

David M. Czerwonky

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MISSION STATEMENT:

- My mission is to create educational spaces for all people to discover science, become independent learners, and cultivate passion.

EDUCATION

PhD Engineering Education | Dec 2027 | Purdue University

MS Electrical and Computer Engineering | May 2023 | Purdue University

- Thesis Topic: A boundary element transcranial magnetic stimulation solver for a neural axon model
- Derived a novel integral equation to describe the interactions neurons and electric fields
- Implemented a boundary element solver in MATLAB to solve the novel integral equation

BS Electrical Engineering | May 2021 | Purdue University

MENTORING EXPERIENCES

Operations Manager | CATME Smarter Teamwork | Mar 2018 - Dec 2021

- CATME is a teaming software that provides team-making and peer evaluation tools to help instructors best manage their student teams.
- Hired 3 undergraduate students.
- Trained 7 undergraduate students. Two of these undergraduates became future Operations Managers and one of them co-managed with me for a year.
- Coordinated the CATME operations team to audit over 700 accounts, open over 2,000 customer accounts, and provide support for over 150,000 users in over 50 countries every year.

Graduate Mentor | Purdue SURF 2023 | Jun 2023 – Aug 2023

- Mentored an undergraduate student during their Purdue summer research fellowship, where they helped our research team by writing a code to study the interactions of myelinated neurons and electric fields.

EURO Graduate Assistant | Purdue SURF 2024 | May 2024 – Present

- Managed the 2024 summer undergraduate research fellowship program at Purdue University for 16 students.

RESEARCH EXPERIENCE

Graduate Research Assistant | Purdue University | Dec 2021 – May 2024

- Project #1: Augmented a brain tissue segmentation algorithm that accounts for uncertainties in tissue boundaries, so that it is more computationally efficient.
- Project #2: Designed a boundary element solver for modeling neuron behavior from electromagnetic brain stimulation devices.
- Project #3: Synthesized membrane models of a rat pyramidal neuron into a MATLAB format for use with a boundary element solver.

Purdue SURF Researcher | Purdue University | Jun 2020 - Aug 2020

- Evaluated a diffuse optical neuroimaging scheme by writing a numerical solver for the inverse problem in MATLAB. Created a technical paper and disseminated my results at a symposium presentation.

Undergraduate Researcher | Purdue University | Jan 2020 - May 2020

- Collaborated to construct an optics table experiment for validation of a super-resolution imaging scheme.

CERTIFICATIONS

CISTAR's Mentoring-in-Action | CISTAR NSF Engineering Research Center | May 2024

CPR/AED/First Aid | American Heart Association | May 2024 - May 2026

Mental Health First Aid | National Council for Mental Wellbeing | April 2024 - April 2027

HONORS AND AWARDS

2023 Applied Computational Electromagnetics Society Student Paper Competition 1st place

2020 Purdue Summer Undergraduate Research Fellowship (SURF) Symposium Best Presenter

2019 National Intercollegiate Running Club Association (NIRCA) Cross Country 2nd place Team

2019 Purdue Boilermaker Half Marathon Champion

2017 Community Foundation of Greater Lafayette Scholar

2017 Raymond Robert Ryder Citizenship Award

2012-2013 Bob Troyer Award

PROFESSIONAL AFFILIATIONS

Applied Computational Electromagnetics Society (ACES) Student Member (2023-present)

American Society for Engineering Education (ASEE) Student Member (2023-present)

CONFERENCE PRESENTATIONS

2023 Brain and Human Body Modeling Conference (BHBM)

2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI)

2023 IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (NEMO)

2023 International Applied Computational Electromagnetics Society Symposium

2020 Purdue Summer Undergraduate Research Fellowship (SURF) Symposium

JOURNAL PUBLICATIONS

[1] Czerwonky, D. M., Aberra, A. S., & Gomez, L. J. (2024). A boundary element method of bidomain modeling for predicting cellular responses to electromagnetic fields. *Journal of Neural Engineering*, 21(3), 036050.

CONFERENCE PUBLICATIONS

[1] Czerwonky, David M., and Luis J. Gomez. "Integral Equation for Analyzing Neuron Response to Non-invasive Electromagnetic Brain Stimulation." 2023 International Applied Computational Electromagnetics Society Symposium (ACES). IEEE, March 2023.

[2] Czerwonky, David M., and Luis J. Gomez. "Integral equation for analyzing cell's response to device E-fields" 2023 IEEE MTT-S International Conference on Numerical Electromagnetic and Multiphysics Modeling and Optimization (NEMO). June 2023.

[3] Czerwonky, David M., and Luis J. Gomez. "Integral Equation for neuron response analysis to non-invasive electromagnetic brain stimulation." 2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI). July 2023.

[4] Czerwonky, David M., and Luis J. Gomez. "Integral Equation for Analyzing Neuron Response to Non-invasive Electromagnetic Brain Stimulation." 2023 Brain and Human Body Modeling Conference (BHBM). August 2023.