Anjali Devi Sivakumar

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EDUCATION

University of Michigan, Ann Arbor, MI
Ph.D. in Electrical and Computer Engineering, GPA: 4.0 /4.0 *April 2026 (Anticipated)*

University of Michigan, Ann Arbor, MI
Master of Science in Electrical and Computer Engineering, GPA: 4.0 /4.0 *May 2023*

SASTRA Deemed to be University, Tamil Nadu, India
Bachelor of Technology in Electronics and Instrumentation Engineering, GPA: 9.31/10.0 *June 2019*

RESEARCH EXPERIENCE

University of Michigan, Dept. of Biomedical Eng. and Dept. of Electrical and Computer Eng. **Ann Arbor, MI**
Graduate Student Research Assistant *Jan 2021- Present*

- Developing low-temperature Au-In-based Transient Liquid Phase (TLP) bonding techniques for packaging lamp-based photoionization detectors for high-yield mass production.
- Prototyping a wearable Transepidermal Water Loss (TEWL) based skin analyzer for rapid detection of food anaphylaxis before symptom onset in pediatric subjects in collaboration with Mary H. Weiser Food Allergy Center.
- Collaborating with clinicians and data scientist teams at Michigan Medicine to study the correlation between body odor emissions and the diagnosis of 22 diseases and health conditions using wearable micro-gas chromatography (micro-GC) devices and other vital signs.
- Designed and characterized the MEMS-based microfluidic differential dual channel photo-ionization detector with a high impedance front-end circuit for ultra-fast and sub-ppt Volatile Organic Compound (VOC) detection for portable gas chromatography (GC) systems.
- Engineered and prototyped a Wearable Analytical Skin Probe (WASP) immune to environmental variations and modelled a corresponding signal processing algorithm for monitoring skin dynamics with CV < 10%.
- Developed portable 1D GC-based analyzers for exhaled breath, enabling non-invasive COVID-19 detection in collaboration with the Max Harry Weil Institute for Critical Care Research & Innovation, achieving an accuracy of 94.7%.

Harvard Medical School – Brigham and Women's Hospital, Division of Eng. in Medicine **Cambridge, MA**
Research Assistant *Jan 2019 – Nov 2020*

- Developed portable, cost-effective smartphone-based diagnostic systems for semen analysis in vitro fertilization (IVF) applications.
- Designed and prototyped a saliva and smartphone-based low-cost ovulation tracker for at-home use.
- Collaborated with Harvard School of Public Health to investigate the effects of environmental exposures on semen quality and sperm epigenome using a smartphone-based diagnostic device.
- Conducted histological analysis of semen and malaria blood cells to train machine-learning models for accurate morphological classification at varying image resolutions.

Indian Institute of Space Science and Technology, Dept. of Avionics **Trivandrum, India**
Summer Research Fellow *May 2018 – July 2018*

- Developed and evaluated analog readout circuit for Palladium-based hydrogen gas sensors (low-valued resistive sensors) utilizing a cost-effective two-stage amplifier configuration, demonstrating operational robustness with a linear output and zero offset.
- Designed and characterized direct-digital front ends for Palladium-based hydrogen gas sensors (low-valued resistive sensors) employing a modified dual-slope ADC architecture, showcasing the capability to generate a linear output unaffected by switch ON-resistances.

MENTORING AND TEACHING EXPERIENCE

Graduate Society of Women Engineers (GradSWE), University of Michigan **Ann Arbor, MI**
Senior K12 Outreach Officer *May 2023- Present*

- Organized and led robotics workshop modules for Junior Girl Scouts, engaging over 25 participants during Winter 2024, Fall 2024, and Winter 2025, sponsored by Aptiv and the UM Center for Educational Outreach (CEO).
- Co-organized Explorer Day sponsored by Aptiv in Fall 2024, welcoming 15+ children from the Community Action Network (CAN), which supports under-resourced families in Washtenaw County; the event featured a visit to the UM campus and the Natural History Museum.
- Collaborated with Tau Beta Pi and the Mechanical Engineering Graduate Student Council to orchestrate Engineering Day for Brownie and Junior Girl Scouts, providing hands-on activities to introduce various engineering disciplines.

University of Michigan Undergraduate Research Opportunity Program (UROP) **Ann Arbor, MI**
Research Mentor *Sept 2023 – April 2025*

- Mentored four freshmen in engineering, guiding them in developing and characterizing portable gas analyzers for medical diagnostics.
- Advised undergraduate students on conducting research and presenting findings at symposium.

