UNIVERSITY OF
South Carolina

Department of Mechanical Engineering

Ph.D. Opportunities in Digital Manufacturing and Digital Twins

The MOSAIC Lab (Manufacturing Operations: Simulation, Automation, Intelligence, and Connectivity), directed by Dr. Michail Katsigiannis in the Department of Mechanical Engineering at the University of South Carolina (USC), is seeking two Ph.D. students to start in Spring or Fall 2027. Students apply to the Mechanical Engineering Ph.D. program and pursue industrial-engineering-oriented research. Lab site: mkatsigiannis.github.io/mosaic-lab.

The lab's research focuses on how digital technologies fit together to form working cyber-physical systems, and builds the infrastructure that supports digitalization for manufacturers of any size. One of the lab's current projects is an educational assembly line for Smart Manufacturing and Lean Manufacturing education and research: an instrumented mixed-model assembly line modeled on Auburn University's Tiger Motors Lean Education Center, built to teach students, demonstrate Industry 4.0 technologies to local manufacturers, and support digitalization research.

Research Areas: Students will work in one or more of the following areas:

- Transformation of traditional Modeling and Simulation techniques to support real-time operations, and integration of physics-based models with higher-level operational models into a single operational model of the factory.
- Shop-floor sensing and connectivity: embedded systems for product tracking, industrial robot and PLC integration, edge computing, computer vision, and retrofits for legacy equipment.
- Distributed Digital Twin architectures and engines, including interoperability, scaling, fidelity, and security of Digital Twin deployments.
- Intelligent applications for cyber-physical systems: locally hosted LLM assistants over live Digital Twin data, natural-language requests translated into safe cyber-physical actions, adaptive dashboards, and adaptive manufacturing decision-support systems.

Funding: Each position carries a graduate assistantship (stipend and tuition support) for the first two years. Continued support through research funding is expected for the duration of the program, contingent on satisfactory progress.

Basic Qualifications: B.S. or M.S. in Industrial, Mechanical, Electrical, or Computer Engineering, Computer Science, or a related field; interest in building systems that combine software, hardware, and models; strong written and oral communication skills in English.

Preferred Qualifications: Research or project experience in one or more of the following:

- Programming (Python, Java, or similar), software development, DevOps, or networking;
- Discrete-Event Simulation or Agent-Based Modeling (AnyLogic, Simio, or code-based);
- IoT or embedded systems, PLCs, or industrial automation;
- Machine learning or large language model applications;
- Robotics, computer vision, or extended reality; and
- A thesis, a publication, or a project built end-to-end and available to review.

How to Apply

Email mkatsigiannis@sc.edu with the subject "Prospective PhD student - MOSAIC Lab" and the following materials:

- CV/resume
- Unofficial transcript(s)
- A statement of no more than one page on which research area interests you and why
- Links to code, a simulation model, a thesis, or a project you built (optional, but weighed heavily)

Deadlines

- Spring 2027: send materials to the lab as early as possible. USC Graduate School deadlines: October 1, 2026 (international); October 15, 2026 (domestic).
- Fall 2027: send materials to the lab by January 15, 2027 for full consideration. USC Graduate School deadlines: May 1, 2027 (international); May 15, 2027 (domestic).