

ANWAR ELHADAD

Binghamton, NY, 13790

C: (857) 206-9347 – aehada1@Binghamton.edu

<https://www.linkedin.com/in/anwar-elhadad/>

Education and Training

Ph.D. in Electrical Engineering | Thomas J. Watson College of Engineering and Applied Science | Aug 2024

- *Dissertation Research: Developing Bio-photovoltaics for smart, stand-alone, always-on wireless sensor networks.*

M.S. in Electrical Engineering | University of Vermont, Burlington, VT| Dec. 2019

- *Thesis: Utilizing Machine Learning for Respiratory Rate Detection Via Radar Sensor*

B.S. in Electrical Engineering | University of Vermont, Burlington, VT | Dec. 2018

Research and Professional Experiences

2024–present SUNY-Binghamton, Bioelectronics & Biosystems Lab (Assistant Professor)

- Conducted a lecture regarding the development of IoT systems.
- Operate a research lab working on creating ML algorithms for smart sensors.
- Collaborate with other researchers for interdisciplinary projects.
- Mentor students on both their academic and research careers.

Publications

Journal Articles:

- [1] **Elhadad, A.**, Gao, Y., Li, G., Yang, J., Liu, D. and Choi, S., 2025. Toward Sustainable, High-Performance, and Scalable On-Chip Biopower: Microbial Biobatteries with 3D-Printed Stainless-Steel Anodes and Spore-Based Biocatalysts. *Advanced Energy and Sustainability Research*, p.2500199.
- [2] **Elhadad, A.**, Cascioli, N., Gao, Y., and Choi, S., 2025, June. A Machine Learning-Driven Multimodal Sensing System for Advanced Mold Detection. In *2025, the 23rd International Conference on Solid-State Sensors, Actuators and Microsystems (Transducers)* (pp. 1037-1040). IEEE.
- [3] **Elhadad, A.**, 2025, February. Bio-powered IoT nodes: Low-power systems in remote Environments. In *2025 1st International Conference on Secure IoT, Assured and Trusted Computing (SATC)* (pp. 1-4). IEEE.
- [4] **Elhadad, A.**, Gao, Y. and Choi, S., 2024. Enhanced and Sustainable Indoor Carbon Dioxide Monitoring by Using Ambient Light to Power Advanced Biological Sensors. *Advanced Engineering Materials*, 26(24), p.2401875.
- [5] **Elhadad, A.**, Li, G., Yang, J., Liu, D. and Choi, S., 2025, January. 3D-Printed Stainless Steel Electrodes for Advancing MEMS Microbial Fuel Cells Toward Sustainable on-chip Energy. In *2025, IEEE 38th International Conference on Micro Electro Mechanical Systems (MEMS)* (pp. 643-646). IEEE.
- [6] Gao, Y., **A. Elhadad**. & Choi, S. Revolutionary self-powered transducing mechanism for long-lasting and stable glucose monitoring: achieving selective and sensitive bacterial endospore germination in micro-engineered paper-based platforms. *Microsyst Nanoeng*, **10**, 187,2024.
- [7] Gao, Y., **Elhadad, A.**, and Choi, S. A Paper-Based Wearable Moist-Electric Generator for Sustained High-Efficiency Power Output and Enhanced Moisture Capture. *Small*, p.2408182. 2024.
- [8] **A. Elhadad**, Gao, Y., and Choi, S, Revolutionizing Aquatic Robotics: Advanced Biomimetic Strategies for Self-Powered Mobility Across Water Surfaces. *Advanced Materials Technologies*, p.2400426, 2024.
- [9] Z. Rafiee, **A. Elhadad**, and S. Choi, “Revolutionizing Papertronics: Advanced Green, Tunable, and Flexible Components and Circuits,” *Advanced Sustainable Systems*, p.2400049, 2024 (**IF 7.2**). This work was featured by Tech Xplore and WBNG

