

Accomplished AI and robotics leader with a track record of driving innovation and delivering high-impact solutions. Demonstrated success in managing large-scale, multi-million-dollar AI and robotics portfolios, leading cross-functional teams, and building strategic government-industry partnerships. Bringing deep technical expertise, strategic vision, extensive program management and leadership experience to translate cutting-edge AI into scalable, transformative solutions that drive intelligent, impactful outcomes.

EMPLOYMENT

◇ National Science Foundation	Lead Program Director in AI, ML, and Robotics	2019–2025
◇ George Mason University	Associate Professor in Computer Science	2020–2023
◇ Catholic University of America	Associate Professor in Computer Science	2010–2020

EDUCATION

◇ Johns Hopkins University	Postdoctoral Fellow in Computer Science	2008–2010
◇ Rice University	Ph.D. in Computer Science	2002–2008
◇ Clarkson University	M.S. in Computer Science	2000–2002
◇ SUNY Fredonia	B.S. in Computer Science	1996–2000

TECHNICAL ACCOMPLISHMENTS

- ◇ **Industry Applications & Cross-Domain Impact**
 - **Defense:** Developed and deployed AI-powered solutions for autonomous operations across underwater, surface, ground, and aerial vehicles, enhancing mission efficiency, safety, and operational reliability.
 - **Healthcare & Medical Systems:** Developed advanced AI-driven techniques in robotic-assisted surgery to improve precision, training, and operational safety.
 - **Manufacturing & Supply Chain Optimization:** Developed AI techniques to enhance agent mobility and coordination in warehouses, boosting efficiency, reducing costs, and supporting scalability.
- ◇ **Autonomous Systems & Robotics**
 - **Motion Planning & Control:** *Leader with 20+ years of impactful contributions* in autonomous navigation. *Pioneered integration of sampling-based motion planning with AI reasoning and discrete search*, optimizing for vehicle dynamics and obstacles to accelerate planning, reduce travel distance, and energy use. Deployed across *ground, aerial, and marine robots*, delivering efficient, scalable solutions.
 - **Goal-Oriented Autonomy:** Pioneered *combined task and motion planning* algorithms enabling autonomous systems to execute high-level missions specified in formal languages (e.g., *LTL, PDDL*), allowing human supervisors to focus on defining goals rather than micromanage control, while robots autonomously adapt, determine required actions, generate motions, and complete missions in dynamic environments.
 - **Multi-Robot Coordination:** Introduced *scalable planning and coordination* algorithms accounting for *robot dynamics*, enabling teams of autonomous robots to execute complex missions with efficient task allocation, collision-free motion, adaptive decision-making, and optimized communication in dynamic environments, enhancing applications in exploration, tracking, and infrastructure inspection.
 - **Natural Language Integration:** Leveraged *large language models (LLMs)* to translate natural language inputs into formal models, enabling robots to interpret intent, adapt to new goals, and provide real-time updates aligned with human expectations for seamless integration.
- ◇ **AI & Machine Learning**
 - **AI-Driven Decision-Making:** Developed scalable, high-impact decision-making solutions using *heuristic search, constraint reasoning, and automated planning*, optimizing operations and outcomes.
 - **Generative AI & LLMs:** Integrated LLMs to enhance decision-making, enabling intelligent automation, efficient knowledge retrieval, and improved human-AI collaboration for complex tasks.
 - **Deep Learning & Reinforcement Learning:** Applied deep learning and reinforcement learning to drive operational efficiency and enhance real-time decision-making and adaptability.
 - **Uncertainty Handling & Probabilistic Modeling:** Advanced AI capabilities in managing uncertainty through probabilistic models and Bayesian inference, improving decision accuracy and robustness.
 - **Distributed Computing for AI Scalability:** High-performance distributed computing to address large-scale AI challenges in planning, search, and optimization.

PROGRAM MANAGEMENT AND LEADERSHIP

- ◇ **NSF National Artificial Intelligence Research Institutes Program:** Led NSF's flagship AI program, managing a \$500M+ portfolio to accelerate high-impact AI research and real-world applications, driving collaboration between academia, government, and industry leaders.

