A. Tye Gardner

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EDUCATION

Ph.D., Electrical Engineering   **Summer 2020**
University of Utah
Thesis: Electronic design and methods for the characterization of implanted neural interfaces
Concentration: Neural interfacing, biosensors and analog circuits
Advisor: Ross M. Walker

B.S/M.S., Electrical Engineering   **Spring 2015**
University of Utah
Project: Image processing techniques for telescope array RADAR
Concentration: Digital communication
Advisor: Behrouz Farhang

ADADEMIC EXPERIENCE

Assistant Professor – Weber State University   **2020 – Present**
- ECE 2700: Digital Circuits
- ECE 3610: Digital Systems

NSF Graduate Research Fellow – University of Utah   **2015 - 2020**
- Invented a new electrochemical measurement tool that reduces neural interfacing characterization time by a factor of 16, improving study efficiency and animal surgical outcomes.
- Developed electronics and implantation protocols to reliably measure low-level *in vivo* signals.
- Data analysis of neural signals, including study of effects of anesthesia on action potentials.
- Prepared patent application documentation for University intellectual property team, including market research, prior art search, and identification of potential commercialization partners.
- Designed FPGA firmware for sensor system controls.

Graduate Research Assistant – Berkeley National Laboratory   **2014 - 2015**
- Designed 3-dimensional feedback test fixture for controlled neuroscience experiments in rodents.
- Designed high-voltage, high-speed precision clocking for CCD imaging for particle accelerators.
- Designed headstages for high-density neural recording.

Undergraduate Research Assistant – University of Utah   **2012 – 2014**
- Designed signal processing data modules in LabVIEW.
- Designed FPGA code and test benches for radar detection modules.
- Implemented image processing based RADAR detection algorithms on FPGA's and deployed test systems in Utah's West Desert.
- Performed data analysis for radar-based astrophysics experiments.

TEACHING AND MENTORING

Teaching Assistant – University of Utah   **Spring 2020**
- Prepared materials and lectures in 2 Introduction to Electronics labs.
- Prepared materials and lectures in 2 Introduction to Matlab labs.

Senior Project Supervisor – University of Utah   **2016 - 2020**
- Planned and recruited students for 4 senior projects involving electrical and mechanical engineers.
- Wrote proposals to secure funding from the University of Utah and Berkeley National Lab.
- Guided students in preparation of presentations and publications of research results.

Graduate Mentor – University of Utah   **2016 - 2020**
- Provided mentorship in an electrical/bioengineering interdisciplinary project to two undergraduates and one MS student, involving biosensor research.
- Guided students in preparing applications to the University of Utah Undergraduate Research Opportunity Program (UROP), to fund their participation in research.
- Collaborated with students to produce 4 publications involving this work.

Teacher – Granite School District   **2015 - 2016**
- Planned and taught 7th grade engineering, programming and shop courses.
- Developed curriculum and hands-on introductory engineering projects.
- Received 2.91/3.0 in instructor assessment from the principal, evaluated in 22 categories.
- Facilitated a strong learning environment in a low-income community, exciting student's interest to organize an after-school robotics club.

ECE Advising Assistant – University of Utah   **2012 - 2013**
- Assisted with advising related tasks, including resolving scheduling conflicts, program planning, and miscellaneous student questions.
- Assisted with the organization of senior project assignments.
- Handled enrollment paperwork and transfer credit evaluation paperwork.

INDUSTRY EXPERIENCE

Electrical Research and Development Engineer – Ripple LLC   **2019 - 2020**
- Awarded federal funding for R&D of a neural signal simulator for medical device testing.
- Specified product budget, timeline and final cost based on market research of competitors products.
- Low-power system design, including USB 3.0, FPGA firmware, and precision analog instrumentation.
- Managed the project from inception, electrical design, mechanical design, and clinical usability.

Inventory Control and Automation – MPRI   **2009 - 2011**
- Designed software for transition to automated inventory tracking.
- Served as interface between engineering and sales team to facilitate quality control, field support, and failure analysis objectives.

