ICAM26

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International Conference on Advanced Manufacturing

Research to Application through Standardization

Industry 4.0: Data Driven Manufacturing: Artificial Intelligence and Machine Learning

The acceleration of artificial intelligence and machine learning technologies in recent years is reshaping how additive manufacturing is designed, controlled, qualified, and scaled.

Additive manufacturing and advanced manufacturing generate large volumes of heterogeneous data across the product lifecycle, from design and simulation to process planning, monitoring, post processing, inspection, and service performance. The expansion of this data ecosystem, combined with advances in deep learning, physics informed modeling, and generative AI, is creating new opportunities for automation, optimization, and decision support in additive manufacturing.

At the same time, the industry continues to face challenges related to data quality, interoperability, security, model validation, and trust, all of which are critical for industrial adoption, qualification, and certification of AI enabled additive manufacturing workflows.

This symposium brings together experts from academia, industry, and government to explore emerging methods, datasets, standards, and applications that advance AI and machine learning in additive manufacturing and help the field move toward more intelligent, scalable, and production ready manufacturing systems.

Contributions are welcomed across a broad range of additive manufacturing processes and materials, including but not limited to metals, polymers, ceramics, concrete, and hybrid manufacturing systems.

Topics of interest include but are not limited to:

Data foundations and pipelines for AI enabled additive manufacturing
Approaches addressing data quality, governance, interoperability, and lifecycle management, with an emphasis on end-to-end data pipelines spanning data generation and curation, model training, deployment, monitoring, and continuous improvement.

AI and ML for additive manufacturing design and optimization
Methods that leverage AI and machine learning to improve part design, enable generative design approaches, predict defects, and support real-time decision making at the machine, cell, or system level.

Case studies and applications: applied AI and ML for additive manufacturing
Real world examples demonstrating tangible outcomes from AI enabled data driven workflows, including applications such as in-situ monitoring, digital twins and shadows, control strategies, and process optimization across the additive manufacturing lifecycle.

Qualification and certification enabled by AI and data centric approaches
Methods and frameworks that support quality assurance, qualification, validation, and certification of additive manufacturing processes and parts using AI and data-driven techniques.

Human, organizational, and systems-level barriers to AI and machine learning adoption.
Non-technical, organizational, and workflow factors influencing AI/ML adoption, including training, data entry practices, integration with existing manufacturing systems, and balancing trust and skepticism in AI-assisted decision-making.

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