

Eric Wait

Low-level systems programming | GPU acceleration | Signal processing | Technical leadership

Education

- 2019 **Ph.D. in Electrical and Computer Engineering**, *Drexel University*, Philadelphia, PA
Dissertation: *5D GPU Accelerated Analysis, Visualization, and UI for Biological Microscopy Applications*.
Engineered signal-processing algorithms in C/C++, CUDA, DirectX, MATLAB, and Python for large-scale data analysis, leveraging numerical optimization and real-time visualization to maximize accuracy and speed.
- 2012 **M.S. in Computer Science**, *University of Wisconsin*, Milwaukee, WI
Thesis: *Visualization and Correction of Auto-Segmentation, Tracking, and Lineage of Stem Cells from Images*.
Engineered low-level algorithms in C/C++ and MATLAB for large-scale multidimensional data analysis, leveraging numerical optimization and real-time visualization with interactive UI to maximize accuracy and speed.
- 2010 **B.S. in Computer Science**, *University of Wisconsin*, Milwaukee, WI

Work Experiences

- 2021–2025 **Principal Data Scientist**, *Elephas Biosciences*, Madison, WI
Led cross-platform C/C++/C# systems development, advanced signal processing, and interdisciplinary teams to deliver high-performance imaging solutions for research and field deployment.
- Engineered GPU-accelerated C/C++ libraries for terabyte-scale image processing and device control; exposed APIs to Python, MATLAB, and C# to unify pipelines and cut analysis runtime by 60%.
 - Optimized multi-threaded algorithms and memory layouts for high-throughput analysis across heterogeneous compute environments.
 - Directed cross-functional teams spanning biology, engineering, and software, translating research needs into robust technical solutions adopted across multiple lab sites.
 - Instituted validation workflows ensuring reproducibility, regulatory alignment, and stakeholder consensus.
- 2017–2021 **Data Scientist**, *HHMI, Janelia Research Campus*, Ashburn, VA, Advanced Imaging Center
Applied low-level programming, GPU optimization, and signal processing to massive time-lapse imaging datasets; guided researchers toward impactful experimental designs using advanced microscopes.
- Built DirectX and CUDA pipelines for multi-dimensional image visualization and preprocessing, leveraging a unified codebase that scaled dynamically from laptops to HPC clusters.
 - Engineered GPU-accelerated feature extraction and tracking algorithms handling hundreds of terabytes of imaging data, achieving multi-fold speedups over prior workflows.
 - Advised on experimental designs to ensure biological relevance while maximizing cutting-edge imaging systems.
- 2015–2019 **High Performance Computing Consultant**, *Winter Wait Consulting LLC*, Sterling, VA
Developed and deployed optimized solvers for large-scale transportation problems, emphasizing memory efficiency and algorithmic optimality; trained and guided teams across technical and strategic domains.
- Implemented custom C/C++ and Python optimization routines in collaboration with mathematicians, applying advanced combinatorial methods to achieve multi-fold performance improvements in solver throughput.
 - Engineered parallelization and vectorization strategies across heterogeneous compute environments, reducing runtime for large-scale logistics models from days to hours.
 - Advised senior leadership on solution architecture and HPC resource allocation for global logistics modeling.
 - Mentored developers in solver design, memory management, and performance tuning for distributed systems.
- 1998–2019 **Command Post Superintendent**, *Air National Guard*, Minneapolis, MN
Held **Top Secret** clearance. Led mission-critical communication and coordination between senior leadership and HQ during wartime and humanitarian operations. Supervised and trained personnel in Command and Control protocols, developed Air Force-wide training systems, and streamlined classified information workflows under high-pressure conditions.
- 2012–2017 **Ph.D. Research Assistant**, *Drexel University*, Philadelphia, PA, Dr. Andrew Cohen's lab
- 2011–2012 **M.S. Research Assistant**, *University of Wisconsin*, Milwaukee, WI, Dr. Andrew Cohen's lab

Professional Skills

Extensive experience across low-level programming, GPU acceleration, hardware integration, and modern development workflows — spanning research, deployment, and creative prototyping.

Languages C/C++/C#, Python, MATLAB, Mathematica, Java, LISP, Perl, SQL, CUDA, DirectX, OpenGL

Tools VSCode, Visual Studio, Eclipse, Git/Subversion, Emacs/Vi, Jupyter, Jira, Copilot, ChatGPT, Claude

Hardware Embedded systems, custom workstation/server builds, RAID/NAS systems, multi-CPU/GPU setups, redundant architectures, advanced and stereoscopic display arrays

Vis & Design Photoshop, Premiere, Illustrator, Blender, Figma, Imaris, Dragonfly, visual pipeline planning

DevOps CMake, Ninja, Azure Pipelines, GitHub Actions, Conda, vcpkg, NuGet

Service

2020-2021 **Review Editor**, *Frontiers in Bioinformatics*

2020-2021 **DEI Committee Member**, *HHMI President's Office*

2019-2020 **Webinar Coordinator and Technical Support**, *Imaging Africa*

2018-2021 **Crisis Action Team Advisor**, *Janelia Research Campus*

Patents

2019 Cohen, A., Dion, G., Winter, M., **Wait, E.**, Koerner, M., *Finger-worn Device with Compliant Textile Regions*, US 10,466,784

