Joshua Monroe Kvavle

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Mission

To lead with my vision, passion, kindness and creativity to make advances in technology that augment human potential, health, and well-being.

Experience

Advanced Photonic Technologies Branch Head, Augmented Reality, and Kill Chains - (2020-Present) NIWC PAC

- Supervised a Branch of 24 technologists working on 20+ independent projects focused on advanced photonic technology research in the areas of: optical communications, high power lasers, quantum optics, non-linear optics, RF photonics, optical comms with low-earth orbit satellites, machine learning applied to inverse photonic device design and underwater sensor fusion.
    - Business Development – work with Principal Investigators to develop vision, strategy, and near, mid and long term business development strategy for their research.
    - Facility Stewardship – Overarching management of 18,000 sq. foot lab facility including space usage, upgrades, and repairs.
    - People development – cultivated branch members potential for promotion, developed award nominations, held one-on-one for performance evaluation and personal development, coaching, and career counseling.
    - Corporate engagement – coordinated engagement of my branch in corporate outreach in the 5000+ person organization, relaying important information and requirements and protecting them from the bureaucracy as much as possible.
- Led a team of eight technologists to create a prototype augmented reality system which connects to ship systems, extracts important information, and then overlays that information virtually on the real-world. The project aims to reduce decision making time and decrease errors that lead to mishaps at sea. The team employs user-centered design and human testing for feedback on the user interface.
- Led the development of a process an Intelligent Autonomous Systems roadmap undertaken by the Office of Naval Research. Coordinated virtual brainstorming sessions, created virtual workshop boards in MIRO, trained ideation workshop facilitators, and wrote facilitator playbook.
- Co-led NIWC Pacific's Ideation Realization Initiative which aims to encourage more innovative thinking and the generation of "big" ideas.
- Led a workforce development effort aimed educating and ideating on the opportunities and gaps in kill chains – aiming to increase the number of people who can trace the path of an electron from decision to action.

Deputy Director of BEMR, STAC Dep 55 Rep, Grassroots S&T Mentor, Photonics Support (2018-2020) – NIWC PAC

- Acted as Deputy Director of the Battlespace Exploitation of Mixed Reality (BEMR) Lab, leads the development of the Mixed Reality R&D vision, engages with VIPs, and works to build business in the area of Mixed Reality.
- Led and manages multiple cross-organizational Navy level projects with high visibility as the Deputy Director for the BEMR Lab with indirect oversight of a portfolio of over $4M in FY19.
- Led, mentors, and provides technical oversight of 20+ scientists and engineers and active duty sailor volunteers in the area of mixed reality, with a portfolio of $1.2M dollars of direct oversight in FY19.

- Managed and Led ONR, DTRA, NHRC, DASN T&E (ASNRDA), NISE funded efforts in Augmented and Virtual reality which aim to provide a virtual overlay of information on the real world, ingest and display sensor data for improved decision making during ship transits (ASTRID), assist with forward observer remote communications(Virtual Scientist), improve access to vestibular therapy(VR4VPT), develop a 21st century update to the MIL STD 2525D(NEMS), developed an augmented reality battlespace visualization tool connected to NGTS (MKR), represented BEMR in a cross warfare center initiative aimed at developing a common AR interface for a broad range of maintenance activities (SMART).
- Reinvigorated the Navy Augmented Reality Community by establishing NARC Organzing Council and established renewed purpose and engagement.
- Initiated role as mentor to Grassroots S&T Council.
- Represented Networks and Communications Department on the Science and Technology Advisory Committee.

ONRG Global Technology Awareness Science Director in Latin America (2016-2018)

- Built and managed a portfolio of basic international research in Latin American countries which included work in non-linear dynamics, twisted light, mathematical algorithms, trust in autonomy, and chemistry.
- Interfaced with ONR as a thought partner, and represented the US Navy to Academic, Industry and Government institutions at the highest levels.
- Led the development of an ONRG Latin America regional strategy which took into account the challenges and opportunities unique to the region and aligned with ONRG objectives.

BEMR, NARC, Deputy Business Portfolio Manager for Discovery and Invention (2015-2016) – NIWC PAC

- Initiated collaboration with Institute for Creative Technology which led to the establishment of the ONR Swampworks funded Battlespace Exploitation of Mixed Reality (BEMR) Lab.
- Established cooperative research and development agreement (CRADA) with DAQRI and connected them with the Athena Project, resulting in GUNNAR winning the innovation jam a led its initial development of the Gunnar Project.
- Served as a rotational Deputy Portfolio Council Manager for the Discovery and Invention Portfolio.
- Established the Navy Augmented Reality Community (NARC) and developed a roadmap for Augmented Reality in the Navy with contributions from sailors, industry partners, and warfare centers across the NR&DE.

