

Eric Cawi

Curriculum Vitae

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Education

- 2015–present **PhD. in Systems Science and Mathematics**, *Washington University in St. Louis*, St. Louis, MO.
Completion expected 2020
- 2011–2015 **B.S. Electrical Engineering and Applied Mathematics**, *George Mason University*, Fairfax, VA, GPA: 3.9.

Honors and Awards

- 2015–present **McDonnell International Scholars Academy**, *Washington University in St. Louis*.
Funding lasts maximum five years
- 2015–present **Graduate Research Fellow**, *National Science Foundation*.
Funding for three out of the next five years
- 2015 **Outstanding Academic Achievement Award**, *George Mason University ECE Department*.
- 2015 **Mary K. Cabell Outstanding Mathematics Student Award**, *George Mason University Mathematics Department*.
- 2015 **Outstanding Project Award**, *George Mason University Volgenau School of Engineering*.
- 2014 **Outstanding Project Award**, *George Mason University Volgenau School of Engineering*.
- 2012 **Schwartztein Best Freshman Research Paper Award**, *George Mason University*.
- 2011–2015 **University Scholars Program**, *George Mason University Honors College*.
Full tuition merit-based scholarship
- 2011 **Anthony Colosi Scholarship**, *Anthony Colosi Memorial Fund for Science*.

Research Experience

Presentations

- 2015 **Volgenau School of Engineering Undergraduate Research Celebration**, *George Mason University*, Keynote Presentation.
Search and Rescue Operations with Unmanned Aerial Vehicles
- 2015 **National Council on Undergraduate Research**, *Eastern Washington University*, Poster.
Search and Rescue Operations with Unmanned Aerial Vehicles

- 2015 **C4I Seminar Series**, *George Mason University*, Oral.
Autonomous Navigation for an Unmanned Aerial Vehicle in Search and Rescue Operations
- 2014 **Volgenau School of Engineering Undergraduate Research Celebration**, *George Mason University*, Poster.
Mapscore: A portal for scoring probability maps
- 2013 **MARCUS Conference**, *Sweet Briar College*, Oral.
Uncertainty Quantification for the Soil-Carbon System using Monte Carlo and Generalized Polynomial Chaos Approaches
- 2013 **OSCAR Summer Celebration of Research**, *George Mason University*, Poster.
Uncertainty Quantification for the Soil-Carbon System using Monte Carlo and Generalized Polynomial Chaos Approaches
- 2013 **GMU Undergraduate Math Conference**, *George Mason University*, Oral.
Paleoclimatology and Climate Field Reconstruction
- 2013 **Joint Math Meetings**, *San Diego, CA*, Oral, Poster.
Paleoclimatology and Climate Field Reconstruction
- 2012 **JSUMS Conference**, *James Madison University*, Oral.
Paleoclimatology and Climate Field Reconstruction
- 2012 **National Search and Rescue Conference**, *Lake Tahoe, NV*, Oral.
Mapscore: A portal for scoring probability maps
- 2012 **Washington Search and Rescue Conference**, *Lake Tahoe, NV*, Oral.
Mapscore: A portal for scoring probability maps
- 2012 **Virginia Search and Rescue Conference**, *Lynchburg, VA*, Oral.
Mapscore: A portal for scoring probability maps

Research

- 2014-present **Research Assistant**, *Dr. Charles Twardy*.
Developing maps using ArcGIS and Python predicting lost person behavior for use in wilderness search and rescue scenarios by fitting distribution parameters to case data. Current map is a diffusion based model where the diffusion coefficient is a function of elevation and terrain. Cross-validated the lognormal and log-cauchy distributions to compare their relative effectiveness.
- 2014- 2015 **Senior Design Project**, *George Mason University ECE Department*.
Developed path planning algorithms using probability maps and Matlab optimization packages to control the trajectory of an unmanned aerial vehicle for use as an autonomous search and rescue unit. Optimized the probability of finding the target given predictive model with local hill climbing algorithms. Tuned the controller's navigation algorithms. Worked in a team of four students.
- 2013 **Research Assistant**, *George Mason University URSP Program*.
Performed Uncertainty Quantification on parameters in the Soil –Carbon system for peat deposits using Monte Carlo and General Polynomial Chaos methods. Served as the primary researcher with a mentor in the Mathematics Department.

2012-2013 **Research Assistant**, *George Mason University URCM Program*.
Approximated historical temperatures using the Singular Value Decomposition on a training temperature dataset, tree ring growth indexes, and CO2 measurements. Performed cross validation and created error bars on the resulting dataset. Served one of two primary researchers under a faculty and graduate student mentor.

2011-2012 **Research Assistant**, *George Mason University C4I Center*.
Developed maps using ArcGIS and Python predicting lost person behavior for use in wilderness search and rescue scenarios. Probabilities were assigned based on distance, elevation, and terrain according to statistics from the International Search and Rescue Incident Database. Assisted in live incident during the 2012 VASAR conference by creating distance rings, elevation, and linear feature (roads, rivers, etc) models.

Research Interests

Computational Mathematics.

Development and improvement of numerical methods used to solve engineering and mathematical problems. Specifically interested in optimization methods and techniques for solving differential equations.

Differential Equations.

Theory and analysis of ordinary and partial differential equations, especially systems with stochastic parameters.

Control Theory.

Control of non-linear dynamical systems, especially those arising in climate science

Climate Science.

Modeling and intervention for at-risk ecosystems using ideas from control theory and mathematics.

Autonomous Vehicles.

Improving hardware and control of autonomous vehicles for applications in search and rescue.

Skills

Numerical Methods	Finite Differences, Runge-Kutta, Singular Value Decomposition, Spectral Method, Newton's Method, Local Hill Climbing with Random Restart, Cross Validation
Technical Skills	Ordinary and Partial Differential Equations, Linear Algebra, Digital/Analog Circuit Analysis and Design, Digital/Analog Filter Analysis and Design, Control System Design, Path Optimization, Uncertainty Quantification
Computer Skills	Python, C, Arduino, MATLAB, Mathematica, ArcGIS, LaTeX, Microsoft Office Suite

Teaching

2015 **Learning Assistant- Calculus III**, *George Mason University Mathematics Department*.

Developed Mathematica course content resulting in student-created art. Managed 3-D printing of the student labs, held regular office hours and exam review sessions.

- 2014 **Learning Assistant- Introduction to Partial Differential Equations**, *George Mason University Mathematics Department*.
Created MATLAB course content and exam review guides. Presented three full lectures, as well as holding regular office hours and exam review sessions.

Extracurricular Activities and Service

- 2015 **Student Co-Mentor**, *Washington University in St. Louis*.
Reviewed essays and provided advice to students applying for the NSF GRFP
- 2015 **Alumni Advisor**, *George Mason Honors College*.
Provided preliminary academic advising to freshmen at the Honors College Orientation.
- 2011–2015 **Honors College Spokesperson**, *George Mason Honors College*.
Promoted the Honors College in a local tv program, spoke on panels and manned tables at recruitment events. Promoted the Honors College at Alumni and local business events.
- 2014–2015 **Lead Volunteer - Water Table**, *National Ovarian Cancer Society 5K Run/Walk*.
Responsible for logistics and team of volunteers providing water to runners
- 2014–2015 **Developer**, *Student Run Computing and Technology*.
Assisted in development of Bookshare, a textbook exchange website.

References

Charles Twardy, Research Mentor.
ctwardy@gmail.com

Timothy Sauer, Research Mentor.
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