

Ariel Slepyan

Contact Information

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Education

08/2021 – PhD in Electrical and Computer Engineering
Johns Hopkins University Baltimore, MD, USA
Advisor: Professor Nitish Thakor
Thesis: *“Ultra-Scalable Tactile Sensing Through Compressive Sampling”*

08/2020 – 08/2021 M.S.E in Biomedical Engineering
Johns Hopkins University Baltimore, MD, USA
Advisor: Professor Nitish Thakor
Dean’s Master’s Fellowship
Thesis: *“Scalable Tactile Sensing E-Skins Through Spatial Frequency Encoding”*

08/2016 – 05/2020 B.S. in Biomedical Engineering
Johns Hopkins University Baltimore, MD, USA
Bloomberg Scholarship

Experience

06/2020 – Graduate Student
Neuroengineering & Biomedical Instrumentation Lab
Johns Hopkins University Baltimore, MD, USA
--Focusing on scalable touch sensing in robotics and wearables

01/2024 – Co-Founder, CTO
Navonic Baltimore, MD, USA
--Scalable touch sensors for robotics and XR

01/2023 – Lead Hardware Engineer
CurveAssure Spine Baltimore, MD, USA
--Leading hardware development of a wearable spine monitor

Summer 2019 Summer Researcher
Singapore Institute for Neurotechnology Singapore
--Developed RFID-based wireless touch sensors

Summer 2018 Visiting Scholar
Interuniversity Microelectronics Centre (IMEC) Leuven, Belgium
--Built microfluidic droplet sorter using DEP in silicon chip

01/2017 – 01/2019 Undergraduate Researcher
BioMEMS Lab
Johns Hopkins University Baltimore, MD, USA
--Built microfluidic droplet-based platform for measuring enzyme kinetics

Summer 2014/15 Research Intern
Groisman Lab
University of California, San Diego La Jolla, CA, USA
--Build PDMS chip to investigate chemotaxis of E. coli

Awards & Honors

2024 Winner of Johns Hopkins Ignite Grant (\$1,000)
2024 Willard & Marilyn Sweetser ARCS Foundation Scholar (\$15k)
2024 Winner of JHU Fuel Cohort Prize (Navonic-Evoked Haptics, \$8k)
2024 Winner of WSE Excellence in Teaching, Advising, and Mentoring Award

2024	Invitee to JHU Fuel Accelerator (Navonic, 10/50 university-wide)
2023	Winner of JHU President's Venture Fellowship (CurveAssure, \$100,000)
2023	Grand Prize Winner of JHU Makerspace Design Challenge
2023	Finalist for IEEE World Haptics Student Innovation Challenge (P1)
2022	Invitee to the Telluride Neuromorphic Cognition Engineering Workshop (1 of 30 international)
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 4-year 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

Research Grants Awarded

- TEDCO MII Technology Assessment Award 2024 (\$115,000) – “High-Density Tactile Sensor Array with a Single Output Wire for Medical Rehabilitation”. (#1 score in cohort 4.167 / 5)
- Space@Hopkins Seed Grant Program 2022 (\$25,000) – “Self-Powered, Electronics-Free Tactile Sensors Immune to the Hazards of Cosmic Radiation”

Patents and Invention Disclosures

1. “WEARABLE PLANTAR SENSOR-BASED SYSTEM FOR LOWER LIMB BIOMECHANICS RECONSTRUCTION” (JHU Tech ID #C18700)
2. “SCALABLE DISTRIBUTED TACTILE SENSORS WITHOUT INTEGRATED CIRCUITS USING RESONANCE MULTIPLEXED PIEZOELECTRIC SENSORS” (JHU Tech ID #C18042)
Provisional Patent Application Number = 63/682,440
3. “METHOD AND APPARATUS OF A HIGH-DENSITY NON-INVASIVE NEURAL STIMULATOR” (JHU Tech ID #C18182)
Provisional Patent Application Number = 63/655,671
4. “METHOD OF SCALABLE SENSOR ARRAYS THROUGH ROW COLUMN COMPRESSIVE SENSING” (JHU Tech ID #C18041)
Provisional Patent Application Number = 63/653,517
5. “SCALABLE, EVENT-BASED SENSING USING WIRELESS SENSOR ELEMENTS EMBEDDED IN FLEXIBLE ELASTOMER” (JHU Tech ID #C16118)
Patent Number = 18/553,717, Published 2022-10-06