CNO's Rapid Innovation Cell, Athena Board Representative (2014-2015) – NIWC PAC

- Bridged NIWC PAC's technologists with emerging trends in active duty innovation and disruptive technology happening at NWDC and USS Benfold.
- Was invited to be the only civilian representative on the CNO's rapid innovation cell (CRIC), tasked with making the Navy better by thinking broadly, traveling widely, and developing new concepts.
- Communicated observed trends in technology and Naval innovation regularly with NIWC that was gained while working with the CRIC, and served as a hub for an increasing network between sailors and technologists.
- Directed the exploration of how Augmented Reality could be applied to Navy Problems by leading workshops with hundreds of sailors and developing concepts that were briefed directly to CNO, and led the development of a Google Glass Application for maintenance that was demonstrated on a USN aircraft carrier.
- Enabled ADM Harris to use of Google Glass during his AFCEA West speech in 2014.
- Served on the Athena Board which aimed to give voice to sailors seeking solutions to their problems.

Grassroots S&T Founder, Learn Warfighter Needs, Grassroots S&T Liaison to APEO (2012-2014) – NIWC PAC

- Founded the Grassroots S&T community, and led effort to understand that community's knowledge, skills abilities, and attitudes, and developed a curriculum, a written guide, and a blog as resources that could fill gaps in those KSA's.
- Helped create a culture of initiative, personal improvement and collaboration across NIWC PAC which inspired the development of other communities such as the Machine Learning community, and the LOF.
- Created partnerships where there was gap between technologists, acquisition professionals and warfighters.
- Acted as liaison to the APEO for S&T by attending meeting of the APEO and the APM's for S&T, interviewing the APM's, sharing insights gained with the S&T workforce, and encouraging greater engagement with headquarters.
- Led a workshop focused on Learning Warfighter Needs that paired sailors from USS Benfold with technologists. Ideas generated from this workshop have resulted in projects, and patents.

Basic Circuit Analysis Online Instructor (2013) – Electrical and Computer Engineering Department, BYU Idaho

- Facilitated the first BYU-I Online Basic Electrical Circuit Analysis Course. Pioneered the first online lab instructs for the hands-on experimental component of course, held recitations for homework and lab questions, graded labs, homework assignments, quizzes and tests.

Project Manager DARPA funding, ONR funding, and NISE Funds (2009-2012) – NIWC PAC

- Managed over $1.5M as a principal investigator in Augmented Reality, RF Photonics, Non-linear Optics, and Workforce Development, Leading over 50 cross-disciplinary contributors in those projects.
- Served on the CO/ED Board of Advisors for SSC Pacific with a focus on improving strategic communications across the organization.
- Developed first lab bench prototype of RF Channelizer System which resulted in transitional funding from ONR Code 31's Peter Craig.

New Professional with Advanced Photonic Technologies (2009) – NIWC PAC

- Established PhD representative position on the New Professional Steering Committee to address unique challenges and requirements for incoming PhD's to SSC Pacific. Met individually with each incoming PhD.
- Managed grants/seedlings as Contracting Officer's Representative for DARPA MTO.
- Contributed technical expertise in the areas of photovoltaics, low loss waveguides, silicon microsphere characterization, RF Photonics, RF signal synthesis, and optical filter design.

High Power Microwave Weapon Sensor Research (2005 – 2009) Brigham Young University, Provo, UT

- Led the development of an electric field sensor system based on hybrid D-fiber/polymer fiber waveguides. Developed waveguide propagation models and verified them by experiment. Initiated investigation into and developed in-situ monitoring tools to understand properties of electro-optic polymers when poled resulting in maximum device performance. Conceived of and developed process for depositing electro-optic polymer via ink-jetting vice spin coating. Conceived of and developed low loss fusion splicing method for connecting D-fiber to commercially compatible PM fiber. Conceived of and developed process for writing surface relief diffraction gratings into the core of a D-fiber. Collaborated with other research groups during gaps in research funding, and further expanded experience into vertically coupled fiber to chip SOI grating couplers, alternative facet preparations for SOI, and cold cathode field triode emitters.

Process Engineer Intern (2003, 2005) – Intel, Ocotillo, AZ

- Motivated a course change by initiating an analysis of a controversial toolset for high volume manufacturing yield improvement. Created a scanning electron microscope recipe automation tool, and designed and implemented a web interface to automate engineering data collection and analysis to save colleagues 30+ hours for each process or equipment change.

Microfabrication and Optics Undergraduate Research (2002 – 2005) - Brigham Young University, Provo, UT

- Led the design and fabrication of waveguide structures, diffraction gratings, research in holographically patterned gratings, and thin film interference pictures.