Cohen, A., Dion, G., Winter, M., **Wait, E.**, Koerner, M., *Wearable Devices, Wearable Robotic Devices, Gloves, and Systems, Methods, and Computer Program Products Interacting with the Same*, US 10,248,200

2016 Bailey, T., Colletti, B., **Wait, E.**, King, A., Gandhi, B., *Parallel Processing for Solution Space Partitions*, US 20160335568A1

Honors

2015 **Koerner Family Fellowship**, *Drexel University*, Philadelphia, PA

2014 & 2019 **Meritorious Service Medal**, *United States Air Force*, Minneapolis, MN
Highest peacetime award given to senior non-commissioned officers.

Invited Talks

2020 **Speaking Qualitatively: Effectively communicating your research**, *Inaugural Pair-up Meeting for Black American Biologists*

2019 **Quantifying Cellular “Dynamics”: A conversation between Biologists and a Data Scientist**, *Syracuse University*

2017 **GPU Processing and Visual Validation of Lattice Lightsheet Data (with bonus 3D Kymographs)**, *Janelia Research Campus*

2015 **Collaborative Visualization in the Browser for Segmentation, Tracking, and Lineaging with 5-D Biological Microscopy Images**, *Bioinformatics Conference*
Normalized Covariance Image Stitching Technique for Rigid Registration of Microscope Tiles, *Bioinformatics Conference*

2014 **Visualization and Correction of Automated Segmentation, Tracking and Lineaging from 5-D Stem Cell Image Sequences**, *4th Symposium on Biological Data Visualization*, Boston, MA
Communal Stereoscopic Visualization of 5-D Fluorescence Images with Segmentation Embedded, *Neural Stem Cell Institute*, Albany, NY

Publications

Select authored and co-authored publications in high-impact journals spanning imaging, computation, and interdisciplinary science. Full list with links at <https://ericwait.com/pubs>

- 2024 Liu C. et al., **Wait E.**, Assessing cell viability with dynamic optical coherence microscopy, ***Biomedical Optics Express*** — optical imaging, cell viability
- 2023 Sinclair R. et al., **Wait E.**, Spatiotemporal dynamics of cell plate development during plant cytokinesis, ***Molecular Biology of the Cell*** — live-cell imaging, plant biology
- Sinclair R. et al., **Wait E.**, 4D quantitative analysis of cell plate development in Arabidopsis using lattice light sheet microscopy, ***Journal of Experimental Botany*** — 4D imaging, growth-phase analysis
- 2022 Hari-Gupta Y. et al., **Wait E.**, Myosin VI regulates spatial organisation of mammalian transcription initiation, ***Nature Communications*** — molecular motor regulation
- Dos Santos Á. et al., **Wait E.**, Binding partners regulate unfolding of myosin VI to activate the molecular motor, ***Biochemical Journal***
- Colin-York H. et al., **Wait E.**, Quantifying molecular dynamics within complex cellular morphologies using LLSM-FRAP, ***Small Methods***
- 2021 Moore A. et al., **Wait E.**, Actin cables and comet tails organize mitochondrial networks in mitosis, ***Nature*** — mitochondrial organization
- Zhao X. et al., **Wait E.**, 3D image analysis of the ventricular-subventricular zone stem cell niche, ***Stem Cell Reports***
- 2020 **Wait E.**, Reiche M., Chew T., Hypothesis-driven quantitative fluorescence microscopy: The importance of reverse-thinking in experimental design, ***Journal of Cell Science*** — methods, experimental design
- 2019 **Wait E.**, Winter M., Cohen A., Hydra Image Processor: 5-D GPU image analysis library with MATLAB/Python wrappers, ***Bioinformatics*** — GPU software library
- Aaron J. et al., **Wait E.**, Practical considerations in particle and object tracking and analysis, ***Current Protocols in Cell Biology***
- Winter M. et al., **Wait E.**, Separating touching cells using pixel-replicated elliptical shape models, ***IEEE Transactions on Medical Imaging***
- 2017 Valm A. et al., **Wait E.**, Applying systems-level spectral imaging to reveal the organelle interactome, ***Nature*** — spectral imaging
- 2016 Caino M. et al., **Wait E.**, A neuronal network of mitochondrial dynamics regulates metastasis, ***Nature Communications***
- Winter M. et al., **Wait E.**, LEVER: Software tools for segmentation, tracking, and lineaging, ***Bioinformatics***
- 2014 **Wait E. et al.**, Visualization and correction of automated segmentation, tracking, and lineaging in 5-D stem cell image sequences, ***BMC Bioinformatics*** — microscopy algorithms
- 2011 Winter M. et al., **Wait E.**, Vertebrate neural stem cell segmentation, tracking, and lineaging with validation/editing, ***Nature Protocols***