Research Papers

Under Review

1. **A. Slepyan***, D. Li*, A. Aug, S. Sankar, T. Tran, and N. Thakor, “Adaptive Compressive Tactile Subsampling: Enabling High Spatiotemporal Resolution in Scalable Robotic Skin”, *Under Review at Science Robotics*, <https://arxiv.org/abs/2410.13847>
2. **A. Slepyan**, J. Chen, and N. Thakor “Scalable Tactile Sensing Skins: Sensors, Wiring and Data Management” *Under Review at Proceedings of the IEEE*.
3. A. Pimpalkar, **A. Slepyan**, and N. Thakor, “At First Contact: Stiffness Estimation Using Vibrational Information for Prosthetic Grasp Modulation”, *Under Review at IEEE Sensors Letters*, <https://arxiv.org/abs/2411.18507>
4. M. Iskarous, Z. Chaudhry, F. Li, S. Bello, S. Sankar, **A. Slepyan**, et al, “Invariant neuromorphic representations of tactile stimuli improve robustness of a real-time texture classification system” *Under Review at PNAS*, <https://arxiv.org/abs/2411.17060>

5. J. Wang, S. Bello, **A. Slepyan**, and N. Thakor "Incline Angle Estimation using High-density Insole Pressure Sensor" *Under review at World Haptics 2025*

Published

6. S. Sankar, W. Cheng, J. Zhang, **A. Slepyan**, et al "A natural biomimetic prosthetic hand with neuromorphic tactile sensing for precise and compliant grasping" *Science Advances*. 2025. <https://www.science.org/doi/10.1126/sciadv.adr9300>
Featured in JHU HUB - <https://hub.jhu.edu/2025/03/05/prosthetic-robotic-hand/>
7. Y. Angkanapiwat, **A. Slepyan**, and N. Thakor, "SensoPatch: a Reconfigurable Haptic Feedback with High-Density Tactile Sensing Glove," 2024 IEEE Biomedical Circuits and Systems Conference (BioCAS), 2024. <https://ieeexplore.ieee.org/document/10798282>
8. **A. Slepyan**, M. Zakariaie, T. Tran, and N. Thakor "Wavelet Transforms Significantly Sparsify and Compress Tactile Interactions" *Sensors*. 2024. <https://www.mdpi.com/1424-8220/24/13/4243>
9. S. Wang, K. Quinn, **A. Slepyan**, et al, "Channel selection and wavelet transformation-based data compression preserve motor unit information" 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC). 2024. <https://ieeexplore.ieee.org/document/10782539>
10. **A. Slepyan***, S. Krishnan*, T. Li and N. Thakor, "A Multi-Channel, Low-Voltage, High-Frequency Programmable Electrical Stimulator for Sensory Feedback," 2023 IEEE Biomedical Circuits and Systems Conference (BioCAS), 2023. <https://ieeexplore.ieee.org/document/10388769>
11. 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. <https://www.mdpi.com/2076-3425/13/1/2>
12. 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/document/9948609>
13. S. Sankar, **A. Slepyan**, et al, "Flexible Multilayer Tactile Sensor on a Soft Robotic Fingertip" 2022 IEEE Sensors, 2022. <https://ieeexplore.ieee.org/document/9967059>
14. 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>
15. **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>
16. **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>

Research Abstracts

17. **A. Slepyan***, D. Li*, T. Tran, and N. Thakor, "Compressive Subsampling for Scalable Tactile Skin" 2025 Data Compression Conference (DCC). 2025. *Accepted*
18. **A. Slepyan***, D. Li*, T. Tran, and N. Thakor, "Live Demonstration: Compressive Subsampling for High-Speed Large-Area Tactile Sensing" 2025 IEEE International Symposium on Circuits and Systems (ISCAS). 2025. *Accepted*