Mine Engineer Intern (2002) - Transalta, Centralia, WA

- Developed deep understanding of mine engineer challenges, created a tool that automated the generation of required government reports, and created databases to populate reports thus saving engineers 20+ hours per month of tedious paperwork.

Education

Ph.D. Electrical Engineering, August 2009
Brigham Young University, Provo, UT
Dissertation: "A System Level Approach to D-fiber Electric Field Sensing"

B.S. Electrical Engineering, April 2005
Brigham Young University, Provo, UT

Ph.D. Coursework

- Optical Communications
- Antennas and Propagation
- Optoelectronic Devices
- Advanced Optical Engineering
- EM Wave Theory
- Physical Optics
- Technical Writing
- Thin-Film Physics
- Quantum Mechanics
- MEMs
- SEM Theory and Operation
- Semiconductor Device Physics

Publications

1. J. Kvavle, et al. "Augmented Reality in the US Navy: A Roadmap," SSC Pacific Technical Report, Sept 2015
2. Pascoguin, B N ; Lu, R P ; Kvavle, J M ; Ramirez, A D, "Road to Silicon Microsphere Fabrication and Mode Coupling," SSC Pacific Technical Report, July 2014
3. J. Kvavle, et al. "An S&T Guide for New Professionals," SSC Pacific Technical Report, September 2013
4. Lu, Ryan P ; Huynh, Christopher K ; Kvavle, Joshua M ; Ramirez, Ayax D, "Microsphere Formation Using an Excimer Laser," SSC Pacific Technical Document, May 2012
5. Brès, C.-S.; Zlatanovic, S.; Wiberg, A.O.J.; Adleman, J.R.; Huynh, C.K.; Jacobs, E.W.; Kvavle, J.M.; Radic, S.; , "Parametric Photonic Channelized RF Receiver," Photonics Technology Letters, IEEE , vol.23, no.6, pp.344-346, March 15, 2011
6. J. Kvavle, J. Young, E. Gutierrez, S. Schultz, R. Selfridge, "Robust Non-Intrusive In-Fiber Electric Field Sensors", IEEE Sensors, Vol. 11 Issue 9, pp. 2057 - 2064 (2011)
7. J. Kvavle, S. Schultz, R. Selfridge, "Ink Jetting of AJL8/APC for D-fiber Electric Field Sensors", Applied Optics, Vol. 48 Issue 28, pp.5280-5286 (2009)
8. J. Kvavle, S. Schultz, and R. Selfridge, "Low loss elliptical core D-fiber to PANDA fiber fusion splicing," Opt. Express 16, 13552-13559 (2008).
9. E. Johnson, J. Kvavle, R. Selfridge, S. Schultz, R. Forber, W. Wang, and D. Zang, "Electric field sensing with a hybrid polymer/glass fiber," Appl. Opt. 46, 6953-6958 (2007).
10. R. Gibson, J. Kvavle, R. Selfridge, and S. Schultz, "Improved sensing performance of D-fiber/planar waveguide couplers," Opt. Express 15, 2139-2144 (2007).
11. J. Kvavle, C. Bell, J. Henrie, S. Schultz, and A. Hawkins, "Improvement to reflective dielectric film color pictures," Opt. Express 12, 5789-5794 (2004).

Conferences

1. "Augmented Ship Transits for Improved Decision-making,"
2. J. Kvavle "An Augmented Navy," Augmented World Expo, San Jose, May 2015

3. J. Kvavle “Learning from Warfighters,” Defense Entrepreneur’s Forum San Diego, March 2015
4. J. Steinman, & J. Kvavle, “Ocean Augmented Reality,” AFCEA West, February 2015
5. J. Steinman, & J. Kvavle, “Ocean Augmented Reality,” ONR S&T Expo, February 2015
6. J. R. Adleman, S. Zlatanovic, J. M. Kvavle, B. M. L. Pascoguin, E. W. Jacobs, “High finesse compound optical ring filter for parametric multicasting RF channelization,” Microwave Photonics (MWP), 2013 International Topical Meeting on, October 2013
7. J. Kvavle, & Panel, “Doing More with Less,” Human Capital Management Defense, March 2012
8. Zlatanovic, Huynh, Kvavle, Adleman, Williams, Wiberg,Tong, Kuo, Myslivets,Radic, Jacobs, “Sensitivity and Dynamic Range of a Wideband RF Analyzer Based on Parametric Multicasting,” Photonics Conference IPC (May 2012)
9. J.M. Kvavle, J.R. Adleman, C.K. Huynh, C-S. Brès, S. Zlatanovic, A.O.J. Wiberg, B.P.P. Kuo, E. Myslivets, S. Radic and E.W. Jacobs, " Optical Domain Wideband RF Spectrum Analysis Using Parametric Mixing", CLEO 2011, Baltimore, MD, USA, May 2011, paper CThR3.
10. R. H. Selfridge, S. Schultz, J. Kvavle, T. Lowder, R. Gibson, Multi-use D-fiber sensors. Proc. SPIE 7982, Smart Sensor Phenomena, Technology, Networks, and Systems 2011, 79820P (April 2011);
11. A. Balls, L. Pei, J Kvavle, A. Sieler, S. Schultz, M. Linford, R. Vanfleet, R. Davis, “Interference Lithography for Vertical Photovoltaics,”
12. J. Kvavle, E. Johnson, R. Selfridge, S. Schultz, R. Forber, W. Wang, and D. Zang, "Hybrid Polymer/Fiber Waveguide for Electric Field Sensing," Proceeding IPNRA, ITuE6 (2007)
13. E. Johnson, J. Kvavle, R. Selfridge, S. Schultz, Richard Forber, Wen Wang, and De Yu Zang, “Electric field sensor based on core-replaced optical D-fiber,” Proc. SPIE 6525 (2007)

