Alexandra McDaniel

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PERSONAL PROFILE

I am a graduate student in electrical engineering with a specialization in signal processing. My background includes research in power quality analysis and underwater acoustics. I bring a strong sense of initiative, a collaborative spirit, and enthusiasm for scientific discovery. I consistently thrive in challenging, research-driven environments.

EDUCATION

Master's in Electrical Engineering Expected graduation: May 2026
University of Wyoming | GPA 4.0 Laramie, WY

Bachelor's in Applied Physics July 2024
Brigham Young University | GPA 3.75 Provo, UT

Rancho High School June 2018
Clark County School District | GPA 4.8 (weighted) | 4.0 (unweighted) Las Vegas, NV

WORK EXPERIENCE

University of Wyoming Dept. of Electrical Engineering Laramie, WY
Graduate Research Assistant August 2024 – Present

- Teacher for lab classes and grader
- Modified IEEE power grid test systems to conduct power quality simulations
- Analyzed the power quality disturbances and the effect they have on a distribution system with solar panel connections
- Training in power quality simulations using both RT-Lab and MATLAB Simulink

Brigham Young University Hydroacoustic Lab Remote
Independent Research Contractor June 2023 – Present

- Trained deep learning models for seabed classification
    - Created synthetic training data of sound signatures from merchant ships with 34 different seabed and water column parameters
    - Compared the robustness of models trained with constant ocean sound speeds to those with greater variation
    - Used the trained models and measured merchant ship acoustic signals from the New England continental shelf to predict the seabed classification
- Analyzed the seabed classification accuracy of a robust deep learning model that accounts for global ocean sound speeds when synthetic data from a single area is used during transfer learning
- This is a continuation of the undergraduate research I began as a student at Brigham Young University. My professor had additional funding and projects she specifically wanted me to work on

** Funded by the Office of Naval Research*

Knobles Scientific and Analysis Remote
Independent Research Contractor August – May 2023

- Analyzed over a month of acoustic data from three Vertical Line Arrays (VLA) placed along the New England continental shelf in 2022
    - Identified 187 merchant ships that passed within 15 km of the VLA's
    - Identified unique acoustic features in the very-low frequency band
    - Performed a statistical inference to estimate the characteristics of the deep sediment layers
    - Discovered deep sediment heterogeneity in the seabed

** Funded by the Office of Naval Research*

University of Wyoming Dept. of Botany Laramie, WY

Field Technician May – August 2024

- Prepared sensors and data acquisition loggers for future deployment in the field
  - Editing data acquisition code in CRBasic
  - Modifying wiring of sensors, basic soldering, calibration, and testing
- Assisted with day and overnight field trips to collect samples of plant life in wetland areas of the Medicine Bow Mountain range in Wyoming
- Experience: measuring water potential of plants, completing vegetation surveys, extracting xylem cores from trees and saplings, measuring fluorescence of plants

Brigham Young University Dept. of Physics and Astronomy Provo, UT

Undergraduate Research Assistant January 2022 – July 2023

- Characterized a laboratory water tank for sound measurements in a model ocean environment
- Introduced temperature and sound speed variability to a laboratory tank to better model the sound speed environments found in the shallow ocean

Physics Lab Manager January 2022 – December 2022

- Management experience adhering to SCRUM and AGILE methodology
- Met one-on-one with team members each week to help them make progress on projects
- Created the lab set up schedule and assignments every week
- Improved coordination between physics professors to organize walk-in physics labs for seven classes
- Led organization improvement projects for lab set ups and training documentation

Physics Lab Technician January – September 2019, May– December 2021

- Setup, test, and trouble shoot equipment for seven undergraduate physics classes
- Designed and implemented an MRI lab for an introductory lab class for pre-medicine students
- Revised a mechanical work lab for an introductory lab class to implement greater use of LoggerPro and curve fitting techniques
- Maintaining and making small repairs to physics equipment used for lab classes

Lab Teaching Assistant September 2021 – December 2021

- Taught a two-hour lab once a week
- Helped students trouble shoot equipment and understand correct experimental practices
- Graded lab reports

FIELD EXPERIENCE

Seabed Characterization Experiment 2022 Falmouth, MA

Student Scientist May 2022

- Assisted with temperature and acoustics device deployment aboard the RV Neil Armstrong
- Processed the ocean temperature data and determined the sound speed of the water column
- The data I helped collect during this month-long experiment is what I have used for underwater acoustics research at both Knobles Scientific and Analysis and Brigham Young University

SKILLS

- Coding languages:
  - Advanced: Python
  - Proficient: MATLAB, MATLAB Simulink
  - Intermediate: LabVIEW, Mathematica
  - Beginner: C++, CRBasic, R
- Software:
  - Proficient: RT-Lab
  - Intermediate: SolidWorks, Autodesk Inventor
- Fabrication experience (using a lathe, photolithography, soldering/circuit design etc.)