SKILLS

Programming Languages: C, C++, Python, Embedded C, MATLAB, Simulink, LabVIEW
Simulation Software: LT-Spice, TI-Tina, Cadence Virtuoso, COMSOL
Rapid Prototyping Hardware: CO_2 Laser cutting, 3-D Printing (SLA & FDM), CNC Machining
Operating Systems: Windows, Linux (Ubuntu), Mac OSX
Robot Platforms: Robotics Operating System (ROS)
Microfabrication: CVD, PVD, ALD, Bonding, Dry and Wet Etching, Lithography
Metrology: SEM/EDS, Stylus profilometry, Optical 3D profilometry, Optical Microscopy, Reflectometry, Ellipsometry, Goniometer, Four-point probe
Design Software: AutoCAD Fusion, KiCAD, Altium, Klayout
Wet Lab: Histology, Cell culture, Biosafety Level 2+

JOURNAL PUBLICATIONS

- **Anjali Devi Sivakumar** , Ruchi Sharma, Junqi Wang, Weiliang Liang, Yulong Zhou, and Xudong Fan (submitted).
- Makiko Mitsunami, Hemanth Kandula, **Anjali Devi Sivakumar**, Tejas Girish Deshpande, Jasmine Kumar, Susitra Gnanasambhandam, Prudhvi Thirumalaraju, Manoj Kumar Kanakasabapathy, Charles L Bormann, Martin Kathrins, Hadi Shafiee, Jorge E Chavarro, Jaime E Hart, "Comparing remote smartphone-based semen assessments with laboratory evaluations in men unselected for fertility concerns", ***Fertility and Sterility,*** July 2025.
- Xiaheng Huang, Shuo Yang, Wencheng Li, Robert Nidetz, Ruchi Sharma, **Anjali Devi Sivakumar**, Chandrakalavathi Thota, Hongbo Zhu, Weishu Wu, Seong-Yong Jeong, and Xudong Fan, "Microfluidic integration of μPID on μcolumn for ultracompact micro-gas chromatography", ***Sensors and Actuators B: Chemical*** **410**, 135717, March 2024.
- **Anjali Devi Sivakumar**, Ruchi Sharma, Chandrakalavathi Thota, Ding Ding, and Xudong Fan, "WASP: Wearable Analytical Skin Probe for Dynamic Monitoring of Transepidermal Water Loss", ***ACS Sensors*** **8** , 4407-4416, November 2023**.**
- Xiaheng Huang, Ruchi Sharma, **Anjali Devi Sivakumar**, Shuo Yang, and Xudong Fan, "Ultrathin silica integration for enhancing reliability of microfluidic photoionization detectors", ***Analytical Chemistry 95***, 8496–8504, May 2023.
- Ruchi Sharma, Wenzhe Zang, Ali Tabartehfarahani, Andres Lam, Xiaheng Huang, **Anjali Devi Sivakumar**, Chandrakalavathi Thota, Shuo Yang, Robert P. Dickson, Michael W. Sjoding, Erin Bisco, Carmen Colmenero Mahmood, Kristen Machado Diaz, Nicholas Sautter, Sardar Ansari, Kevin R. Ward, and Xudong Fan, "Portable Breath-Based Volatile Organic Compound Monitoring for the Detection of COVID-19 During the Circulation of the SARS-CoV-2 Delta Variant and the Transition to the SARS-CoV-2 Omicron Variant", ***JAMA Network Open 6***, e230982, February 2023.
- Xiaheng Huang, Maxwell Wei-hao Li, Wenzhe Zang, Xiaolu Huang, **Anjali Devi Sivakumar**, Ruchi Sharma, and Xudong Fan, "Portable Comprehensive Two Dimensional Micro-Gas Chromatography Using Integrated Flow-Restricted Pneumatic Modulator", ***Nature Microsystems & Nanoengineering*** **8**, 115, November 2022.
- Aridany Suárez-Trujillo, Hemanth Kandula, Jasmine Kumar, **Anjali Devi**, Larissa Shirley, Prudhvi Thirumalaraju, Manoj Kumar Kanakasabapathy, Hadi Shafiee, Liane Hart, "Validation of a smartphone-based device to measure concentration, motility, and morphology in swine ejaculates", ***Translational Animal Science*** **6**, 1-8, October 2022.

- Manoj Kumar Kanakasabapathy, Prudhvi Thirumalaraju, Hemanth Kandula, Fenil Doshi, **Anjali Devi Sivakumar,** Deeksha Kartik, Raghav Gupta, Rohan Pooniwala, John A Branda, Athe M Tsibris, Daniel R. Kuritzkes, John C Petrozza, Charles L Bormann, Hadi Shafiee, "Adaptive Adversarial Neural Networks for Lossy and Domain-Shifted Medical Image Analysis", ***Nature Biomedical Engineering* 5**, 571-585, June 2021.