Patents

1. Josh Kvavle, “Method for Determining the Rotation Rate of a Resonator Using a Periodic Frequency Comb,” USN Patent Application #102095 filed with US Patent Office, March 2013
2. J. Kvavle, “Optical Phase Locking System and Method for a Resonant Fiber Optic Gyroscope,” USN Patent Application #101770 filed with US Patent Office, January 2013
3. Josh Kvavle, “System and Method for Detecting Frequency Shifts in Optical Resonances Using a Frequency Comb and Resonant Fiber Optic Gyroscope,” filed with US Patent Office USN Patent Application #101439 filed with US Patent Office, October 2012
4. JM Kvavle, JR Adleman, CK Huynh, C-S Bres, S Zlatanovic, AOJ Wiberg, PP Kuo, E Myslivets, EW Jacobs, S Radic, “Optical domain wideband RF spectrum analyzer/channelizer based on third-order nonlinear mixing,” US 8611759 B1, Feb 2012
5. Ryan P. Lu, Christopher K. Huynh, Ayax D. Ramirez, Joshua M. Kvavle, “Reusable biochemical agent sensor and method using optical micro-resonator grid arrays”, US 8437591 B1, June 2011

Professional Involvement and Affiliations

- Member: OSA (2007-2020) - OSA Display Group Executive Committee Member (2015- 2018)
- IEEE (2003-present) - Member of working group aimed at developing AR Standards (2015)
- Navy Athena Project Board (2014-2016)
- Navy Augmented Reality Community – founder (2015-2016, 2018-2020)
- Toastmasters - Competent Communicator (2012)
- Brigham Young University IEEE Student Branch Chair (2004-2005)
- Brigham Young University IEEE Student Branch Treasurer (2003-2004)

Community Involvement and Activities

- Big Brother at Big Brothers Big Sister of America (2019 – 2020)
- Lego League Junior Coach (2016-2017)
- Mentored 4 SEAP and 3 NREIP Interns and 3 SDSUF Interns at SSC Pacific
- Foster/Adoptive Parent - San Diego County (11 newborns and toddlers) (2010-2016)
- Boy Scouts of America – Scoutmaster in San Diego Imperial Council Troops 533 & 386 (2012-2016)

- Science, Technology, Engineering and Math (STEM) Outreach (2010 to 2016)
- Brigham Young University Swing Kids Club Treasurer (2003-2004)
- BYU Swing Dance Team (2003)
- Brigham Young University Folk Dance Team (2002)
- ACCESS (Big Brother/Big Sister) Volunteer (98-99, 2001-2003)
- LDS Mission, Curitiba, Brazil (1999-2001)
- Brigham Young University Student Service Organization (1998-1999)

Honors and Awards

- Promoted to ND 5 (GS 15) based on sustained technical performance and contributions (2020)
- Navy Meritorious Civilian Service Award (2019)
- PI for Gunnar - SECNAV Innovation Award Winner (2017)
- SSC Pacific Center Team Achievement Award BEMR Team (2015)
- SSC Pacific Center Team Achievement Award RF Photonics Team (2015)
- SES Challenge Coin from Dr. Steve Russell (2014)
- SSC Pacific Exemplary Achievement Award (2013)
- Team SPAWAR Innovation Award – Grassroots S&T (2012)
- New Professional Steering Committee Most Valuable Representative (2012)
- SSC Pacific “On-the-Spot-Award” (2011)
- Eta Kappa Nu - National Electrical and Computer Engineering Honor Society member (2003)
- University Scholar Scholarship, Brigham Young University (1998-1999)
- Boy Scouts of America Eagle Scout (1997)