Swagat Bhattacharyya

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Education

Georgia Institute of Technology School of ECE, Atlanta, GA • PhD Electrical Engineering, Minor in Neuroscience	2026 (Est.)
Georgia Institute of Technology School of ECE, Atlanta, GA • MS Electrical Engineering (Thesis); 3.87/4	Aug., 2023
Purdue University School of ECE, West Lafayette, IN • BSE Electrical Engineering, BS Applied Physics, BS Mathematics • Honors College Graduate with Highest Distinction; GPA: 3.96/4	May, 2022
Morgantown High School, Morgantown, WV | GPA: 4.42(**W**)/4	May, 2018

Research & Internship Experience

2.1 Past Positions

Lune Systems, Atlanta, Ga • Developed electronics and embedded software for a smart pillow to aid insomnia patients	Oct, 2023 – Current
Integrated Computational Electronics Laboratory, Atlanta, GA • Designed and experimentally demonstrated the first analog sorting circuits on hardware; published a conference paper on this work that won the best short paper award • Developed a circuit to sample signals at extrema points to obtain low reconstruction error despite a low number of samples; published a conference paper on this work • Developed hardware and software implementations of biorealistic, transistor-channel Hodgkin-Huxley neurons, synapses, and networks; published one journal paper and one conference paper on this work	Aug., 2022 – Current
Neurava LLC, West Lafayette, IN • Designed and characterized a novel, wearable PCB sensor array for monitoring and classifying epileptic seizures; the wearable underwent clinical testing in Summer, 2022 • Filed for a provisional patent in March, 2022 and for a patent in March 2023; presented a poster on this work and now writing a journal paper on this work	May, 2021 – July, 2022
Center for Implantable Devices, Weldon School of BME, Purdue • Helped develop a novel implantable sensor node for monitoring gastric signals; designed, simulated, and validated a high-order bandpass filterbank	Jan., 2021 – May, 2021

Computational Electronic Systems Lab, Lane Dept. of CSEE, WVU • Developed a quadrature, amplitude-regulated voltage-controlled oscillator (VCO) on a OTA-C topology; published a peer-reviewed paper on this work and starting a theory paper based on this work • Developed a gait analyzer to detect and study the progression of Parkinson's outside the clinical setting • Awarded a WVU Summer Undergraduate Research Experience appointment in Summer 2019 • Wrote embedded software for a field-programmable analog array (FPAA) • Developed the circuitry and training algorithms for a vehicle detector/classifier on a FPAA-based platform • Designed and simulated a novel, low-power analog-digital converter and low-PDP logic gates	June, 2014 – June, 2022
National Radio Astronomy Observatory, Green Bank, WV • Gathered spectroscopy data pertaining to the hydroxyl radical (OH) from several stellar sources • Analyzed data using information theoretic criteria and developed a peak crosscorrelating algorithm	July, 2014

2.2 Publications

Refereed Journal	**Bhattacharyya S**, Ayyappan PR, and Hasler J, "Towards Scalable Digital Modeling of Networks of Biorealistic Silicon Neurons", *IEEE Journal on Emerging Topics in Circuits and Systems*, vol. 13, no. 4, pp. 927-939, December, 2023 **Bhattacharyya S** and Graham DW, "Amplitude-Regulated Quadrature Sine-VCO Employing an OTA-C Topology", *IEEE Transactions on Circuits and Systems II: Express Briefs*, vol. 70, no. 6, pp. 1886-1890, June 2023 **Bhattacharyya S**, Andryzcik S, and Graham DW, "An Acoustic Vehicle Detector and Classifier Using a Reconfigurable Analog/Mixed-Signal Platform", *Journal of Low-Power Electronics Applications*, vol. 10, no. 1, Article 6, March-April, 2020
Non-Refereed Journal	Senthilvelan J, **Bhattacharyya S**, Tanner D, and Crites S, "Detection of the Interstellar Molecule OH in W3, W49, and Cassiopeia A using the 40-ft Telescope and the GBT", *Radio Astronomy, 21-28*, July-August, 2015

2.3 Patents

1.	**Bhattacharyya S**, Ganesh V, Hsiung Y, Meyer T, and Shah J, "Multi-Modal Seizure Sensor Array," Provisional filed in March, 2022; Patent filed in March, 2023.

2.4 Posters

1. Trevor Meyer, **Swagat Bhattacharya**, Patrick Lehman, Vivek Ganesh, Joseph Ta, Kelly Lowen, Deidre Dragon, Rup Sainju, Brian Gehlbach, Jay Shah, William Nobis, and George Richerson, "A Novel Multi-Modal Arm Wearable For Seizure Detection," AES Conference, Orlando, FL, Dec 1-5, 2023
2. **Bhattacharya S**, Graham D, and Hasler J, "Amplitude Regulation of an OTA-C Sine VCO," IEEE MWSCAS, Tempe, AZ, Aug 6-9, 2023
3. Rumple M, **Bhattacharyya S**, Hagedorn I, and Ghera Z, "RevEx: Low-Power, Nonoptical VR Limb Tracking with Eddy-Current Haptics," Purdue Spark Challenge, West Lafayette, IN, Dec 10, 2020
4. Prakash M, Szadowski H, Thompson M, Dextre A, Chan M, Lee J, **Bhattacharyya S**, Ravichandran K, Saylor D, and Howard B, "Microfluidic Argonaute Mediated COVID-19 Diagnostic Device," Fall Research Expo, West Lafayette, IN, Nov 16-20, 2020
5. **Bhattacharyya S**, Andryzcik S, Dilello A, Baker J, and Graham DW, "Low-Power Gait Analyzer to Aid Parkinson"s Disease Diagnosis," Summer Undergraduate Research Symposium, Morgantown, WV, July 25, 2019
6. **Bhattacharyya S**, "DIMOS: A Low-Power, Fast Response Logic Gate Architecture," Intel ISEF 2018, Pittsburgh, PA, May 13-18, 2018
7. Yan M and **Bhattacharyya S**, "myCAST: A Personalized Stroke Identification and Prevention System," Intel ISEF 2017, Los Angeles, CA, May 14-19, 2017

