# Israel J. Vaughn

## EDUCATION

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|---|---|---|
| **PhD** | Optical Sciences | *University of Arizona, College of Optical Sciences* |
| **MS** | Mathematics | *University of New Mexico* |
| **BS** | Mathematics | *New Mexico Institute of Mining and Technology* |

## EMPLOYMENT

**Research Associate-Space Situational Awareness** | *Western Sydney* 2020-Present
Imaging systems, Satellite observations, Event based imaging,
Algorithms

**Research Associate-Space Optics** | *UNSW Canberra* 2019-2020
Imaging systems, Optical Engineering, Systems Engineering
Control Engineering, Space Systems Engineering, Polarisation

**Research Associate** | *UNSW Canberra* 2016-2019
Imaging systems, Polarimetric Imaging, Scatterometer, Optical Engineering,
Control Engineering

**Systems Engineer** | *maxwell's muse, llc* 2014-2016
Systems Engineering, Optical Design, C++ Design

**Graduate Researcher** | *University of Arizona* 2009-2016
Machine Learning, Polarimetric System Design, Imaging Operators

**Software Engineer** | *Advanced Optical Technologies* 2011-2012
Material Classification of Polarimetric Data

**Systems/Software/Optical Engineer** | *Advanced Optical Technologies* 2006-2009
Polarization, Remote Sensing, Machine Learning

## QUALIFICATIONS | EXPERIENCE

*7-12+ Years Experience*
C/C++, Matlab, Classification/Machine Learning, Optical Design, Systems Engineering/Instrumentation, Polarisation/Polarisation Imaging, Software Engineering, Scientific Computing, Instrumentation control

*2-6 Years Experience*
Mathematical Imaging Science, Labview, Solidworks, Inventor, and ASME Y14.5-2009 tolerancing, Management (2-3 people), Low level hardware troubleshooting (TCP, I2C bus), ZEMAX, Space Systems Engineering, Project Lead, Project Management

Mentoring of 9 undergraduate students and 5 graduate students
Direct supervision of 7 undergraduate students and 1 graduate student
Flat structure supervision of 2 mechanical engineers for optomechanical support

## HONORS, FELLOWSHIPS, AND AWARDS

GTEAMS NSF GK-12 Fellowship *National Science Foundation*
Tech and Research Initiative Funding: Imaging Fellowship *State of Arizona, USA*

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| 2nd place poster Artificial and Computational Intelligence Conf. | *American Meteorological Soc.* |
| Optical Sciences Departmental Fellowship | *University of Arizona, USA* |
| Mathematics Departmental Award | *New Mexico Tech, USA* |
| Silver Scholarship | *New Mexico Tech, USA* |
| New Mexico Scholars Scholarship | *State of New Mexico, USA* |
| Tech Scholar | *New Mexico Tech, USA* |
| Student Appreciation Award for Student Body Service | *New Mexico Tech, USA* |

## PUBLICATIONS

J Song, IJ Vaughn, AS Alenin, and JS Tyo (2019) Imaging dynamic scenes with a spatio-temporally channeled polarimeter, *Opt. Express*

IJ Vaughn, JS Tyo (2019) Spatio-temporal hybrid color-polarization channeled sensors, *Proc. SPIE 11132, 111320K*

MC Polo, IJ Vaughn, T Kamal, and A Lambert (2019) Characterisation of Geosynchronous satellites through the Analysis of On-Sky Polarimetric Signatures obtained with a Micropolariser Array Image Sensor," in *Imaging and Applied Optics 2019 (COSI, IS, MATH, pcAOP)*

D Naughton, R Bedington, S Barraclough, Md. Islam, D Griffin, B Smith, J Kurtz, AS Alenin, IJ Vaughn, A Ramana, I Dimitrijevic, Z Tang, C Kurtsiefer, A Ling, and R Boyce (2018) Design considerations for an optical link supporting inter-satellite quantum key distribution, *Opt. Eng.*

IJ Vaughn, AS Alenin, JS Tyo (2018) Channeled spatio-temporal Stokes polarimeters, , *Opt. Letters.*

J Song, IJ Vaughn, AS Alenin, ME Gehm, JS Tyo (2018) Channel-first design of modulated polarimeters, *SPIE Vol. 10655*.

AW Kruse, AS Alenin, IJ Vaughn, JS Tyo (2018) Perceptually uniform color space for visualizing trivariate linear polarization imaging data. *Opt. Letters.*

AS Alenin, IJ Vaughn, JS Tyo (2018) Optimal bandwidth and systematic error of full-Stokes micropolarizer arrays. *Appl. Opt.*

IJ Vaughn, AS Alenin, JS Tyo (2017) A fast Stokes polarimeter: preliminary design. *SPIE Vol. 10407*.

