

## LEAD SOFTWARE ENGINEER

### Full-Cycle Software Development | Simulation & Modeling | Technical Leadership & Team Management

Innovative, detail-oriented software engineer with 9 years of experience developing and directing large-scale simulation tools with machine learning integration. 7 years of experience managing project delivery and driving end-to-end software product development in fast-paced environments. Highly analytical professional skilled in leveraging data to anticipate needs, solve critical business problems, and advance the evolution of technology. Articulate leader with proven results cultivating cross-functional collaboration, managing stakeholder relationships, and presenting complex information to diverse audiences.

#### Core Competencies & Technical Skills:

Predictive Simulation Tools Design & Development • Software Testing, Maintenance & Launch • Data-driven Model Validation  
Telemetry-based Statistical Analysis • ML/AI Integration • Large-Scale Distributed Systems & HPC Expertise • Cloud Proficiency  
C/C++ • Python • MPI • OpenMP • Java • Fortran • JavaScript • Git • PyTorch • MuJoCo • NVIDIA Modulus • CI/CD • Docker

## PROFESSIONAL EXPERIENCE

**NASA Ames Research Center:** Entry Systems & Technology Division

**2015 – Present**

### LEAD SOFTWARE ENGINEER – AMA, Inc. (Jan 2024 – Present)

Drive strategic initiatives and lead the development of predictive simulation products while maintaining a strong technical focus.

- **Strategic Leadership:** Shape and execute strategic roadmaps for 5 complex NASA projects, ensuring alignment with organizational objectives and stakeholder expectations while optimizing resource allocation for timely delivery.
- **Product Lifecycle Management:** Oversee the complete lifecycle of 6 simulation products from conception through launch. Manage feature integration, code optimization, rigorous testing, and transitions to open-source platforms to enhance product quality and performance. Drive impactful large-scale complex simulations that provide critical insights for NASA.
- **Metrics and Validation:** Develop software systems to transform petabytes of raw sensor data into actionable metrics, validating simulation tools and ensuring their reliability in supporting NASA's data-driven decision-making processes.
- **Innovation and R&D:** Lead applied science projects in physics-based material modeling with machine learning integration, driving the development of next-generation simulation tools to support cutting-edge NASA missions and technologies.

### SENIOR SOFTWARE ENGINEER – AMA, Inc. (Nov 2020 – Jan 2024)

Led engineering team developing physics-based simulation tools for critical NASA missions, creating advanced software, improving user experience, and building open-source infrastructure to support large-scale simulations and foster collaboration.

- **Leadership:** Directed 12 NASA projects with 8 engineers, overseeing code development, research, milestones, and long-term planning. Secured \$3M in research funding. Coordinated with NASA leadership, managed team administration, organized 30 annual visits for professors and students, and established 2 international agreements with research institutes.
- **Full-Cycle Software Management:** Led development of [PATO](#) (ablation analysis R&D platform in C/C++), coordinating with 100+ developers and 200+ users. Released PATO as open-source by collaborating with cross-functional teams and navigating government paperwork. Expanded testing to ensure ongoing software integrity. Improved tools by adding conda packages, supercomputer modules, user guides, Google Cloud integration, and SQL web database using Django and JavaScript.
- **Machine Learning (ML):** Supervised development of deep learning segmentation tools for video ([arcjetCV](#)) and 3D imaging data ([PuMA](#) | [TomoSAM](#)). Trained physics-informed neural networks to create surrogate models for statistical analysis. Fine-tuned generative AI model GPT-NeoX (1.3B) to enhance knowledge management systems. Participated in ML training and conferences and invited external experts to lead collaborative sessions to strengthen team's proficiency in ML applications.
- **Verification and Validation:** Utilized large experimental data sets, on the order of petabytes, from various NASA facilities equipped with advanced sensors and instruments to validate simulation results. This rigorous comparison ensured the reliability of simulation tools, supporting NASA missions with accurate insights for informed decision-making.
- **Innovation and R&D:** Published journal papers and presented at leading conferences using large-scale simulation data to drive scientific advancements. Developed novel multiscale models to address critical NASA challenges such as micro-tomography analysis, material response, particle tracking, turbulence, hypersonic CFD, radiation, and plasma physics.

## SOFTWARE ENGINEER – STC & UIUC (Jan 2016 – Oct 2020)

Led development of 2 complex simulation software in C/C++ from scratch, including feature integration, testing frameworks, and model validation through rigorous experiments. Managed an engineering team, delivering high-quality, scalable solutions.

- **Software Development:** Designed and implemented PATO and [ARChES](#) (arc heater digital twin) for NASA's entry systems. Created Python tools for enhanced visualization, optimization, and multi-physics integration. Optimized ARChES with GPU acceleration using CUDA and Kokkos during NVIDIA hackathon, enhancing 3D radiation model performance by 100x.
- **Software Testing:** Developed a tailored testing framework integrated with CI/CD, ensuring high-quality, automated tests. Created unit and regression tests while supporting developers by maintaining code integrity and promptly addressing issues.
- **Statistical Analysis and Validation:** Optimized and analyzed experimental and Martian flight data to validate simulations. Performed uncertainty quantification, ensuring accurate predictions to support NASA missions with data-driven decisions.
- **Large-Scale HPC Simulations:** Debugged extensive MPI simulations on NASA Supercomputer, totaling over 10M core-hours.
- **Leadership:** Managed a team of 4 engineers, setting goals and milestones and securing funding to ensure project success.

## SOFTWARE ENGINEER INTERN – UIUC (Jun 2015 – Dec 2015)

Executed projects on CubeSat constellation for solar observation and developed critical software for space weather missions.

- **Software Development:** Implemented embedded flight software in C/C++ to manage CubeSat science data during flight. Developed Python ground control interface, used successfully in an Antarctica balloon test to calibrate high X-ray detector.
- **Research Analysis:** Authored a detailed document on small satellites for solar observations, including large science matrix summarizing CubeSat instrument options, presented to Heliophysics experts at NASA for further space weather analysis.

## INDEPENDENT PROJECTS

### Drone Club

2016 – 2018

- **Leadership:** Founded 5-person club to build drones using CAD tools, 3D printer, and off-shelf components.
- **Software Development:** Created C/C++ flight software. Tested drones in field and debugged and fixed drones in real time.

### Mars Desert Research Station

2013 – 2015

- **Leadership:** Established analog mission club and secured \$15K in funding to send 6 members to Utah Desert station.
- **Technical Design:** Designed and 3D-printed drone for studying communication relay in Utah desert for future Mars mission.
- **Software Development:** Developed C/C++ flight software utilizing open-source libraries and tested at drone facility.

### CubeSat Design

2013 – 2015

- **Software Development:** Developed embedded flight software in C/C++ for IMU of QB50 CubeSat in collaboration with ONERA & CNES, contributing to successful deployment from ISS and transmission of flight data during atmospheric reentry.

## EDUCATION

**Master of Engineering, Aerospace,** ISAE-Supaero

**Bachelor & Master of Engineering, Electro-Mechanics,** UCLouvain-EPL

## LEADERSHIP

Led technical section of proposal for \$40M ESTRAD contract. (2023)

Member of AMA Awards Panel. (2023-Present)

Wrote proposals, securing 4 NASA-funded projects totaling \$3M in grants. (2017-Present)

Published [19 journal/conference papers](#) and presented at 20 scientific conferences. (2015-Present)

President of 4 student associations. (2009-2015)

## AWARDS

[NASA Software of the Year Winner \(2022\)](#) | [NASA Early Career Public Achievement Medal \(2020\)](#)