Conference and Abstract Presentations without proceedings

1. **A. Slepyan**, D. Li, T. Tran, and N. Thakor, "Compressive Subsampling for Scalable Tactile Sensing Robot Skin" 2024 Workshop on Neuromorphic Principles in Biomedicine and Healthcare
2. **A. Slepyan**, M. Iskarous, S. Sankar, and N. Thakor, "Scalable, Biomimetic Sensory Solutions for Dexterous Robotics Hands" 2021 NRI & FRR Principal Investigators' Meeting, 2021
3. **A. Slepyan**, R. Acharya, A. Silva, D. Kumar, and N. Thakor, "A Biomimetic Soft Finger for Palpation Applications", Do Good Robotics Symposium, Maryland, 2019
4. **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

Teaching Lead of Original Courses (110+ students)

EN.520.299	PCB Design and Microcontroller Programming	Winter 2023 – 2025
	<i>Student feedback – "Arik is extremely helpful, and willing to put in the extra time for both students who are struggling and those who want to go above and beyond. 10/10 instructor!"</i>	
EN.580.113	Prosthesis Instrumentation	Winter 2023
	HUB Article – https://hub.jhu.edu/2023/02/06/intersession-prosthesis-instrumentation/	

Teaching Assistantships (16 classes)

EN.580.471	Principles of the Design of Biomedical Instrumentation	Fall 2020 – 2024
EN.520.448	Advanced Electronics Design Lab	Spring 2023 – 2024
EN.580.571	Honors Instrumentation	Spring 2021 – 2025
EN.580.456	Introduction to Rehabilitation Engineering	Fall 2022 – 2023
n/a	BME Design Studio TA	2021 – 2022
EN.580.457	Rehabilitation Engineering: Design Lab	Spring 2021
EN.580.477	Biomedical Data Science Lab	Fall 2019

Leadership Experience

2023 –	Co-President of ECE Graduate Student Association
2023	ECE representative for the Graduate Student Organization (GRO)

Student Mentorship (35 students), (8 published *)

Master's Students: Dian Li* (2024 –), Kai Cheng (2024 –), Anway Pimpalkar* (2024 –), Dheeraj Gudluru (2024), Diego Gomez (2024), Junjun Chen (2024 –), Priyanka Fernandes (2023 – 2024), Tianao Li* (2023 –), Siddharth Krishnan* (2022 – 2023), Michael Zakariaie* (2022 – 2023), Arnab Chatterjee (2022), Yucheng "Jacky" Tian* (2022)

Undergraduate Students: Ashley Luo (2024 –), Keya Agrawal (2024), Rudy Zhang (2024 –), Amanda Butler (2024), Mathew Schricker (2023 – 2024), Laura Xing (2023 –), Yanisa "Belle" Angkanapiwat* (2022 – 2024), Guangyan "Molly" Li (2022 – 2023), Eli Levenshus* (2021 – 2023), Aidan Aug* (2021 – 2023), Dylan Zhu (2022 – 2023), Neeti Prasad (2022), Aryaman Shodhan (2021), Martin Prados de Haro (2021)

High School Students: El Donald (2024), Srinitha Kondapaneni (2023), Ian Tran (2023), Upanshu Bajaj, Shriya Sane, and Kimaya Basu (2022 – 2023), Pratham Mathapati, Pranavaa Elangovan, Sahil Mada (2020 – 2021),

Professional Activities

- Reviewer for 2025 IEEE World Haptics Conference (WHC)
- Reviewer for 2024 31st IEEE International Conference on Electronics, Circuits & Systems (ICECS)
- Reviewer for 2024 10th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)
- Reviewer for 2022 29th IEEE International Conference on Electronics, Circuits & Systems (ICECS)
- Reviewer for 2022 9th IEEE International Conference on Biomedical Robotics and Biomechatronics (BioRob)

Consulting Work

- PCB Design for OmniSense Surgical, Inc

Developed a "smart retractor" providing real-time surgical guidance with a focus on mastectomy procedures and plastic & reconstructive surgery. Startup spun out of the Texas Biodesign program.