

Stephen Stegall

Systems Engineering & Model and Simulation Lead | Multi-Agent Swarming • Distributed Mission Autonomy • Modeling & Simulation

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EXECUTIVE SUMMARY

Accomplished Systems Engineering and Simulation Lead offering over 15 years of professional experience focused on multi-agent swarming topologies, algorithm logic, and distributed mission autonomy. Possesses extensive technical knowledge in containerized environments and Linux-based systems. Demonstrated success in guiding multidisciplinary teams throughout the product lifecycle, encompassing everything from the rapid prototyping of UAS swarms to the field-testing and deployment of mission and safety-critical hardware-software interfaces.

CORE TECHNICAL COMPETENCIES

Modeling, Simulation & Analysis	Physics & Sensor Phenomenology: Sensor phenomenology modeling at varying fidelities, frame transformations, targeting, and guidance systems. • SITL / HITL Integration: Real-time Software/Hardware-in-the-loop simulation integrating multi-degree-of-freedom autonomous agents. • Distributed Simulation (DIS): Multi-threaded constructive, virtual, and live distributed simulation environments. • Operational Analysis: Mission effectiveness and operational trade studies (STK, MATLAB, AFSIM, NGTS).
Autonomy, Swarming & Robotics	Robotics Middleware: Robotics Operating System (ROS2), Behavior Trees, and DDS QoS tuning. • Flight Stacks & Simulation: ArduPilot, PX4 flight controllers, MAVLink telemetry protocol, and Gazebo. • Distributed Consensus: Fault-tolerant consensus algorithms and decentralized coordination for autonomous swarms.
Software Engineering & Systems	Programming Languages: Rust, C++, C, Python, C#, Fortran, Shell scripting. • HCI & UI Development: Human Computer Interface development with GTK, Qt, and XAML. • Secure Linux Environments: GNU/Linux development, hardening, and deployment in secure and classified enclaves. • ML / AI Algorithms: Integration of modern machine learning and autonomous decision-making algorithms.
Infrastructure & Protocols	Containerization & Virtualization: Rootless Podman, Docker, OpenShift, and VMWare enterprise virtualization. • Network & Comms Protocols: UDP, TCP, DDS (Data Distribution Service) real-time middleware. • Avionics Bus Standards: MIL-STD-1553, ARINC-429, and mission-critical deterministic serial protocols.
Numerical Methods & Control	Modern Control Theory: Linear and nonlinear control systems for atmospheric aircraft and spacecraft. • Optimization & Numerical Methods: Complex mathematical optimization and trajectory generation for multi-agent formations.
Systems Engineering & Hardware	Full Lifecycle Verification: Requirements derivation (SYS I-IV), V&V, and FAA safety-critical certification. • Prototyping & Fabrication: Additive manufacturing, precision machining, and custom PCB design.

RECENT TECHNICAL PROJECTS

Distributed Swarm Consensus Architecture — [Rust](#) • [ROS2](#) • [DDS](#) • [Behavior Trees](#)

- Developed fault-tolerant consensus mechanisms for multi-agent autonomous swarms utilizing Behavior Trees and DDS QoS tuning to maintain topological integrity and mission objectives during simulated communication degradation and packet loss.

Resilient Swarm Coordination in Contested Environments — [Containerized ROS2](#) • [Linux](#) • [Distributed Consensus](#)

- Built a containerized ROS2 simulation sandbox to validate autonomous fallback behaviors and dynamic leader-follower re-election during simulated comms denial and electronic warfare jamming.

Suppression of Enemy Air Defenses (SEAD) Swarm Orchestration — [ROS2](#) • [Sensor Fusion](#) • [Heterogeneous Agents](#)

- Engineered heterogeneous swarm orchestration algorithms under simulated high-intensity EW jamming and adversarial radar environments, coordinating sensor fusion and dynamic task allocation.

PROFESSIONAL EXPERIENCE

NORTHROP GRUMMAN CORPORATION

Systems Engineer, M&S; Lead

2020 – Present

- Architected a seamless constructive-to-real-time simulation environment integrating cutting-edge autonomy on unmanned platforms for System-of-Systems (SoS) verification.
- Engineered an automated Monte-Carlo verification framework (C++ / Python) to rigorously validate non-deterministic autonomous behaviors, significantly reducing regression cycles for FAA Safety-Critical Certification.

- Led safety-critical SITL/HITL integration of ACAS Xu into operational flight programs, enabling landmark first deployments in cooperative national airspace.
- Directed full-lifecycle verification (SYS I–IV) for autonomous flight safety, translating complex algorithmic metrics into cleared operational envelopes.
- Consulted on enterprise-wide Detect and Avoid (DAA) and M&S; accreditation efforts.

M&S; Advanced Development Lead

2015 – 2020

- Led integration, testing, and evaluation of multi-platform and multi-site distributed constructive, virtual, and live (LVC) M&S; efforts across engineering disciplines.
- Executed rapid model updates during live field integration events, swiftly diagnosing and resolving hardware-software interface anomalies to preserve high-visibility test windows.

Internal Innovation Challenges / Competitions Lead

2014 – 2017

- Directed cross-functional engineering teams (10–30 members) in the rapid design, development, and tactical deployment of heterogeneous autonomous UAS swarms for competitive challenges, consistently achieving top-tier ranking.
- Architected an edge distributed processing architecture utilizing NVIDIA Jetson, Raspberry Pi, and Pixhawk autopilots—offloading heavy computer vision and sensor fusion to preserve real-time compute loops for edge tactical execution.

Systems Engineer, M&S;

2009 – 2015

- Analyzed algorithms and modeled complex sensor phenomenology to estimate system performance and trade sense-and-avoid capabilities for High-Altitude Long-Endurance (HALE) platforms.
- Led comprehensive Verification and Validation (V&V;) activities across diverse M&S; asset suites.
- Authored mission/combat effectiveness analyses and tactical scenario simulations.

CONSULTING (STRAIGHT UP IMAGING / HI-TECH)

Autonomous Systems & Payload Integration Consultant

2016 – 2019

- Integrated diverse dynamic payload drivers for rapid sUAS concept development with focus on sensor stabilization and hot-swappable architectures.
- Leveraged small-board computers and system-on-module units (NVIDIA Jetson TX2, Raspberry Pi) to satisfy demanding onboard edge compute requirements.

EDUCATION & ACADEMIC RESEARCH

Embry-Riddle Aeronautical University — M.S. & B.S. in Aerospace Engineering

2009

- Thesis: Formation Feedback Control of UAV Flight. M.S. Concentration in Aeronautics; B.S. Concentrations in Aeronautics and Astronautics with Minor in Mathematics. Core research focus in Modern Control Theory, Optimization, and Swarm Dynamics.