

JACK LAWRENCE

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OBJECTIVES

Astrophysicist and machine vision engineer looking to outperform the current generation of engineers by applying a physics-based mindset to novel machine learning applications, optics systems, and research.

SKILLS

Programming:	C/C++, Python, PyTorch, Tensorflow, Qt, Arduino, L ^A T _E X, MATLAB, Mathematica, Teach Pendant
Software:	Autodesk Inventor, OnShape, <i>myme</i> , Microsoft Office, Google Suite, Atlassian Suite, Adobe Photoshop, Connected Components Workbench, waveSharp (RegiStax6)
Experimental:	γ -Ray Spectroscopy, HPGe Detector Upkeep & Maintenance, Solar Telescope Configuration & Maintenance, Background Subtraction and Signal Tuning, Data Acquisition System Development, NIM/VME System Design, Vacuum and Cryo System Design
Other:	Computational Image Processing, Signal Tracing, Supervised and Unsupervised ML Construction, Monte Carlo Simulation, Dead-time Measurement, Electrical Fault Diagnosis and Repair, 3D Design and Printing, PLC Configuration

EXPERIENCE

Vision Technician UnitX Labs	Nov 2023 - Present Santa Clara, CA, USA
<ul style="list-style-type: none">• Develop and manage over 19 unique machine vision solutions for customers across manufacturing industries (eg: automotive, medical, semiconductor, etc.)• Design and build imaging and lighting systems with robotic arm (Fanuc) and PLC integration for automated assembly• Train neural networks (AI) for defect detection with custom integrated image pre-processing and post-processing scripts• Create deep clustering algorithms for improved defect detection• Build custom image preprocessing scripts (ie filtering, sharpening, computational stacking) to optimize inspection• Conduct HIL tests on custom integrated solutions• Test lenses, filters, and wavelengths for optimal image capture• Troubleshooting communication between software, light controllers, and PLCs• Create CAD of machine visions solutions including custom components for camera and light fixturing and prototype printing	
DAQ System Developer - SULI Sponsorship Lawrence Livermore National Laboratory - Nuclear Criticality Safety Division	May 2023 - Sept 2023 Livermore, CA, USA
<ul style="list-style-type: none">• Utilized custom neural networks trained with real and simulated data for accurate dead-time corrections and background subtraction• Developed DAQ system with reduced dead-time and live data-analysis capabilities• Configured DAQ software with PLC and irradiated sample transport system for time-synced spectroscopy• Designed unique experiments with radiation detectors, scintillators and PMTs for DAQ system validation• Maintained and repaired detectors and vacuum equipment• Configured DAQ system on a private, offline server• Maintained basic clearance, and utilized the proper methods for sharing/censoring information• Cooled detectors with liquid nitrogen daily to maintain a noise-free signal environment• Kept detailed notes of all tasks performs to track issues and changes, as well as increase project reproducibility• Compiled DAQ system development and experiments into a detailed report submitted to the DOE through SULI• Attended weekly lectures from research groups around the laboratory	
Astronomy Instrumentation Engineer - Undergrad Research Morehead Planetarium & Science Center	Oct 2022 - April 2023 Chapel Hill, NC, USA
<ul style="list-style-type: none">• Stationed an H-Alpha telescope on planetarium roof-deck to allow Morehead Planetarium to sponsor stellar research• Constructed plastic and aluminum telescope enclosure with servo-controlled hood for protection from the environment• Designed custom circuitry and servo system for remote telescope etalon tuning	

- Implemented a Raspberry Pi and virtual desktop to remote control image capture, stacking, and filtering to produce consistently high resolution images of the Sun

DAQ Software Developer - DSTI Sponsorship

May 2022 - Aug 2022

Lawrence Livermore National Laboratory - Nuclear Criticality Safety Division

Livermore, CA, USA

- Developed DAQ system with reduced dead-time and live data-analysis capabilities
- Improved detector readout capability through added spectroscopy windows
- Increased DAQ system flexibility to streamline the unification of multi-detector systems
- Cooled detectors with liquid nitrogen daily to maintain a noise-free signal environment

DAQ Software Developer - Undergrad Research

Jan 2021 - May 2022

Triangle Universities Nuclear Laboratory - LENA & The Tandem Laboratory

Durham, NC, USA

- Developed open-source DAQ software to improve flexibility and usability for TUNL research projects
- Performed comparative dead-time tests on various DAQ programs and which led to the lab-wide adoption a new DAQ software for nuclear experimentation
- Became the TUNL point of contact for modern nuclear DAQ software as older programs were phased out
- Constructed efficient, clock-synced data streams from detectors to NIM modules to software

EDUCATION

Bachelor of Science, Astrophysics*, University of North Carolina at Chapel Hill

Aug 2019 - May 2023

*minor in English

TRAINING & CERTIFICATION

DOE Certificate of Core Radiological Training

May 2021 - May 2025

Radiation Worker I

DOE Certificate of Core Radiological Training

May 2023 - May 2025

Radiation Worker II

Machine Learning, Stanford University & DeepLearning.AI (ID RTBETC4ZVQL1)

Jan 2025

Supervised Machine Learning: Regression and Classification (ID ECE4CZYJPANU)

Advanced Learning Algorithms (ID BQMYKWB6MF9B)

Unsupervised Learning, Recommenders, Reinforcement Learning (ID FLWZPO1N9WEY)

PUBLICATIONS

- 1 J.Garcia-Duarte, Y. Mishnayot, A. S. Tamashiro, **J. R. Lawrence**, and J. T. Harke, "Innovative dead-time correction and background subtraction for neutron multiplicity measurements using neural networks", Scientific Reports 14, Available online ([here](#)), 7579 (2024).

AFFILIATIONS

OutLoud Sports

Aug 2023 - Jan 2024

An LGBTQ+ sports league that fosters a safe community for queer athletes and hosts charity events for underprivileged members of the queer community

UNC Society for Physics Students, Student Member

Jan 2019 - May 2023

A chapter based society that exists to help students transform themselves into contributing members of the professional Physics community

UNC Physics Foundations Seminary, External Liaison

Jan 2021 - Jan 2022

A student-led organization hosting faculty and guest speakers to teach foundational physics topics, promoting understanding and engagement for both majors and non-majors

UNC Running Club, Member, Travel Coordinator

Aug 2019 - May 2023

A student-led club affiliated with the National Intercollegiate Running Club Association that connects a community of student runners, providing training and registration resources for affiliate and non-affiliate races