

Aaron J. Pung, Ph.D.

Data Scientist / Signal Processing Eng.

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I am a Data Scientist with 10+ years of experience in data fusion, unstructured data analysis, and machine learning (ML). My expertise in solving complex problems has been recognized internationally through U.S.-U.K. collaboration awards, an R&D100 Award, and high-impact peer-reviewed publications. My passion to innovate and solve real-world problems is evidenced by four sole-author patents.

Employment

Sr. Data Scientist (Signal proc.)	Slingshot Aerospace	10/2022 - Present
Sr. Data Scientist (RF analysis)	Space Dynamics Laboratory	09/2020 - 10/2022
Optical Engineer	Sandia National Laboratories	01/2015 - 09/2020

Expertise

AI / ML

- Developed low-latency ML solutions to scrape, process, and predict localized fog presence based on publicly available data, achieving 93.6% precision
- Constructed ML-enhanced software to collect and process large atmospheric and optical sensor datasets, increasing overall data volume intake by 35%
- Explored ML solutions for real-time detection and classification of ionosphere layer strength, topology, and evolution
- Automated optical character recognition (OCR) pipelines to convert autobiography images to text for large language model (LLM) sentiment analysis

Data Analytics

- Designed and implemented algorithms to identify anomalous behavior in streaming SATCOM data, enabling pattern-of-life predictions of ground- and space-based transmitters
- Engineered software tools to scrape measurements and predictions from a mesonet of APIs and personal weather stations, resulting in a real-time comparison of location-specific metrics
- Matured, automated, and maintained containerized tools to pull, process, and analyze real-time RF satellite data from Amazon Web Services (AWS), reducing analysis runtime by 250%
- Developed a multispectral image analysis pipeline to process streaming *in vivo* imagery, resulting in a revolutionary non-invasive tumor cell identification capability

RF Modeling / Threat detection

- Developed and deployed a Radiation And Trajectory Simulator (RATS) capable of modeling RADAR jammers, spoofers, and directed energy against ground and space vehicles
- Performed antenna design verification and validation in Python, significantly increasing the realism of RATS simulations across multiple RF frequency bands
- Assessed and enhanced signal processing algorithms to target and track hypersonic vehicles, increasing detection performance of on-orbit and ground-based optical systems

- Restructured image processing algorithms to ingest and clean streaming SATCOM data, resulting in a revolutionary technique to interpret passively intercepted communication data
- Developed pipelines to gather, fuse, and process detonation data from plenoptic, multispectral, and hyperspectral imaging systems, improving on-orbit discrimination of illegal weapons testing
- Created algorithms to scrape and process RF data from passively monitored over-the-horizon RADAR (OTHR) systems, increasing overall system efficiency and awareness by 300%
- Established signal processing routines to ingest, align, and interpret hyperspectral time-series plant imagery, providing an early-warning system for crop-based chemical detection

Patents

U.S. Patent US20230176261A1	Uniaxial Optical Multi-Measurement Imaging System	10/26/22
U.S. Patent US20230179843A1	Aperture Stop Exploitation Camera	09/28/22
U.S. Patent US20230175952A1	Uniaxial Optical Multi-Measurement Sensor	12/02/21
U.S. Patent 11761750	Multi-environment Rayleigh Interferometer	09/19/23
U.S. Patent 16369218	Optical Devices Enabled by Vert. Diel. Mie Resonators	05/05/21

Publications (Journal)

Aaron J. Pung, "[Computational analysis of a scalable optically homogeneous free-space interferometer](#)," J. Opt. Soc. Am. A 40, 1789-1796 (2023)

Aaron J. Pung, "[Capturing multiple full-scene images with a single camera via aperture stop exploitation](#)," J. Opt. Soc. Am. A 39, 1456-1461 (2022)

S. Campione, **A. J. Pung**, L. K. Warne, W. L. Langston, T. Mei, and H. G. Hudson, "[Validation of Shielded Cable Modeling in Xyce Based on Transmission-Line Theory](#)," Progress In Electromagnetics Research Letters, Vol. 87, 51-57 (2019)

Goldflam, Michael, et al. "[Nanoantenna-Enhanced Resonant Detectors for Improved Infrared Detector Performance](#)". United States, 2020.

(Full list available on website)

Education

Doctorate of Philosophy	Photonic Science	Clemson University	2013
Master of Science	Optical Engineering	Univ. of North Carolina	2011
Bachelor of Science	Physics	Kansas State University	2008

Volunteerism

Civil Air Patrol	Pilot / Squadron II Commander	2017 – 2023
Optical Society of America (OSA)	Special Topics SME	2018 – 2020
American Red Cross	Image processing SME	2020 – 2022