AS Alenin, IJ Vaughn, JS Tyo (2017) A nine-channeled partial Mueller matrix polarimeter. *SPIE Vol. 10407*.

IJ Vaughn, AS Alenin, JS Tyo (2017) Statistical scene generation for polarimetric imaging systems. *preprint arXiv:1707.02723.*

AW Kruse, AS Alenin, IJ Vaughn, JS Tyo (2017) Polarization-color mapping strategies: catching up with color theory. *SPIE Vol. 10407*.

AS Alenin, IJ Vaughn, JS Tyo (2017) Optimal bandwidth micropolarizer arrays. *Opt. Letters*.

IJ Vaughn, AS Alenin, JS Tyo (2017) Focal plane filter array engineering I: rectangular lattices. *Opt. Express*.

M Cegarra-Polo, AS Alenin, IJ Vaughn, AJ Lambert (2016) GEO Satellite Characterization Through Polarimetry Using Simultaneous Observations from Nearby Optical Sensors. *AMOS*.

IJ Vaughn, AS Alenin, JS Tyo (2016) Bounds on the microanalyzer array assumption. *Proc. SPIE 9853, 98530W*.

AS Alenin, IJ Vaughn, JS Tyo (2016) Estimation of errors in partial Mueller matrix polarimeter calibration. *Proc. SPIE 9853, 98530T.*

F Snik, G van Harten, AS Alenin, IJ Vaughn, JS Tyo (2015) A multi-domain full-Stokes polarization

modulator that is efficient for 300-2500nm spectropolarimetry. *Proc. SPIE 9613, 96130G*.

IJ Vaughn, OG Rodríguez-Herrera, M Xu, JS Tyo (2015) A portable imaging Mueller matrix polarimeter based on a spatio-temporal modulation approach: theory and implementation. *Proc. SPIE 9613, 961312*.

IJ Vaughn, OG Rodríguez-Herrera, M Xu, JS Tyo (2015) Bandwidth and crosstalk considerations in a spatio-temporally modulated polarimeter. *Proc. SPIE 9613, 961305*.

T Wakayama, K Komaki, IJ Vaughn, JS Tyo, Y Otani, T Yoshizawa (2013) Evaluation of Mueller matrix of achromatic axially symmetric wave plate. *Proc. SPIE 8873, 88730P*.

IJ Vaughn, BG Hoover, JS Tyo (2012) Classification using active polarimetry. *Proc. SPIE 8364, 83640S*.

IJ Vaughn (2011) The imaging equation for a microgrid linear Stokes polarimeter. *Proc. SPIE 8160, 816008.*

SR Felker, JS Tyo, EA Ritchie, IJ Vaughn (2010) Support vector machine techniques to predict tropical cyclone re-intensification following extratropical transition. *AMS Conference on Hurricanes and Tropical Meteorology*.

IJ Vaughn, BG Hoover (2008) Noise reduction in a laser polarimeter based on discrete waveplate rotations. *Opt. Express 16, 2091-2108*.

## PRESENTATIONS AND POSTERS

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| Spatio-temporal hybrid color-polarization channeled sensors | SPIE 2019 |
| Hybrid Modulation Schemes for Adaptive Polarimetry (for J Song) | SPIE 2019 |
| A fast Stokes polarimeter: preliminary design | SPIE 2017 |
| Temporal focal plane filter arrays | SPIE 2017 |
| Bounds on the microanalyzer array assumption | SPIE 2016 |
| Spatio-temporal imaging Mueller matrix polarimeter theory | SPIE 2015 |
| A portable imaging Mueller matrix polarimeter | SPIE 2015 |
| Classification using active polarimetery | SPIE 2012 |
| The imaging equation for a microgrid linear Stokes polarimeter | SPIE 2011 |
| Machine learning techniques to analyze extra-tropical transition | AMS 2011 |
| Demonstrations of noise- and error-reduction in a laser polarimeter | SPIE 2007 |

## TECHNICAL, WHITE, AND WORKING PAPERS

A short introduction to one parameter semigroups
Retardance correction of IR zero-order waveplates (with B. G. Hoover)
Issues in imaging false alarm rates when using per pixel classification
Empirical Risk in Terms of ROC variables
Support vector machine parameter description

## REFEREES

Available upon request