SELECTED CONFERENCE PROCEEDINGS AND PRESENTATIONS

- **Anjali Devi Sivakumar**, Ruchi Sharma, Chandrakalavathi Thota, Shuo Yang, Ali Tabartehfarahani, Xudong Fan, "WASP: A Next-Generation Wearable Solution for Dynamic Skin Health Monitoring", ***UM Skin Research Center's 6th Annual Symposium: Advances in Skin Biology & Diseases, Ann Arbor***, February 2025.
- **Anjali Devi Sivakumar**, Ruchi Sharma, Chandrakalavathi Thota, Xudong Fan, "WASP: Wearable Analytical Skin Probe", ***46th Annual International Conference of the IEEE Engineering in Medicine & Biology Society, Orlando, Florida***, July 2024.
- **Anjali Devi Sivakumar,** Ahmed Shokr, Luis G. C. Pacheco, Prudhvi Thirumalaraju, Manoj K. Kanakasabapathy, Jahnavi Gandhi, Deeksha Kartik, Filipe S. R. Silva, Eda Erdogmus, Sai Hemanth K. Kandula, Shenglin Luo, Xu G. Yu, Raymond T. Chung, Jonathan Z. Li, Daniel R. Kuritzkes, and Hadi Shafiee, "Rapid, Sensitive, Point-of-Care Detection of SARS-CoV-2 On-Chip", ***Discover Brigham***, November 2020.

PATENTS

- Xudong Fan, **Anjali Devi Sivakumar**, 'Dual-Channel PID', 2025 (Patent disclosure filed)
- Xudong Fan, **Anjali Devi Sivakumar**, 'Modifications to TEWL device', 2025 (Patent disclosure filed).
- Xudong Fan, Ruchi Sharma, Chandrakalavathi Thota, **Anjali Devi Sivakumar**, Ali Tabartehfarahani, Shuo Yang, Wencheng Li, Loc Cao, Sardar Ansari, 'Skin emission sampling pouch', 2024 (Patent disclosure filed).
- Xudong Fan, Xiaheng Huang, Shuo Yang, Wencheng Li, Robert Nidetz, Ruchi Sharma, **Anjali Devi Sivakumar**, Chandrakalavathi Thota, Hongbo Zhu, Weishu Wu, Seong-Yong Jeong, 'Monolithic integration of micro-gas chromatography column and micro-photoionization detector on a chip', (Provisional patent application number: 63/622,741, filed on January 19, 2024).
- Xudong Fan, **Anjali Devi Sivakumar**, 'A transepidermal water loss device' (PCT application number: 18/428,514, filed on February 1, 2024).
- Xiaheng Huang, Ruchi Sharma, **Anjali Devi Sivakumar**, Shuo Yang, and Xudong Fan, 'Protective Dielectric Layers for Enhancing Reliability of Vacuum Ultraviolet Lamps' (PCT application number: PCT/US2024/022212, filed on March 29, 2024).

ACADEMIC HONORS AND AWARDS

- Received the **Dr. Helen Wu Award** from Rackham Graduate School for Spring/Summer 2024.
- Awarded the prestigious **Barbour Scholarship** (endowed in 1917) from Rackham Graduate School for the academic year 2024-25.
- Received the **Rackham Conference Travel Grant** from Rackham Graduate School for the academic year 2024-25.
- Inducted into the **Excellence in ECE Honor Roll 2023-24** for service to the ECE department through contributions to department-specific events and programming designed to foster an inclusive, supportive community for all.
- Awarded **the Research Excellence Award** from **Brigham Research Institute** for **outstanding contributions to research** at **Brigham and Women's Hospital** on Nov-12,2020**.**
- Received the **Desh Videsh Scholarship** for pursuing my bachelor's thesis at Harvard Medical School, MA, USA.
- Awarded the **Smt. K.Thulasi Memorial Award** for **best outgoing student from School of Electrical and Electronics Engineering** amongst the graduating batch of 2019.
- Awarded the **Dr. V.Jayashankar Award** for student who has secured highest CGPA., upto VII Semester in the B.Tech.-Electronics and Instrumentation Engineering & M.Tech (5-year Integrated) Instrumentation & Control Programme.
- Awarded the **Shri. Vishwantha Iyer Award** for **best outgoing student** from the Department of Electronics and Instrumentation Engineering amongst the graduating batch of 2019.
- Received the **Dean's Merit Scholarship** for being in the **top 2% of UG Batch 2015-2018** in terms of academic performance.
- Awarded the **Shri. A.Venkataraman Award for academic excellence** from SASTRA University**.**
- Awarded the prestigious **Young Environmental Scientist-2014 Award** from IWMA.

PROFESSIONAL AND SERVICE ACTIVITIES

University of Michigan Lurie Nano Fabrication User Committee, *Member* *Jan 2024- Present*
University of Michigan UROP Syposium, *Judge* *Spring 2024*
Tau Beta Pi (TBP) - The Engineering Honor Society, *Active Member* *Winter 2022 – Present*
Eta Kappa Nu (HKN) – The Electrical and Computer Engineering Honor Society, *Active Member* *Fall 2021- Present*