

## Adebayo A. Eisape II

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### Education

The Johns Hopkins University

Ph.D., Electrical Engineering

Master of Science, Computer Engineering

Bachelor of Science, Computer Engineering

BALTIMORE, MD

Sept 2018 – Present

Sept 2016 – May, 2018

Sept 2012 – May 2016

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### Research

The Kang Group, Dr. Sung Hoon Kang

JHU, September 2019 – Present

#### Piezoresistive Nanocomposite Material

- Investigate different materials and fabrication techniques for the synthesis of piezoresistive nanocomposite materials
- Study effects of process and material variation on piezoresistivity and sensitivity
- Design and conduct experiments to determine effects of the variation of fabrication process parameters

Computational Sensory-Motor Systems Lab, Dr. Ralph Etienne-Cummings

JHU, May 2016 – May 2018

#### Integrate and Fire Array Transceiver (IFAT)

- Testing and implementation of artificial neuron array
- Developed digital control hardware for controlling a custom analog design (IFAT) and interfacing with a network-on-chip (UPSIDE)
- Developed hardware architecture using VHDL to implement velocity-controlled oscillators (VCOs) using hardware

Electrical and Computer Engineering, Dr. James E. West

JHU, May 2015 – Present

#### Electret Based Energy Harvester

- Designed and implemented a novel electret based energy harvesting system/low frequency transducer
  - Included on intellectual property for provisional patent.
  - Communicated with professional engineers on a daily basis to modify and discuss designs.
  - Assist in the design of a hybrid energy system and the characterization of novel piezoelectric nanocomposite materials used in hybrid system
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### Awards

Microsoft Research Fellowship

January 2021

- A two-year fellowship for PhD students at North American universities pursuing research aligned to the research areas carried out by Microsoft Research.

Collegiate Inventors Competition, 2nd place, HEARO

October 2020

- Self-powered, acoustically matched sensor for picking up sounds from a source of interest (human body) while rejecting external interference
- Patent filing started August 2020

GEM Ph.D. Engineering Fellowship

Sept 2019

- The mission of The National GEM Consortium is to enhance the value of the nation's human capital by increasing the participation of underrepresented groups (African Americans, American Indians, and Hispanic Americans) at the master's and doctoral levels in engineering and science. GEM recruits high quality underrepresented students looking to pursue Master's and Doctoral degrees in applied science and engineering, and matches their specific skills to the specific technical needs of GEM employer members.

The Electrical and Computer Engineering Student Leadership Award

May 2016

- The Electrical and Computer Engineering Student Leadership Award recognizes significant achievement by a graduating senior for leadership and service in the Department of Electrical and Computer Engineering.
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### Experience

The Johns Hopkins University Applied Physics Laboratory, Space Exploration Sector

June 2019 – Present

Engineer, Temp on Call

Aug 2019 – Present

- Design PCB for Raspberry Pi-based magnetometer kit as part of the outreach effort for NASA's [EZIE mission](#).

### Internship

June 2022 – Aug 2022

- Conduct GPS vulnerability study to understand the weaknesses of sponsor-provided timing servers
- PCB design, routing, and fabrication for Raspberry Pi-based magnetometer kit, to be distributed to partnered high schools and assembled by students as part of the outreach portion of NASA's [EZIE mission](#).

### Internship

June 2020/21 – Aug 2020/21

- Support radiation monitoring instrument testing and verification for the [Europa Clipper](#) mission, including VHDL synthesis, component and sensor characterization, and scripting and GUI development in Python and Matlab.
- Work on developing cost-effective, polymer-based nanocomposite material for underwater pressure sensing and salinity measurement applications

### GEM Internship

June 2019 – Aug 2019

- Support for [GUSTO](#) balloon mission, including thermal testing, camera refurbishment, and development of camera fixtures for new cameras for upcoming launch
- Circuit and PCB design for charged particle sensor
- Thermal/high-voltages failure testing and worst analysis for charged particle pre-amplifier frontend
- Assist in development of refurbishment procedure for cameras retrieved from previous GUSTO balloon mission

### ECE Graduate Student Association

JHU, Oct 2018 – Oct 2021

#### President

- Develop and plan community-building events
- Establish and facilitate outreach opportunities
- Lead board in finalizing all decisions and approving funding for board initiatives

### JHU Makerspace, Whiting School of Engineering – Manufacturing

JHU, Sept 2017 – Jan 2019

#### Student Worker

- Provide training on all equipment
- Maintain and troubleshoot equipment in space
- Advise and support electronic aspects of large-scale projects

### Independent Study, Computer Vision

JHU, Feb 2016 – May 2016

- Developed a simple building recognition system to be used on a mobile robot to identify buildings and localize itself, using Python, C++, and ROS

### Advanced ECE Design Team

JHU, Sept 2015 – May 2016

- Lead a design team in the design and development of an autonomous drone that tracks and follows a user, keeping them in the center of the field of view of an onboard camera while maintaining a preset leading/following distance and avoiding obstacles, using Python, C++, and ROS