AWARDS AND FELLOWSHIPS

NSF Non-Academic Research Internship Award	2018
NSF Graduate Research Fellow, University of Utah	2015 - 2019
Graduate Research Internship, Berkeley National Lab	2014 - 2015
Science Undergraduate Laboratory Internship, Berkeley National Lab	2014
Thornton Endowed Scholarship	2013
Engman Scholarship	2012

SKILLS AND INTERESTS

• PCB Design (Altium)	• Matlab	• Verilog and VHDL
• Integrated circuit design (Cadence)	• LabView	• Python
• LaTeX	• Neural interfacing	• Digital communication
• R	• Electrochemistry	• Biosensors

PUBLICATIONS

[1]   **A. T. Gardner**, H. J. Strathman, and R. M. Walker, "Design methodologies for rapidly multiplexed electrochemistry of implanted electrodes," MDPI Sensors, (**Invited**, in preparation).

[2]   **A. T. Gardner**, H. J. Strathman, and R. M. Walker, "A Multiplexed Electrochemical Measurement System for Characterization of Implanted Electrodes," IEEE International Symposium on Circuits and Systems, (**Invited**, Accepted).

[3]   **A. T. Gardner**, H. J. Strathman, D. J. Warren, and R. M. Walker, "Impedance and noise characterizations of Utah and microwire electrode arrays," IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology, 2018.

[4]   **A. T. Gardner**, R. M. Walker, H. J. Strathman, and D. J. Warren, "Signal and noise sources from microwire arrays implanted in rodent cortex," 2018 IEEE Life Sciences Conference, 2018.

[5]   **A. T. Gardner**, J. Mize, D. J. Warren, and R. M. Walker, "Comparative characterization of in vivo and in vitro noise of the SIROF Utah electrode array," Proceedings of IEEE Sensors, 2017.

[6]   M. Sharma, **A. T. Gardner**, H. J. Strathman, D. J. Warren, J. Silver, and R. M. Walker, "Acquisition of neural action potentials using rapid multiplexing directly at the electrodes," Micromachines, **Invited**, 2018.

[7]   M. Sharma, **A. T. Gardner**, J. Silver, and R. M. Walker, "Noise and impedance of the SIROF Utah electrode array," Proceedings of IEEE Sensors, 2017.

[8]   R. M. Walker, I. S. Subramanian, A. A. Bajwa, L. Rieth, J. Silver, T. Ahmed, N. Tasneem, M. Sharma & **A. T. Gardner**, "Integrated neural interfaces," IEEE Midwest Symposium on Circuits and Systems (MWSCAS), 2017.

[9]   R. Abbasi**, A. T. Gardner** et.al. "Telescope Array Radar (TARA) Observatory for Ultra-High Energy Cosmic Rays," Nuclear Instruments and Methods in Physics, 2014.

[10]   M. Othman, **A. T. Gardner** et. al., "Bistatic Radar Detection of UHECR with TARA" International Cosmic Ray Conference, 2013.

TALKS AND POSTERS

[1]   "Multiplexed Electrochemical Measurement of Implanted Neural Electrode," Oral presentation at IEEE International Symposium on Circuits and Systems, Seville Spain, 2020.

[2]   "Rapid Electrode Multiplexing for Scalable Neural Recording," Poster presented at Neural Interfaces Conference, Minneapolis, MN, 2018.

[3]   "Signal and noise sources from microwire arrays implanted in rodent cortex," Oral presentation at IEEE Life Sciences Conference, Montreal, Canada, 2018.

[4]   "Advances in Neural Interfacing with the Utah Electrode Array," Oral presentation at University of Utah, 2017.

[5]   "Comparative characterization of in vivo and in vitro noise of the SIROF Utah electrode array," Poster presented at IEEE Sensors, Glasgow, Scotland, 2017.

[6]   "Very-Fast CCD Imaging," Oral presentation at University of Utah, 2015.