral response of a 7-layered human skin model for diagnostic imaging" **2020**
12. "Autonomous navigation robot with color coded navigation cues and distance sensors" **2020**
13. "*Towards scalable soft e-skin*: Flexible event-based tactile sensors using wireless sensor elements embedded in soft elastomer" **2019**
14. "A two-finger soft robotic gripper with tactile feedback for delicate grasping" **2019**
15. "A smart, wireless UV sensing wristband with alarm and snooze" **2019**
16. "Wireless video game control via motion sensing for bilateral transhumeral amputees" **2019**
17. "Vacuum based droplet loading for microfluidics" **2018 – 2019**
18. "Micro-droplet sorting using dielectrophoresis (DEP) in a silicon microchip" **2018**
19. "Rapid development of paper-based point-of-care diagnostics using an inexpensive piezoelectric inkjet printer" **2017 – 2018**
20. "Enzyme Kinetics Measurements in a Combinatorial Dynamic Droplet Array" **2017**
21. "Rapid development of paper-based microfluidic devices using crayons and coffee filters" MedHacks **2017**

Patents

"SCALABLE, EVENT-BASED SENSING USING WIRELESS SENSOR ELEMENTS EMBEDDED IN FLEXIBLE ELASTOMER"

Patent Number = WO2022212730A1, Published 2022-10-06

<https://patents.google.com/patent/WO2022212730A1>

Leadership Experience

- 2022 Technical Advisor for Hopkins Asian Medicine Pulse Diagnosis Project
- 2017 – 2020 Hardware Director at WJHU Student Radio
- 2017 – 2018 Team leader of student venture PPOC4.me
Focused on developing accessible paper based microfluidic diagnostic devices using an inkjet printer. Member of TCO Lab's Hatchery Incubator. Presented at invitational Baltimore Innovation Week Science Conference (2017).

Mentoring

Masters Students: Michael Zakariaie (2022 –), Yucheng “Jacky” Tian (2022)

Undergraduate Students: Yanisa “Belle” Angkanapiwat (2022 –), Guangyan “Molly” Li (2022 –), Eli Levenshus (2021 –), Aidan Aug (2021 –), Dylan Zhu (2022 –), Neeti Prasad (2022), Aryaman Shodhan (2021), Martin Prados de Haro (2021)

High School Students:

Pratham Mathapati, Pranavaa Elangovan, Sahil Mada (2020 – 2021)
Upanshu Bajaj, Shriya Sane, and Kimaya Basu (2022 – 2023)

Project Advising

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| 2022 | Auris: The OxyEaring – Circuit design/PCB design | team lead = Subhi Somanathan |
| 2022 | CurveAssure – Circuit design and PCB design | team lead = Evan Haas |
| 2022 | BioStabilizer – PCB design | team lead = Molly Li |
| 2022 | FiOR – Circuit design and PCB design | team lead = Aydin Turkey |