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## Publications

- Eisape, A.; Rennoll, V.; Van Volkenburg, T.; Xia, Z.; West, J.E.; Kang, S.H. Soft CNT-Polymer Composites for High Pressure Sensors. *Sensors* 2022, 22, 5268. <https://doi.org/10.3390/s22145268>
- Eisape A., Sun B., Li J., Kang S.H. (2022) Nanoporous Composite Sensors. In: Borghi F., Soavi F., Milani P. (eds) Nanoporous Carbons for Soft and Flexible Energy Devices. *Carbon Materials: Chemistry and Physics*, vol 11. Springer, Cham. [https://doi.org/10.1007/978-3-030-81827-2\\_5](https://doi.org/10.1007/978-3-030-81827-2_5)
- Rennoll, V., McLane, I. M., Eisape, A., Elhilali, M., & West, J. (2021). Evaluating the impact of acoustic impedance matching on the airborne noise rejection and sensitivity of an electrostatic transducer. *The Journal of the Acoustical Society of America*, 149(4), A23-A23.
- Erturun, Ugur, et al. "Design and Analysis of a Vibration Energy Harvester Using Push-Pull Electrostatic Conversion." *Smart Materials and Structures*, 2020, doi:10.1088/1361-665X/aba5e2.
- A. Khalifa et al., "The Microbead: A 0.009 mm<sup>3</sup> Implantable Wireless Neural Stimulator," in *IEEE Transactions on Biomedical Circuits and Systems*, vol. 13, no. 5, pp. 971-985, Oct. 2019. doi: 10.1109/TBCAS.2019.2939014
- J. L. Molin, A. Eisape and R. Etienne-Cummings, "Live demonstration: Event-based image processing on CMOS Mihalas-Niebur neuron array transceiver," 2017 IEEE International Symposium on Circuits and Systems (ISCAS), Baltimore, MD, 2017, pp. 1-1. doi: 10.1109/ISCAS.2017.8050406
- Jamal Lottier Molin, Adebayo Eisape, Chetan Singh Thakur, Vigil Varghese, Christian Brandli and Ralph Etienne-Cummings, "Low-Power, Low-Mismatch, Highly-Dense Array of VLSI Mihalas-Niebur Neurons", ISCAS conference, 2017
- A. Eisape, "Low frequency, push-pull, electrostatic energy harvesting implementing a tunable, capacitive transducer", Graduate Thesis, The Johns Hopkins University, 2018, available at <http://jhir.library.jhu.edu/handle/1774.2/59288>

- A. B. Cellon, A. A. Eisape, M. Furuta and R. Etienne-Cummings, "Velocity-Controlled Oscillators for Hippocampal Navigation on Spiking Neuromorphic Hardware," 2019 IEEE International Symposium on Circuits and Systems (ISCAS), Sapporo, Japan, 2019, pp. 1-5. doi: 10.1109/ISCAS.2019.8702579
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## Patents

US20200178001; PUSH-PULL ELECTRET TRANSDUCER WITH CONTROLLED RESTORING FORCE FOR LOW FREQUENCY MICROPHONES AND ENERGY HARVESTING JHU, May 2018

- An electret-based energy harvester utilizing a monocharged film to induce and move charges

US2021218350A1; FLEXIBLE AND HYBRID ENERGY HARVESTING DEVICE COMBINING PIEZOELECTRIC AND ELECTROSTATIC CONVERSIONS JHU, June 2021

- An electret-based energy harvester utilizing a monocharged film to induce and move charges
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## Teaching

Course Assistant, 520.657: Product Design Lab/Design of Biomedical Instruments and Systems JHU, Sept 2018-21 – Dec 2018-21

- Develop and maintain [course website](#), featuring student projects and course information
- Guide students in the design and implementation of self-defined group projects

Course Assistant, 530.618: Fabricatology - Advanced Materials Processing JHU, Feb 2020 – May 2020

- Create, assign, and grade homework assignments and lectures
- Present lectures on varying fabrication techniques spanning multiple length scales

Course Assistant, 520.424/644: FPGA Synthesis Lab JHU, Sept 2019 – Dec 2019

- Guide and assist students in the simulation, implementation, and debugging of predefined VHDL projects

Course Assistant, 520.448/738: Electronic Design Lab JHU, Feb 2018/19 – May 2018/19

- Assist with use of design tools and concepts (circuit capture, 3D modeling fabrication, etc)
- Lecture on various topics of electrical design
- Guide students in the design and implementation of individual, self-defined projects

Course Assistant, 520.491/691: CAD Design of Digital VLSI Systems JHU, Sept 2017 – Dec 2017

- Assist class with use of CAD tools (Cadence Suite)
  - Lecture on digital design and architecture
  - Guide students in implementing designs and troubleshooting
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## Technical Skills

C • C++ • Python • Java • Assembly • VHDL • Circuit Design/Analysis • CAD VLSI • Digital Design • CAD (SolidWorks, FreeCAD) • PCB Design (Altium Designer, KiCAD, Eagle) and Assembly •  $\LaTeX$  • Basic Machining • CAM • Embedded Systems Development and Design

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## Interests

Energy Harvesting/Conversion • Sensing Materials • Computer Vision • Circuit Design • 3D Printing • Automation • FPGA development • Digital Design • Wearable Technologies