

# Aaron Hagstrom

## Writer/Researcher

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### Summary

Computational/Mathematical Engineer with interest in cognitive robotics and background in communication and journalism and patent research.

- Computational Engineering: mesh creation, finite element analysis, compatible discretization, boundary value problems, dynamical systems, image analysis, CAD.
- Machine Learning: Optimization methods for Dynamic Neural Fields
- Journalism: Video Documentary, Print, Broadcast.

### Education

MS (online), Electrical Engineering (candidate) Aug. 2023 - Present  
Purdue University

PhD Candidate, Mathematics Aug. 2021 - Aug. 2023  
Florida Atlantic University  
Researching neural fields and applications to cognitive robotics with Drs. Jason Mireles-James and Will Hahn.

MA, Mathematics Aug. 2019 - June 2021  
University of Hawaii at Manoa  
Researched neural fields with Dr. Evan Gawlik.

BS, Applied & Computational Mathematics 2016 - 2018  
SUNY, Empire State College  
Studying mathematics and computer science.

Master of Arts, Journalism 2012 - 2014  
University of Southern California  
Studied print and documentary journalism. My combined thesis was on LAPD community police officers working in South LA housing developments.

Bachelor of Arts, English Literature 2010 - 2011  
University of Northwestern  
Studied English and American literature. Studied abroad at Wycliffe Hall, Oxford University.

### Work Experience

Consultant June 2023 - Present  
Mark Kallenbach - Attorney  
Creating an options trading bot for Modeling of Stocks/Bonds in IBKR

Researcher/Consultant Jan 2023 - Present  
Veritec Inc.

### Core Competencies

- Mathematical Modeling
- Numerical Analysis
- Finite Element Analysis
- Graph Theory
- PDEs
- ODEs
- Dynamic Neural Fields

### Technical Summary

#### Applications



- Matlab
- Mathematica
- Comsol
- Fortran 95
- XPP Auto
- Simulink
- C++
- Python
- Fenics
- pyMOL
- Java
- PyMOL
- VMD
- Gromacs
- Deal.ii

#### Computer-Aided Design



- SolidWorks

#### Languages



- Classical Greek
- Russian

#### Technical Writing



- LaTeX

### Graduate Courses

**MAP 6336 Ordinary Differential Equations:** Green's Functions, Perturbation Theory, Bifurcation Theory, Pattern Formation and Order Parameters.

**MATH 601 Applied Dynamical Systems:** Continuous and discrete dynamical systems; bifurcation theory; chaotic maps. Additional topics from PDEs and linear algebra.

Researching and organizing patent portfolio pertaining to 2D barcodes and dual-use financial cards.

Intern Jan 2019 - Aug. 2019  
Oak Ridge National Lab  
Modeling of proteins with finite element methods.

Intern June 2018 - Aug. 2018  
University of Minnesota  
Modeling of chemical reaction networks with Dr. Hans Othmer.

Reporter Jan. 2018 - March 2018  
China Daily  
Reporting on US-China trade

Editor - IP Stars 2016 - 2018  
Euromoney Institutional Investor  
profiling IP firms and lawyers throughout the US.

Court Reporter 2016  
Reorg Research  
Reporting on debt as a stringer in Minnesota.

Intern June 2013 - Aug. 2013  
Financial Times, World Desk

Reporter May 2012 - Aug. 2012  
US Army Cadet Command  
Writing stories on US Army ROTC cadet training

**STA 6444 Mathematical Probability:**

This course gave an introduction to the rigorous mathematical treatment of probability theory using measure theory. Topics covered include construction of probability measures, random variables, distributions, expectation and integration, independence, product measures, and laws of large numbers.

**STA 6326 Mathematical Statistics:** This course was an introduction to mathematical statistics relating theory to practice. Topics covered include random sampling, principles of data reduction, methods of parameter estimation (least squares method and maximum likelihood method etc), hypothesis testing, asymptotic evaluations, analysis of variance and regression, and regression models.

**MATH 625 Differentiable Manifolds:**

Differentiable structures on manifolds, tensor fields, Frobenius theorem, exterior algebra, integration of forms, Poincare Lemma, Stoke's theorem.

**MATH 603 Partial Differential**

**Equations:** Classical existence and uniqueness theory for PDEs, qualitative properties, classification, boundary value and initial value problems, fundamental solutions, other topics.

**MAD 5403 Computational Mathematics**

: Basics of Fourier analysis, Frechet derivatives, floating point arithmetic, solving linear and nonlinear equations in finite and infinite dimensions.

**MAT 6907 Machine Learning for**

**Dynamic Neural Fields:** Studying optimization techniques for dynamic neural fields including intrinsic plasticity, genetic algorithms, and Kalman Filters.