- ◇ **NSF Robust Intelligence:** Directed funding for cutting-edge AI/ML research, including generative AI, LLMs, computer vision, and foundational models.
- ◇ **NSF Foundational Research in Robotics, NSF National Robotics Initiative:** Led NSF's flagship robotics initiatives to advance autonomy and human-robot collaboration.
- ◇ **NITRD AI R&D & Intelligent Robotics and Autonomous Systems Interagency Working Groups**
Coordinated federal AI R&D strategy and led cross-agency initiatives to strengthen U.S. leadership in AI and drive advancements in autonomous systems and intelligent decision-making.
- ◇ **International Partnerships:** Advanced international partnerships in AI and Robotics between NSF and Japan's Science and Technology Agency and UK's Engineering and Physical Sciences Research Council.
- ◇ **Strategic Leadership & Team Alignment:** Proven ability to inspire, lead, and align cross-functional teams towards a unified vision, driving successful outcomes through clear goal-setting, collaborative execution, and fostering a culture of accountability and innovation.
- ◇ **Executive Communication & Stakeholder Engagement:** Proven ability to convey complex technical concepts to a broad spectrum of stakeholders, from technical experts to executive leadership, ensuring clear understanding and alignment for informed decision-making.

TECHNICAL SKILLS

- ◇ **Extensive Programming Experience:** 25+ years in C++ and 15+ years in Python and Java, developing high-performance, scalable software, implementing large-scale projects with tens of thousands of lines of efficient, maintainable code. Skilled in algorithm optimization, low-level performance tuning, and system architecture. Strong focus on writing production-quality, modular, and rigorously tested code.
- ◇ **AI/ML/Robotics Expert:** Deep expertise in AI, ML, and robotics including *deep learning, supervised & unsupervised learning, LLMs, reinforcement learning, motion planning, control, search, planning, optimization, and constraint satisfaction*, with a proven track record solving complex, real-world problems.
- ◇ **LLM Integration:** Expertise in integrating LLMs in AI-driven systems, combining advanced natural language processing and understanding with planning and decision-making.
- ◇ **AI/ML/Robotics Libraries & Tools:** Extensive experience with industry-standard AI, ML, and robotics libraries and tools, including TensorFlow, PyTorch, Keras, Scikit-learn, XGBoost, Hugging Face Transformers, ROS, Gazebo, MoveIt! for developing, training, and deploying AI and robotics models and methods.
- ◇ **Data Science & Advanced Analytics:** Expert in statistical modeling, hypothesis testing, predictive analytics, time-series analysis, clustering, regression, data visualization, and advanced data-driven techniques to drive insights and inform decision-making.
- ◇ **Algorithms & Data Structures:** Deep expertise in designing, analyzing, and optimizing advanced algorithms and data structures, including graph algorithms, dynamic programming, search algorithms, and tree-based structures, to solve complex, large-scale computational problems.
- ◇ **Formal Verification & Safety Assurance:** Expertise in formal verification, model checking, and assurance techniques to ensure correctness, safety, and reliability.
- ◇ **Open-Source Software Development:** Developed OOPSMP, an AI planning toolkit, and ROMEO, a biomolecular modeling platform, both widely used in research and education. Released AI and ML methods with open-source code supporting numerous published papers.
- ◇ **Miscellaneous:** Git, UNIX/Linux, scripting, MATLAB, NumPy, Pandas, Matplotlib, Seaborn, Plotly, MPI

SELECTED AWARDS AND GRANTS

- ◇ Secured and led over \$1 million in funding from federal agencies to advance AI and Robotics, focusing on improving intelligent decision-making and human-AI collaboration, across various applications.
- ◇ **NSF Director's Award for Superior Accomplishments 2021**
Recognized for creating the Foundational Research in Robotics program.
- ◇ **Research Paper Awards:** Several finalist and best paper awards in international robotics conferences.
- ◇ **Fellowships & University Awards:** CUA Kaman Excellence in Research (2015), ONR Faculty Research Fellowship (2014), CUA Burns Fellowship (2011)
- ◇ **Publications** [full list: <https://erionplaku.github.io/Publications.html>]: 95+ papers in AI conferences and journals, 3000+ citations, h-index: 27, i10-index: 53.