Erion Plaku, Ph.D.

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EMPLOYMENT

◇ **National Science Foundation** — **Program Director (AI, Robotics)** — 2019–2025
◇ **George Mason University** — **Associate Professor (Computer Science)** — 2020–2023
◇ **Catholic University of America** — **Associate Professor (Computer Science)** — 2010–2020
◇ **Johns Hopkins University** — **Adjunct Assistant Professor (Computer Science)** — 2010–2012

EDUCATION

◇ **Johns Hopkins University** — **Postdoctoral Fellow, 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**

- **Navy, Defense, Aerospace**: Developed and deployed AI-powered autonomy for underwater, surface, ground, and aerial vehicles, enhancing mission reliability.

- **Healthcare & Medical AI**: Advanced AI-driven robotic-assisted surgery techniques for enhanced training and automation, ensuring safety and compliance.

- **Manufacturing & Supply Chain**: Implemented AI-enhanced robotics for warehouse automation, predictive maintenance, and logistics optimization.

◇ **Autonomous Systems & Robotics**

- **AI-Driven Motion Planning & Control:** Developed innovative AI reasoning frameworks integrated with motion planning to improve robot autonomy in unstructured environments. Reduced planning time, travel distance, and energy consumption. Deployed successfully across ground, aerial, and marine robots, providing scalable, efficient solutions for various applications.

- **Collaborative Robotics:** Developed multi-robot coordination strategies for exploration and data collection, optimizing task allocation and communication efficiency to boost operational productivity.

- **Logistics Optimization:** Built advanced frameworks for autonomous delivery operations, improving efficiency by factoring in robot, vehicle dynamics, and constraints on deliveries and vehicle loads.

- **Robotic Manipulation:** Innovated machine-learning approaches for robots to manipulate unknown objects using haptic sensing, enabling improved handling based on tactile and geometric information.

◇ **AI & Machine Learning**

- **Planning, Search, and Reasoning:** Developed efficient AI-driven decision-making methods, enabling scalable solutions through heuristic search, constraint reasoning, and automated planning.

- **High-Dimensional Search & Optimization:** Created techniques for optimizing AI in high-dimensional, constrained spaces, enhancing search efficiency and decision-making in complex environments.

- **Integrating LLMs:** Innovated hybrid AI architectures that integrate LLMs in planning and decision-making frameworks to improve adaptability and solution quality in real-world scenarios.

- **Deep Learning and Reinforcement Learning:** Leveraged deep learning and reinforcement learning to enhance planning efficiency, incorporating runtime predictions for improved decision-making.

- **Formal Methods & Assurance:** Developed safety verification methods, ensuring reliable and trustworthy deployment in autonomous transportation and air traffic control.

- **Routing & Resource Allocation:** Optimized mobile agent routing and resource allocation under constraints, improving operational efficiency in logistics and supply chain management.

- **Probabilistic Reasoning & Uncertainty:** Advanced decision-making in uncertain environments by developing robust, stochastic planning and control policies for autonomous systems.

- **Distributed Computing:** Developed high-performance distributed computing solutions to tackle large-scale AI problems in planning, search, and optimization.

AI & ROBOTICS PROGRAM MANAGEMENT AND LEADERSHIP

◇ **NSF National Artificial Intelligence Research Institutes Program (Co-Lead)**

Led the flagship AI program, managing a $**540M** portfolio to accelerate high-impact AI research and real-world applications, driving collaboration between academia, government (**NSF, NIFA, DoD, DHS, NIST**) and industry (**Amazon, Google, IBM, Intel, Accenture, CapitalOne**).

- ◇ **NSF Foundational Research in Robotics (Co-Lead), NSF National Robotics Initiative (Co-Lead)**
Led NSF's flagship robotics initiatives to advance autonomy and human-robot collaboration.

- ◇ **NSF Robust Intelligence (Program Director):** Directed funding for cutting-edge AI/ML research, including generative AI, large language models, computer vision, and foundational models.

- ◇ **NITRD AI R&D Interagency Working Group (IWG) (member)**
NITRD Intelligent Robotics and Autonomous Systems IWG (Co-Chair)
Coordinated federal AI R&D strategy and led cross-agency robotics initiatives to strengthen U.S. leadership in AI and drive advancements in autonomous systems and human-robot collaboration.

- ◇ **Global AI & Robotics Collaboration:** Advanced global 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 Expertise:** Deep expertise in AI, ML, Robotics, including *search, planning, optimization, constraint satisfaction, deep/supervised/unsupervised/reinforcement learning, motion planning, control, manipulation*, 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 motion planning, decision-making, and autonomous robotics.

- ◇ **AI/ML/Robotics Libraries & Tools:** Extensive experience with industry-standard AI, ML, and robotics libraries and tools, including TensorFlow, PyTorch, Keras, Scikit-learn, XGBoost, ROS, and MoveIt!, for developing, training, and deploying intelligent systems and autonomous robots.

- ◇ **Open-Source Software Development:** Developed OOPSMP, a robotics toolkit, and ROMEO, a platform for biomolecular modeling, both widely used in research and education. Released AI and ML methods for autonomous systems and robotics with open-source code accompanying many published papers.

- ◇ **Misc:** Git, UNIX/Linux, shell scripting, MATLAB, Matplotlib, Seaborn, Plotly

SELECTED AWARDS AND GRANTS

- ◇ Secured and led over $1 million in funding from NSF and NRL (2014–2023) to advance robotics and AI, including robot autonomy in unstructured environments, human-robot collaboration, and enhanced autonomy for underwater vehicles through improved mission and motion planning.

- ◇ **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 top robotics and AI conferences and journals, 3000+ citations, h-index: 27, i10-index: 53