

# Rachel D. Newton

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## EDUCATION

University of Michigan (UM) | Ann Arbor, Michigan

**Doctor of Philosophy in Electrical Engineering**, College of Engineering

**Master of Science in Electrical Engineering**, College of Engineering

Arizona State University (ASU), Barrett, the Honors College | Tempe, Arizona

**Bachelor of Science in Electrical Engineering**, Ira A. Fulton Schools of Engineering

**Bachelor of Science in Computational Mathematics**, College of Liberal Arts and Sciences

GPA: 3.93/4.00

*Anticipated May 2025*

*Received April 2022*

GPA: 4.00/4.00

*Received May 2020*

*Received May 2020*

- Inducted Eta Kappa Nu (May 2017)
- Inducted Tau Beta Pi (December 2017)

## PUBLICATIONS

**R. Newton**, Z. Du, L. Balzano, P. Seiler, “Manifold Optimization for Data Driven Reduced-Order Modeling,” Submitted to IEEE American Controls Conference (ACC) 2023.

A. Chen, **R. D. Rhoades**, A. J. Halton, J. C. Booth, X. Shi, X. Bu, N. Wu, and J. Chae, “Wireless Wearable Ultrasound Sensor to Characterize Respiratory Behavior.” In: Ossandon, M.R., Baker, H., Rasooly, A. (eds) Biomedical Engineering Technologies. *Methods in Molecular Biology*, vol 2393 (November 2021): 671-682. [https://doi.org/10.1007/978-1-0716-1803-5\\_36](https://doi.org/10.1007/978-1-0716-1803-5_36)

A. Chen, J. Zhang, L. Zhao, **R. D. Rhoades**, D. Kim, N. Wu, J. Liang, J. Chae, “Machine-learning enabled wireless wearable sensors to study individuality of respiratory behaviors”, *Biosensors and Bioelectronics* 173, no. 112799 (November 2020). DOI: 10.1016/j.bios.2020.112799.

A. Chen, A. J. Halton, **R. D. Rhoades**, J. C. Booth, X. Shi, X. Bu, N. Wu, and J. Chae, “Wireless Wearable Ultrasound Sensor on a Paper Substrate to Characterize Respiratory Behavior,” *ACS Sensors* (American Chemical Society) 4, no. 4 (March 2019): 944–952. DOI: 10.1021/acssensors.9b00043.

## RESEARCH EXPERIENCES

**Machine Learning for Control Systems** with Dr. Laura Balzano and Dr. Peter Seiler at UM

*January 2021-Present*

- Implemented two Grassmannian optimization algorithms to compute the reduced-order model for a small-scale wind farm control system
- Currently developing theoretical limitations by leveraging recent publications on similar problems

**Fulton Undergraduate Researcher** for Chae Research Group at ASU

*January 2018 – December 2018*

- Developed firmware for wireless wearable biomedical sensors to transmit data to auxiliary devices
- Programmed an Android application to receive and analyze the data received from sensors programmed in Java with Android Studio

**Senior Design Project** with Dr. David Allee at ASU

*September 2019 – May 2020*

- Developed a sound identification machine learning algorithm that utilizes a convolutional neural network (CNN) to analyze and categorize the spectrogram of different sound datasets
- Utilized a remote server to decrease wall clock time required to train the algorithm during the refinement process

**Barrett Honors Thesis** with Dr. Christ Richmond at ASU

*September 2019 – May 2020*

- Determined an estimation of the Adaptive Matched Filter (AMF) using the Chernoff bound
- Developed a MATLAB program to compare the AMF (well-known and exactly calculated) with the estimation under a variety of circumstances and conditions

## WORK EXPERIENCES

**Electrical Surety Analysis Intern** for Sandia National Laboratories

*June 2020 – August 2020*

- Developed a COMSOL 2D axisymmetric Multiphysics simulation model to predict the direct effects of a lightning strike on various materials
- Improved model performance by performing mesh refinement and atmospheric independence studies

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## WORK EXPERIENCE CONTINUED

### **Electromagnetic Effects Engineering Intern** for The Boeing Company

May 2019 – August 2019

- Developed a COMSOL 3D Multiphysics simulation model to predict the performance of an aircraft test configuration
- Verified resolutions to 10 manufacturing defects to ensure continued production
- Compiled information for the 777-9 aircraft electromagnetic effects documentation including information for designers and for certification documentation to demonstrate compliance with FAA regulation 25-581
- Developed a full-plane 3D finite element analysis model in MSC Patran to determine the impacts of a possible design change to lightning indirect effects on the 737-8 aircraft

### **Test Engineering Intern** for Viasat, Inc.

May 2018 – May 2019

- Developed the test hardware for validation of a fixed ~20GHz local oscillator module for a space broadband receiver
- Designed test software to automate the Device Under Test cycle for the module utilizing Iron Python
- Aided in hosting an educational outreach booth at the annual Chief Science Officers Summer Institute

### **Subject Area Tutor** for ASU University Academic Success Programs

August 2017 – May 2020

- Provided one-on-one and group tutoring in the subjects of Mathematics, Physics, and Chemistry
- Skilled in tutoring advanced mathematics including Calculus I, II, III, Differential Equations, and related coursework
- Improved customer service by applying student feedback and attending regular trainings

## LEADERSHIP EXPERIENCE

### **High-Voltage Systems Lead** at Sun Devil Motorsports – Formula Electric

August 2016 – May 2020

- Organized a team to begin design on an electric powertrain for the Formula Electric competition
- Developed the high-voltage accumulator and tractive system for the 2020 Formula SAE Electric vehicle
- Worked alongside a team of 8 other engineering students in designing and analyzing electronic components to connect the 10+ subsystems of the 2018 Formula SAE car while adhering to the Formula SAE competition rules

### **Volunteer and Member** at Girl Scouts of America

April 2003 – Present

- Received the Gold Award for creating and implementing an instrument cleaning instructional program for former high school band and two middle school bands

## AWARDS AND RECOGNITION

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|--|-----------------------|
| • National Science Foundation Graduate Research Fellowship | Fall 2022-Present     |
| • J. and H. Hughes Electrical Engineering Fellowship at UM | Fall 2020-Summer 2021 |
| • Fulton Schools of Engineering Dean's List                | Fall 2016-Spring 2020 |
| • New American University Scholar – ASU President's Award  | Fall 2016-Spring 2020 |
| • Texas Instruments Scholarship                            | Fall 2017-Spring 2020 |
| • James F. Golder Memorial Scholarship                     | Fall 2019-Spring 2020 |
| • Ford Motor Company Undergraduate Engineering Scholarship | Fall 2018-Spring 2019 |
| • Tau Beta Pi Association Scholarship Forge No. 70         | Fall 2018-Spring 2019 |
| • ASAP-METS Scholarship                                    | Fall 2017-Spring 2019 |
| • Solutions Grant, Scholarship                             | Fall 2016-Spring 2017 |
| • AZ Cactus Pine Girl Scouts Scholarship                   | Spring 2017           |
| • Girl Scout Gold Award                                    | Fall 2016             |