- [10] Y. Gao, **A. Elhadad**, and S. Choi, "Janus Paper-Based Wound Dressings for Effective Exudate Absorption and Antibiotic Delivery". **Adv. Eng. Mater.** 2301422, 2024. (**IF 4.2**)
- [11] **A. Elhadad**, and S. Choi, "Electrochemical Additive Manufacturing of Living Bioelectrodes Having Intimate Electronic Couplings between Exo-electrogenic and Electrodes," **Advanced Engineering Materials**, 25(24), p.2301137, 2023. (**IF 4.2**)
- [12] J.S. Dorsainvil, M.S. Brown, Z. Rafiee, **A. Elhadad**, S. Choi, and A. Koh, "Cellulosic Nanofibers Utilizing a Silicone Elastomeric Core to Form Stretchable Paper," **Advanced Materials Interfaces**, p.2300487, 2023. (**IF 6.4**)
- [13] **A. Elhadad**, Y. Gao, and S. Choi, "Integrating Renewable Microbial Fuel Cells in Dual In-Line Package for Chip-On-Board Circuits," **Advanced Materials Technologies**, p.2301035 (**IF 6.84**)
- [14] **A. Elhadad**, and S. Choi, "Powering the Internet of things in aquatic environments: Solar energy harvesting through a buoyant bio-solar cell array," **Journal of Power Sources**, 581, p.233501, 2023 (**IF 9.794**)
- [15] M. Landers, **A. Elhadad**, M. Rezaie, and S. Choi, "Integrated Papertronic Techniques: Highly Customizable Resistor, Supercapacitor, and Transistor Circuitry on a Single Sheet of Paper," **ACS Applied Materials & Interfaces**, 14(40), pp.45658-45668., 2022 (**IF 10.383**) **This work was featured by AZOm, Space daily, and electronic design.**
- [16] **A. Elhadad**, and S. Choi, "Biofabrication and Characterization of Multispecies Electroactive Biofilms in Stratified Paper-based Scaffolds," **Analyst**, 147, 4082-4091, 2022 (**IF 5.227**)
- [17] **A. Elhadad**, L. Liu, S. Choi, "Plug-and-Play Modular Biobatteries with Microbial Consortia," **Journal of Power Sources**, 535, 231487, 2022 (**IF 9.794**) **This work was featured by ScienceDaily, Technology Networks, Interesting Engineering, Tech Xplore, Inceptive Mind, Mirage News, Inavate, ASME, STLE, etc.**
- [18] L. Liu, M. Mohammadifar, **A. Elhadad**, M. Tahernia, Y. Zhang, W. Zhao, and S. Choi, "Spatial Engineering of Microbial Consortium for Long-Lasting, Self-Sustaining, and High-Power Generation in a Bacteria-Powered Biobattery," **Advanced Energy Materials**, 11, 2100713, 2021 (**IF 29.698**)

Conference Proceedings:

- [1] **Elhadad, A.** 2025, January. Bio-powered IoT nodes: Low-power systems in remote Environments. The IEEE Conference on Secure and Trustworthy CyberInfrastructure for IoT and Microelectronics (SaTC 2025).
- [2] **Elhadad, A.**, Li, G., Yang, J., Liu, D. and Choi, S., 2025, January. 3D-Printed Stainless-Steel Electrodes for Advancing Mems Microbial Fuel Cells Toward Sustainable on-chip Energy. In *2025 IEEE 38th International Conference on Micro Electro Mechanical Systems (MEMS)* (pp. 643-646). IEEE.
- [3] Gao, Y., **Elhadad, A.** and Choi, S. June. BASED WEARABLE MOIST-ELECTRIC GENERATORS WITH EFFICIENT ATMOSPHERIC WATER CAPTURE. *In Technical digest, SolidState Sensor, Actuator and Microsystems Workshop*. Transducer Research Foundation, 2024.
- [4] **A. Elhadad**, Y. Gao, and S. Choi, "A Microfabricated Gastrobot for Sustainable On-Water Propulsion," *2024 IEEE 37th International Conference on Micro Electromechanical Systems (MEMS)*, Austin, TX, USA, 2024, pp. 497-500.
- [5] Z. Rafiee, **A. Elhadad**, and S. Choi, "Integrated Papertronics for a Sustainable Future," *2024 IEEE 37th International Conference on Micro Electromechanical Systems (MEMS)*, Austin, TX, USA, 2024, pp. 600-603
- [6] Y. Gao, **A. Elhadad**, and S. Choi, "Bacterial Endospore-Based Wearable Biosensors for Selective and Sensitive Glucose Monitoring," *2024 IEEE 37th International Conference on Micro Electromechanical Systems (MEMS)*, Austin, TX, USA, 2024, pp. 402-405. (**This paper has been selected as a finalist for the Best Poster Award Competition**)
- [7] **A. Elhadad**, and S. Choi, "A Buoyant Bio-solar Cell Array with Long-Lasting High-Power Output: Energy Harvesting from Aquatic Environments," **PowerMEMS 2022**: The 21st International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Dec. 12-15, 2022, Salt Lake City, UT, USA, In-print. (**Oral Presentation**)
- [8] M. Rezaie, **A. Elhadad**, and S. Choi, "Stackable, Storage, Millimeter-Scale Biobatteries Having High Instantaneous Power Output," **PowerMEMS 2022**: The 21st International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications, Dec. 12-15, 2022, Salt Lake City, UT, USA, In-print.
- [9] **A. Elhadad**, and S. Choi, "3-D Printed Redox-active Organic Electrodes to Bridge across Biology and Electronics," **Hilton Head Workshop 2022**: A Solid-State Sensors, Actuators and Microsystems Workshop, June 5 - June 9, 2022, Hilton Head Island, SC, USA, pp. 282-283 (**Late News**).
- [10] M. Landers, **A. Elhadad**, and S. Choi, "Papertronics: Fully Paper-Integrated Resistor, Capacitor, and Transistor Circuits," **Hilton Head Workshop 2022**: A Solid-State Sensors, Actuators and Microsystems Workshop, June 5 - June

9, 2022, Hilton Head Island, SC, USA, pp. 419-422 (*This paper has been selected as a finalist for the Best Poster Award Competition*).

- [11] **A. Elhadad**, T. Sullivan, S. Wshah and T. Xia, "Machine Learning for Respiratory Detection Via UWB Radar Sensor," *2020 IEEE International Symposium on Circuits and Systems* (ISCAS), October 12-14, 2020, Seville, Spain, pp. 1-5.

Conference Presentations:

- [1] **A. Elhadad**, S. Choi, "Paper supported 3 D Cell Culturing, Sensing and Bio fabrication for Exploring Research Frontiers in Electro microbiology"; Materials Research Society, 2021 MRS Fall Meeting and Exhibit, Dec. 6-8 (Virtual), Boston, MA, USA

Community Memberships & Activities

NSF ERI reviewer (04/2025)

NSF SBIR/STTR Ad-Hoc Review (03/2025)

Teaching & Mentoring Experience

Fall 2025

SUNY Binghamton

EECE 580M Low-power IoT (31st Dec 2024) – Lecturer

- Designed and delivered lectures on foundational and advanced low-power IoT systems topics, including energy-efficient communication protocols, sensor networks, and embedded system design.
- Facilitated hands-on lab sessions where students developed and deployed IoT prototypes using microcontrollers, low-power wireless modules, and real-time data acquisition tools.
- Integrated project-based learning and real-world case studies to help students understand the trade-offs in power consumption, latency, and scalability in IoT applications.

Spring 2025

SUNY Binghamton

EECE 580O Smart sensors (31st May 2025)- Lecturer

- Designed and delivered lectures on smart sensor technologies, covering topics such as sensor principles, signal conditioning, data acquisition, and sensor fusion techniques.
- Incorporated real-world applications and case studies to illustrate the role of smart sensors in fields such as healthcare, environmental monitoring, and industrial automation.
- Guided students through designing and implementing sensor-based systems, emphasizing calibration, noise reduction, and power efficiency.

Graduated students

Pierce Alvir

palvir1@binghamton.edu

Acquired Awards

NSF Engine Project award 1196573 (\$200,000)