

# James Fairbanks, PhD

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<http://www.jpfairbanks.net>

<http://github.com/jpfairbanks>

## EDUCATION

### Georgia Institute of Technology (Atlanta, GA)

Ph.D Computational Science and Engineering 2012 - 2016

- ▶ Adviser: Professor David A. Bader
- ▶ Title: Graph Analysis Combining Numerical, Statistical, and Streaming Techniques
- ▶ Qualifier: Computational Data Analysis and High Performance Computing passed Oct. 2013

### University of Florida (Gainesville, Florida)

B.S. Mathematics 2009 - 2012

- ▶ GPA 3.94/4.0
- ▶ Summa cum laude
- ▶ Thesis: *A Ramsey Theorem for Indecomposable Matchings* [Abstract](#)

## WORK EXPERIENCE

### Georgia Tech Research Institute (GTRI) (Atlanta, GA)

Research Engineer II, May 2016 - Present

- ▶ Conduct research into high performance data analysis software
- ▶ Technical lead of a multi-year strategic research initiative studying near real-time analysis of news articles and propaganda
- ▶ Contributed to DARPA proposal for modeling and simulation of social processes
- ▶ Research advisor to several students in Graduate and Undergraduate programs
- ▶ Projects:
  - \* Developed a web application for personalized medicine at the hospital scale using Golang, Python, and PostgresDB deployed with Docker.
  - \* Applied machine learning techniques to personalized medicine for predicting adverse patient outcomes presented in a real time Speech to Text physician facing web interface.
  - \* Technical lead for submission to NIJ crime prediction challenge. Predicted crimes in Portland, OR using temporal and geographic features derived from crime statistics and GIS databases

### Ionic Security (Atlanta, GA)

Data Scientist, Summer 2015

- ▶ Developed data analytics software.
- ▶ Designed a service oriented architecture for near real time analysis written in Go and Julia.
- ▶ Leveraged time series and network database technologies including Heka, InfluxDB, RabbitMQ, and Elasticsearch.

### Lawrence Livermore National Laboratory (Livermore, CA)

Institute for Scientific Computing Research Intern, Summer 2014

- ▶ Studied relationship between numerical accuracy of eigensolvers and solution quality of mincut graph partitioning.
- ▶ Developed very fast approximate eigensolvers for large graphs.
- ▶ Applied probabilistic reasoning to describe numerical computations.
- ▶ Presented results at LLNL poster session.

### Center for Computing Sciences (Bowie, MD)

Conducted research into Malware structure and similarities

- ▶ Studied execution patterns of malicious programs.
- ▶ Developed clustering and methods for understanding the structure of malicious programs with graph analytics.
- ▶ Built a high performance distributed system for conducting these analyses with ZeroMQ communication.

### Georgia Institute of Technology (Atlanta, GA)

Graduate Research Assistant, 2012 - 2016

- ▶ ASEE/NDSEG Fellowship 2013 - 2016
- ▶ Applied Mathematics
- ▶ Data Analysis
- ▶ Large Graph Analysis
- ▶ High Performance Computing

### CNL Software (Indianapolis, IN)

Software Engineering Intern, Summer 2011

- ▶ Developed a program to analyze geo-location data for physical security of a building, and present real time data to management.
- ▶ C#/.Net Development

## OPEN SOURCE

Core maintainer of [LightGraphs](#) the most widely used Graph Algorithm Package in [Julia](#).

## RESEARCH

### Peer Reviewed Journal Articles

- ▶ J.P. Fairbanks, D. A. Bader, and G. D. Sanders Graph Partitioning with Spectral Blends, Oxford Journal of Complex Networks, Jan 2017
- ▶ J.P. Fairbanks, R. Kannan, H. Park, D. A. Bader, Behavioral Clusters in Dynamic Graphs, Parallel Computing Special Issue of Scientific Graph Analysis 2015
- ▶ J.P. Fairbanks, [A Ramsey Theorem for Indecomposable Matchings](#), Electronic Journal of Combinatorics, Vol 18(1) Dec 2011.

### Peer Reviewed Conference Publications

- ▶ E. Nathan, G. Sanders, J. P. Fairbanks, V. Henson and D. Bader *Graph Ranking Guarantees for Numerical Approximations to Katz Centrality*. International Conference On Computational Science 2017
- ▶ D. M. Ediger and J. P. Fairbanks *Deriving Streaming Graph Algorithms from Static Definitions*. IEEE Parallel and Distributed Processing - Graph Algorithm Building Blocks 2017.
- ▶ T. Frederick, C. Herlihy, J. P. Fairbanks *Using Big Data to Predict and Analyze Cooperation and Conflict*. The Conflict Conference at UT-Austin 2017.
- ▶ A. Zakrzewska, E. Nathan, J.P. Fairbanks, D. A. Bader *A local measure of community change in dynamic graphs*. ASONAM 2016: 349-353
- ▶ J.P. Fairbanks, A. Zakrzewska, D.A. Bader [Novel Stopping Criteria for Spectral Partitioning](#) SIAM Network Science July 2016
- ▶ Poster at SIAM Computational Science and Engineering *Discovering Block Structure with Approximate Eigenvectors* Mar 2015
- ▶ J.P. Fairbanks, D. Ediger, R. McColl, D.A. Bader, E. Gilbert, [A Statistical Framework for Analyzing Streaming Graphs](#), IEEE/ACM ASONAM 2013, Aug 2013.
- ▶ Poster at Graph Theory at Georgia Tech (GT@GT) May 7-11 2012

## TEACHING

Georgia Tech Professional Education

- ▶ Big Data Analytics with J. Poovey, D. Ediger, and M. Rost. Fall 2016

Teaching Assistant at Georgia Tech

- ▶ CSE 6643 Numerical Linear Algebra under Prof. Haesun Park, Spring 2016
- ▶ CSE 6220 High Performance Computing under Prof. Srinivas Aluru, Spring 2014

## NON-RESEARCH ACHIEVEMENTS

Honors Awards and Fellowships

- ▶ National Defense Science and Engineering Graduate Fellow 2013 - 2016
- ▶ Presidential Fellowship for Graduate Study at Georgia Tech 2012 - 2016
- ▶ University Scholar at the University of Florida 2011 - 2012
- ▶ Kermit Sigmon Scholarship *for service to the mathematical community* 2012
- ▶ Tau Beta Pi, Engineering Honor Society, Georgia Tech Chapter 2015 - Present
- ▶ Phi Beta Kappa, University of Florida Chapter 2012

Leadership and Service

- ▶ Tau Beta Pi Atlanta Alumni Chapter President, 2017-2018
- ▶ Georgia Tech College of Computing Graduate Student Association VP for the School of CSE, 2015-Present
- ▶ Pi Mu Epsilon Chapter President, 2011-2012
  - \* I organized a series of talks for the mathematics students at UF on diverse mathematical topics and skills like LaTeX, programming and technical communication in the field.
- ▶ Eagle Scout, 2009-Life

## SKILLS

Some of my technical skills:

- ▶ Programming languages (most familiar to least) Julia, Golang, Python, C, Bash, SQL, Matlab, C#/Java
- ▶ Computational Data Analysis (using pandas and pylab and Jupyter Notebook)
- ▶ Web development with Golang and Python (flask)
- ▶ Database Applications primarily with PostgreSQL
- ▶ Continuous Integration/Deployment, Docker
- ▶ Test Driven Development (TDD)
- ▶ Familiar with \*NIX command line, git, make, L<sup>A</sup>T<sub>E</sub>X
- ▶ Avid Linux User