Dr. Samyakh Tukra

Talk Title: Grounded Multi-Agent Systems for Decision Support in Industrial Operations

Abstract:

Industrial operations need AI systems that can reason across live process data, engineering knowledge, and operator workflows. Yet conventional machine learning models often remain narrow predictors, while large language models lack grounding in plant behaviour, constraints, and real-time operating context. This talk presents Orbital, a grounded multi-agent system for decision support in industrial operations.

Orbital combines three complementary layers: a time-series model for multivariable process dynamics and uncertainty-aware forecasting; a constraint-learning layer that extracts engineering relationships from plant documentation, including P&IDs, datasheets, mass and energy balances, and operating manuals; and a language-fusion layer that aligns process behaviour with engineering descriptions. These components are coordinated through specialist agents for planning, tool execution, verification, memory, and response composition.

The system moves beyond prediction toward interpretable decision support: detecting abnormal behaviour, retrieving relevant historical events, explaining likely root causes, and grounding recommendations in both data and engineering constraints. More broadly, this work argues that the next generation of industrial AI must be grounded, multi-modal, and

operationally trustworthy; connecting data, domain knowledge, and human decision-making in high-consequence environments.

Bio: Dr. Samyakh Tukra is Co-founder and Chief AI Officer at Applied Computing, where he leads Orbital, a multi-agent AI copilot for heavy industry and process operations. Orbital combines large language models, time-series forecasting, reinforcement learning, and self-supervised learning to support real-time industrial decision-making. Samyakh holds a PhD in Artificial Intelligence and 3D Computer Vision and an MSc in Robotics from Imperial College London. His work spans deep learning, robotic perception, 3D reconstruction, reinforcement learning, and self-supervised AI, with a focus on translating frontier research into explainable, production-grade systems for high-consequence industrial environments.