Alexander Reynolds | Curriculum Vitæ

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Experience

US Air Force Research Laboratory **Dayton, OH**
Research Associate II, Sensors Directorate, Layered Sensing Exploitation Division *September 2016–January 2017*
Research position in computer vision at the premier US Air Force research facility. Investigated the propagation of uncertainty in image registration algorithms. Collected and analyzed registration data for evaluation of computer vision algorithms. Developed video stabilization scripts for truthing in machine learning research software. Support from USAF.

Wright State University, US Air Force Research Laboratory **Dayton, OH**
Research Intern, Automatic Target Recognition Center *May 2016–August 2016*
Summer research position in computer vision. Developed fully Bayesian techniques to obtain consistent uncertainty estimates in georegistration algorithms for UAV video feed. Participated in weekly seminars on computer vision and image processing. Support from DoD and USAF.

Arizona State University **Tempe, AZ**
Undergraduate Researcher, School of Mathematical and Statistical Sciences *May 2015–April 2016*
Research in applied Fourier analysis; focus in analysis of edge detection methods with spectral data in synthetic aperture radar signals. Participated in weekly group meetings with professors, post-docs, and doctoral candidates from multiple disciplines and attended seminars on applied and computational mathematics. Support from DoD and NSF.

GIK Acoustics (Remote) **Atlanta, GA**
Educator, Designer *August 2012–April 2016*
Developed acoustic absorbers and diffusors tested at Riverbank (US) and University of Salford (UK), conducted in-situ acoustic measurements using free-field test microphones, designed neutral acoustic spaces for clients, authored articles to disseminate knowledge of room acoustics, and modeled acoustic elements and spaces.

Skills

Languages: Python (OpenCV, NumPy, MatPlotLib), Matlab (Image Processing Toolbox, Signal Processing Toolbox, Computer Vision Toolbox, CVX, VGG), C/C++ (OpenCV), Git, Java, LaTeX, HTML, CSS

Computer Vision: Image registration, localization, particle filtering, tracking, feature detection, image processing

Signal Processing: Fourier analysis, edge detection, statistical signal processing, inverse problems, optimization

Acoustics: Acoustic design, architectural acoustics, acoustic measurement and analysis, speech intelligibility

Education

Honors Bachelor of Science, Mathematics **Tempe, AZ**
Barrett, The Honors College, Arizona State University, Magna Cum Laude *August 2013–May 2016*
Focus in abstract algebra, scientific computing, and signal processing.

Edge Detection from Spectral Phase Data
Honors Thesis, Barrett, the Honors College *April 2016*
Analysis of methods to create edge maps constructed from noisy and intermittent spectral phase data with post-processing techniques. Supervised by Dr. Anne Gelb and Dr. Douglas Cochran, in partial fulfillment for the requirements of a Barrett Honors degree.

Awards and Scholarships

Bidstrup Foundation Research Fellowship: Barrett, the Honors College *Spring 2016*

Best Undergraduate Poster: AMS ASU Student Chapter Poster Conference *Spring 2016*

Dean's List: Arizona State University *Fall 2014–Spring 2016*

President's Scholarship: Glendale Community College *Spring 2009*

Projects

Video Template Tracking (Matlab, Python+OpenCV)
Repo: github.com/alkasm/matlab-template-tracking *May 2017*
This project spun out of someone asking the best way to track Mario in Super Mario Bros game-play. Uses frame-by-frame template matching via summed square differences to track a template through a video, and includes optimizations to dynamically reduce the search area as needed to find the template.

Video Stabilization for Machine Learning Truthing (Python, Matlab)
Sensors Directorate, US Air Force Research Laboratory *Fall 2016*
Video stabilization scripts for ML truthing software, prototyped in Matlab and then programmed in Python. Used OpenCV for speedy processing and built a customized Lucas-Kanade pyramid algorithm for homography estimation.

Spectral Method PDE Solver (Matlab, paper)
Numerical Analysis II, Arizona State University *Spring 2016*
Program to solve second order linear PDEs via spectral methods, i.e., converting PDEs to ODEs with a Fourier transform. Outputs a sequence of solutions at varying time steps and computes the error between the numerical solutions and exact solutions.

Semidirect Products (Paper)
Intermediate Abstract Algebra, Arizona State University *Spring 2016*
Extracurricular paper on semidirect products, complete with motivation, recognition theorems, proofs of various properties of semidirect products, and classifications of groups arising from semidirect products.

Conferences and Presentations

AFRL ATR Center Briefings: Presentation, poster *August 2016*
AMS ASU Chapter Poster Conference: Poster (best undergraduate poster) *April 2016*
Barrett Celebrating Honors Symposium: Poster *April 2016*
Barrett Thesis Defense: Presentation, oral defense *April 2016*
ASU SoMSS Thesis Panel: Panel, poster *March 2016*
SUnMaRC: Mini-symposium *February 2016*
AMS/MAA Joint Mathematics Meetings: Mini-symposium, poster *January 2016*

Articles

The Basics of Room Setup: GIK Acoustics *September 2014*
http://www.gikacoustics.com/basics-room-setup-acoustic-panels-bass-traps/
Understanding Decay Times and Waterfall Plots: GIK Acoustics *February 2013*
http://www.gikacoustics.com/understanding-decay-times/
Low-Down on Low Frequency Absorbers: GIK Acoustics *November 2012*
http://www.gikacoustics.com/understanding-different-bass-trapping/

Memberships and Involvement

Professional Societies: AMS, SIAM, IEEE
Academic Clubs: AMS ASU Chapter, Math Club, Software Developers Association
Involvement: ASU Math Day Panel, Barrett Thesis Panel Expo, SUnMaRC, ASU Night of the Open Door
Local Groups: DesertPy, PHX Deep Learning, Learn Data Science Phoenix, Phoenix JavaScript

References

Clark Taylor: Senior Research Electronics Engineer, US Air Force Research Laboratory (clark.taylor.3@us.af.mil)
Anne Gelb: Professor, Mathematics Department, Dartmouth College (annegelb@math.dartmouth.edu)
Douglas Cochran: Professor, Fulton School of Engineering, ASU (cochran@asu.edu)
Rodrigo Platte: Associate Professor, School of Mathematical and Statistical Sciences, ASU (rplatte@asu.edu)
Glenn Kuras: President, GIK Acoustics (glenn.k@gikacoustics.com)

Presentations, papers, code, and other materials can be accessed via `http://reynoldsalexander.com`. *Compiled May 18, 2017*