2.5 Talks

Invited

Senthilvelan J, **Bhattacharyya S**, Tanner D, Crites S, and Coots T, "Detection of Interstellar Molecule OH in W3, W49, Cassiopeia A, K350, W75s, and NGC 7538 Using the 40-ft Telescope and the GBT," ALCon 2016, Washington, DC, August 10-13, 2016

Contributed

Bhattacharyya S, Yang L, and Hasler J, "BuzzSort: A Linear-Time, Event-Driven Data Conversion and Sorting Framework for Approximate Computing Architectures," IEEE ICRC, San Diego, CA, Dec 5-6, 2023

Bhattacharyya S and Hasler J, " Extrema-Triggered Analog-Digital Conversion for Low-Power Wireless Sensor Nodes," IEEE MWSCAS, Tempe, AZ, Aug 6-9, 2023

Bhattacharyya S, Mathews P, Ayyappan PR, and Hasler J, "Toward Biorealistic Silicon Neural Circuits on Reconfigurable Platforms," IEEE MWSCAS, Tempe, AZ, Aug 6-9, 2023

Senthilvelan J, **Bhattacharyya S**, Tanner D, and Crites S, "Detection of the Interstellar Molecule OH in W3, W49, and Cassiopeia A using the 40-ft Telescope and the GBT," SARA Conference, Green Bank, WV, June 21-24, 2015

2.6 Current Research Interests

Resource-constrained signal processing, mixed-signal systems, reconfigurable circuits, haptic interfaces, biologically-inspired systems, dynamical system modelling.

Select Honors and Awards [Key: Team → †, Solo → §]

- IEEE Intl. Conf. on Rebooting Computing Best Short Paper Award — 2023 †
- **NSF Graduate Research Fellowship Program Awardee** — 2022 §
- Georgia Tech Presidential Fellowship — 2022 §
- 2nd Place in the Purdue School of ECE Spark Challenge — 2021 †
- Purdue Mathematics Department Gordon L. Walker Scholarship — 2021 §
- Purdue Physics and Astronomy Department Scholarship — 2021 §
- 1st Place in the Purdue JSA Japanese Speech and Skit Competition (1st year) — 2019 §
- 2nd Place in Embedded Systems and 1st place NSA research directorate award in Computing at the Intel ISEF; honored with a minor planet in my name — 2018 §
- Selected as one of two WV delegates to the National Youth Science Camp — 2018 §
- Purdue University Trustees Scholarship — 2018 §
- Physics Photo Contest Finalist: Photo featured on the 2018-19 AAPT calendar — 2018 §

Leadership and Teaching Experience

Electrical Design and Fabrication Team Lead of the Purdue IEEE Engineering in Medicine and Biology Society — 2021-22, 2019-20

- Taught 20 electrical team members skills to design and fabricate circuits
- Designed and constructed a navigational aid for the blind
- Designed and constructed the controls circuitry for an exoskeletal assistive arm for Parkinson's patients

President of the Purdue Institute of Electrical and Electronics Engineers (IEEE) Student Branch — 2020-21

- Oversaw operations of eleven committees, ensured compliance with Purdue regulations, provided technical guidance, spearheaded outreach events, and initiated new inter-organization collaborations

Vice President of the Purdue IEEE Student Branch — 2019-20

- Oversaw six technical committees, managed shared resources, ensured compliance with the Purdue IEEE constitution, resolved conflicts among technical committees, provided technical guidance, improved the safety of the shared workspace, initiated a student member recognition program

Community Service

Purdue Engineering Week Demonstration — Apr. 16, 2021

- Coordinated and participated in an interactive demo booth where children from West Lafayette, IN could control Purdue IEEE's custom-made pneumatic grabber during Purdue Engineering Week and ask questions

Electrical Engineering Outreach Seminar — Apr. 13, 2021

- Helped coordinate & host a seminar with NSBE where IEEE overviewed an education and career in Electrical Engineering to Black high school students
- Created an interactive demo where the students could characterize basic properties of an electric motor and answered questions in a Q&A session

Halloween Toy Workshop — Oct. 20, 2020

- Proposed, helped coordinate & execute a workshop where Purdue IEEE built toys proposed by elementary school children from rural Boswell, IN
- Presented the engineering process, inspiring the children to pursue STEM

Skills and Miscellaneous

Software Skills: MATLAB®, Python, C, LaTeX, Arduino, Cadence Virtuoso®
Affiliations: Purdue IEEE, Purdue iGEM, Purdue Honors College
Languages: English, Bengali (Mother Tongue), Hindi (Advanced), Japanese (Basic), German (Basic)
Music: Hindustani Classical Music (Vocal), Violin, Bamboo Flute
Sports: Taekwondo (2nd Degree Black Belt), Tennis, Soccer