

ABOUT ME

I am a Ph.D. Candidate in Applied Mathematics at the Harvard University School of Engineering and Applied Sciences (SEAS), as a Draper Laboratory Fellow. My interests include surface description, from shape inference from shading to the intersection of topological data analysis (TDA) and probability.

EDUCATION

Harvard University

Doctor of Philosophy, Applied Mathematics, expected May 2020
Paulson School of Engineering and Applied Sciences // Draper Fellow

Courses taken: Functional Analysis, Linear Algebra, Randomized Algorithms, Biomedical Signal and Image Processing (MIT), Computational Geometry, independent reading course on Differential Geometry, Data Science, Control & Estimation, Applied Algebra, Algebraic Topology, Differential Topology.

Courses taught: Introduction to Probability (ES150), Spring 2016.

Harvard University

Master of Science, Applied Mathematics, received November 2016
Paulson School of Engineering and Applied Sciences // Draper Fellow

UCLA

Bachelor of Science, Applied Mathematics, received June 2014. Graduated cum laude.

Upper-division mathematics courses taken: Linear Algebra (sequence), Real Analysis (sequence), Optimization, Probability (sequence), Mathematical Modelling, Advanced Linear Algebra w/Applications to QM, Applied Numerical Methods (sequence), Directed Research, Mathematical Imaging

Other relevant courses taken: Machine Learning (Statistics 261), Mechanics, Electromagnetism and Oscillation, Optics, Programming in C++ (sequence), Programming in Java

CODING SKILLS

Python, TensorFlow, MATLAB, Bash, C++, Java, Git, Mathematica, Magma.

RESEARCH EXPERIENCE

Graduate Research

Current

Harvard University SEAS // Advisors: Todd Zickler and Natalya Markuzon // Shape from shading.

2015 - 2016

Harvard University SEAS // Group collaboration, designing and analyzing distributed algorithms for optimal energy management, i.e. strategies for smart grid. We focused on demand response strategies where the system is only allowed very limited communication.

Undergraduate Research

2013 - 2014

California Research Training Program in Computational and Applied Mathematics, UCLA Department of Mathematics // Developing novel methods to visualize neural patterns within EEG data. Our research dealt with custom wavelet development and corresponding signal decompositions.

2012

Research in Industrial Projects for Students (RIPS), Institute for Pure and Applied Mathematics, UCLA // Developing novel methods of Digital Elevation Model (DEM) reconstruction.

2011

Mathematical and Theoretical Biology Institute (MTBI), Arizona State University // Modelling the formation of photochemical smog.

PUBLICATIONS

1. Ding J, Shahrampour S, **Heal K**, and Tarokh V. Analysis of Multi-State Autoregressive Models. In review.
2. Deng Z, Ding J, **Heal K**, Tarokh V. *The Number of Independent Sets In Hexagonal Graphs*. 2017 IEEE International Symposium on Information Theory (ISIT). 2017.
3. Enyioha C, Magnusson S, **Heal K**, Li N, Fischione C, Tarokh V. *On Variability of Renewable Energy and Online Power Allocation* ; IEEE Transactions on Power Systems. 2017.
4. Enyioha C, Magnusson S, **Heal K**, Li N, Fischione C, and Tarokh V. *Robustness Analysis for an Online Decentralized Descent Power Allocation Algorithm*. To appear in Proceedings of the 2016 Workshop on Information Theory and its Application.
5. Magnusson S, **Heal K**, Enyioha C, Li N, Fischione C, Tarokh V. *Convergence of Limited Communications Gradient Methods*, to American Control Conference (ACC). Boston, MA; 2016.
6. Magnusson S, Enyioha C, **Heal K**, Li N, Fischione C, Tarokh V. *Distributed Resource Allocation with Limited Bandwidth Communications for Power Networks*, to Conference on Information Sciences and Systems (CISS). Princeton, NJ; 2016.
7. Gilles J, **Heal K**. *A parameterless scale-space approach to find meaningful modes in histograms - Application to image and spectrum segmentation*. International Journal of Wavelets, Multiresolution and Information Processing, 2014.

RECENT HONORS, ACTIVITIES, AND FUNDING

- Conference talk, *The Number of Independent Sets in Hexagonal Graphs*. International Symposium on Information Theory, 2017.
- Poster presentation, *Induced Probability Measures on Persistence Diagrams*. SIAM Algebraic Geometry, 2017.
- Attended S3PM conference with NSF funding, 2017.
- Seminar talk, *Estimating the Reach of a Manifold*. Learning, Intelligence, and Signal Processing group, Boston University, 2016.
- Seminar talk, *Estimating the Reach of a Manifold*. Tarokh group, Harvard, 2016.
- Poster presentation, *A Decentralized Online Algorithm for Fair Power Allocation*. Optimization and Parsimonious Modeling, IMA, 2016.
- Awarded a Harvard University Certificate of Distinction in Teaching based on student evaluations, 2016.
- Invited to and awarded funding to attend the Heidelberg Laureate Forum in Heidelberg, Germany; 200 students were accepted globally, 2016.
- Awarded a competitive Draper Laboratories five-year doctoral fellowship, 2014.
- Conference talk, *Electroencephalogram Analysis Using the Empirical Wavelet Transform*. Pacific Coast Undergraduate Mathematics Conference, 2014.