Richard N. Vanderburgh

Dayton, OH

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Technical Skills

- Languages: C++, C, Python, MATLAB, FORTRAN, Java, JavaScript (Angular)
- Other Skills: Git, OpenMP, MPI, CUDA, Visual Studio, GTest, CMake, Windows, Linux, Docker, CI/CD, AFSIM (User & Developer)

Professional Experience

Autonomy Researcher, University of Dayton Research Institute, Dayton, OH, Mar 2024 - Present

- Designing, implementing and testing (unit and integration) UAV behaviors
- Developing and maintaining computational geometry & physics algorithms to simulate aircraft maneuvers for UAV route planning
- Validating calculations (linear algebra, ODE's) for UAV tactical maneuvering engine
- Assisting multidisciplinary team (aerospace engineers, control engineers, mathematicians) with software implementation (C++, CMake, Python, Git)

Open Source Developer, Max Planck Institute for Plasma Physics, Remote, 2023 - 2025

- Collaborating with an international team of physicists/mathematicians to contribute to plasma physics software (STRUPHY), used in nuclear fusion simulations
- Implementing numerical methods for energy-conserving kinetic plasma modeling
- Augmented CI/CD pipeline to build in many different Linux environments

Software Developer, Radiance Technologies Dayton, OH Oct 2022 - Mar 2024

- Supported several geospatial applications (web and desktop) for remote sensing used in mission-critical systems at the National Air and Space Intelligence Center
- Extracted and refined C++ algorithms to optimize performance and maintainability
- Designed unit tests for algorithms and calculations used in space-based IR data analysis
- Performed code peer-reviews to assess code quality and adherence to conventions

Simulation Scientist, Infinity Labs LLC Dayton, OH Dec 2020 - May 2022

- Designed command & control simulations of aerial ad-hoc networks to optimize SATCOM, UAV, and electric VTOL wireless communications with AFSIM
- Assessed multi-domain ISR networks using DAKOTA and Monte Carlo methods to assess performance of platforms and sensors in defense scenarios for the Air Force Research Labs
- Created visualization tools with Jupyter Notebook to analyze results from DOE simulations
- Documented customer deliverables including software demos and capability summaries

Wright State University, Graduate Teaching Assistant Dayton, OH Sep 2019 - Aug 2020

- Taught undergraduate physics laboratory courses for 4 semesters
- Led experiments in Newtonian Physics, Electricity & Magnetism, Opticks, Circuits, etc.
- Graded 60 lab reports each week to provide students with performance assessments

Education

Graduate: Wright State University– MS, Physics, Dayton, OH December 2020

- Thesis: Designed kinetic particle-in-cell (PIC) simulations in MATLAB to model time-evolution of various plasma distributions. Integrated open-source codes in FORTRAN, Python, and C into MATLAB. Created animated visualizations for analyzing plasma phenomena.

Undergraduate: Wright State University, Dayton, OH May 2019

- BS, Major in Physics, Minor in Math
- Vice President of Wright State Society of Physics Students