- Management Experience:
  - Implementation of SCRUM and AGILE methodologies
  - Scheduling experience
  - Interviewing/hiring experience
  - Weekly one-on-ones with team members
  - Implementation of workflow tools such as Click-up and Trello
- Bilingual: English / Spanish

PUBLICATIONS

- Hopps-McDaniel, Alexandra M., et al. "Deep sediment heterogeneity inferred using very low-frequency features from merchant ships." The Journal of the Acoustical Society of America 156.4 (2024): 2265-2274.

- Hopps-McDaniel, Alexandra M., and Tracianne B. Neilsen. "Temperature-induced sound speed variability in a laboratory water tank." Proceedings of Meetings on Acoustics. Vol. 51. No. 1. AIP Publishing, 2023.

- Harmer, Madeline, et al. "Leveraging scientific modeling to engage pre-med undergraduates in physics lab courses." Physical Review Physics Education Research 20.2 (2024): 020150.

- Undergraduate Capstone Project: Hopps, Alexandra, “Characterizing the sound speed variability in laboratory water tank,” Advisor: Traci Neilsen (Capstone, Jun 2023).

PRESENTATIONS AT CONFERENCES

- May 2025 - Acoustical Society of America (New Orleans, Louisiana)
  - Presented using deep learning to classify seabed using recordings of ship noise
  - Focused on the need to train robust seabed classification models in the face of sound speed variations in the ocean

- May 2024 - Acoustical Society of America (Ottawa, Canada)
  - Presented on deep sediment layer heterogeneity along the New England continental shelf inferred from acoustic features from passing merchant ships

- March 2024 – Seabed Characterization Experiment Workshop (Kingston, Rhode Island)
  - Poster on deep sediment layer heterogeneity along the New England continental shelf

- May 2023 - Acoustical Society of America (Chicago, Illinois)
  - Presented on introducing sound speed variability in a laboratory water tank for testing the robustness of machine learning algorithms

- February 2023 - Brigham Young University Student Research Conference (Provo, Utah)
  - Presented research involving variability in a laboratory water tank
  - Awarded first place for best presentation my session

- January 2023 - Conference for Undergraduate Women in Physics (Santa Cruz, California)
  - Poster about characterizing a laboratory water tank for underwater acoustics measurements
  - Awarded for best poster design

- July 2022 - American Association for Physics Teachers (Grand Rapids, Michigan)
  - Presented on the design of a modeled MRI machine experiment I designed for an undergraduate lab class at Brigham Young University

AWARDS

- 2023: University of Wyoming full graduate assistantship in electrical engineering
- 2022: McKay Family Foundation - BYU Women in STEM Full Tuition Scholarship
- 2018: Brigham Young University Full Tuition Scholarship
- 2018: Valedictorian (class of 850 students)
- 2018: Career and Technical Education Award in Aerospace Engineering
- 2018: Second place in Chemistry Lab at the Nevada State Science Olympiad Competition
- 2017: First place in Public Health at the Nevada State Health Occupation Students of America competition
- 2016: Black Belt in Kenpo Karate
    - Placed in the Annual Las Vegas Tournament in 2008, 2009, 2014, and 2016
    - Helped teach children's karate classes every month and two self-defense classes

RELEVANT COURSE WORK

- Engineering: Cyber Physical Systems, Power Reliability, Power Quality, Power Engineering, Thermodynamics, Biomedical Engineering
- Mathematics: Linear Algebra, Calculus 3, Ordinary Differential Equations, Partial Differential Equations, Theory of Statistics 1 & 2
- Programming: Convolutional Neural Networks, Python lab, MATLAB lab, C++
- Physics: Electricity and Magnetism 1 & 2, Acoustics, Mechanics, Optics, Modern Physics, Intro to Physics 1 & 2
- TA courses: Basic Circuits Lab, Communication Theory Lab, Introductory Physics Lab

UNDERGRADUATE RESEARCH PROJECTS

Three semesters of student-designing experimentation in advanced lab classes

- Built a laser microphone using principles of optics, interferometry, and a transimpedance photodiode to record and analyze songs, chirps, and white noise
- Designed a vacuum system for creation of plasma and plotting the Paschen curve of various gases
- Conducted an experiment to determine the critical temperature of a superconductor sample BiPbSrCaCuO
- Modeled how linear density affected resonance patterns in a Chladni plate

VOLUNTEER EXPERIENCE

Utah Children's Justice Center Provo, UT

Victim Assistance Mentor June 2021 – December 2022

- Completed a 40-hour training on sexual violence and child abuse
- Spent 2-3 hours every week doing a fun activity with my mentee

Church of Jesus Christ of Latter-day Saints Salem, OR

Religious Missionary September 2019 – March 2021

- Served 9 hours a day for 6 days a week. Taught people from the scriptures and did regular service projects
- Learned to speak Spanish fluently and taught English as a second language

Walter Bracken Elementary School Las Vegas, NV

Big Brothers Big Sisters Program September 2015 – May 2018

- Spent one hour each week mentoring an assigned elementary little
- We would often work on homework for half of the time and play a game for the other half