

# Seminar

## "Industrial Artificial Intelligence for Maintenance and Service Innovations in Next Generation Industry Systems"

**Xiaodong Jia, PhD**

**Research Assistant Professor  
Mechanical and Materials Engineering Department  
University of Cincinnati**

### abstract

Driven by the rapid growth of sensor technology, the internet of things (IoT), and machine(deep) learning algorithms, the research field industrial Artificial Intelligence (AI), that emphasizes the systematic integration of human experts, learning and decision-making analytics, and digital and automation technologies into industry systems for efficiency improvements and waste reduction, is emerging as a core technology that facilitates the smart and digital transformation in industry systems. According to Manufacturing x Digital (MxD), industrial AI in the manufacturing industry will maintain a 33.5% CAGR (Compound Annual Growth Rate) in the next 7 years and the market size will grow from 1.4B in 2020 to 16.7B in 2028. Amongst all the smart manufacturing capabilities, enhanced sensing and monitoring and advances in analyzing data and trends hold the greatest economic impact according to the latest NIST economic analysis briefing. This seminar will focus on industrial AI for maintenance and service innovations by demonstrating the representative works related to the semiconductor manufacturing and high-precision optical lens manufacturing. In the first case study, a semi-automated toolkit for multivariate trace data analysis is developed and applied to the critical semiconductor manufacturing processes (e.g., semiconductor etching, chemical mechanical polishing, etc.) for yield enhancement. In the second study, a virtual lens assembly methodology is developed to recommend the optimal lens angles in final assembly and enhance the production yield. After demonstrating these on-going research activities, this seminar will discuss future research initiatives for the upcoming 5 years and identify research opportunities related to the multi-modal sensing system in the Medicare/ Pharmacy field, intelligent operation and maintenance of complex industry systems, and cyber-manufacturing.

### biosketch

Dr. Xiaodong Jia currently serves as a Research Assistant Professor in the Mechanical and Materials Engineering Department (MME) at the University of Cincinnati (UC), leading multiple research projects sponsored by NIST, Applied Materials, Hitachi High-Tech, Taiwan Semiconductor Manufacturing Company, United Microelectronic Corporation, Winbond Electronics, Mitsubishi Electric, among others. He received his Ph.D. in Mechanical Engineering at UC (2018) and worked as a postdoc fellow for one year (2019). Dr. Xiaodong Jia's research focuses on developing advanced analytical solutions, including advanced sensing and monitoring and advanced data analytics, for maintenance and service innovations in next-generation industry systems (industry 4.0). His research works have been successfully implemented in a broad range of applications, including semiconductor manufacturing processes, high-precision optical lens manufacturing, Traumatic Brain Injury (TBI) prognosis, high precision linear motion equipment, wind turbines, among others. To date, Dr. Xiaodong Jia has published 45+ peer-reviewed articles, led 10+ research projects sponsored by industry companies and government agencies, and maintained close collaborations with 30+ industry companies around the globe. Also, he is currently teaching two engineering courses at UC, introduction to industrial AI and reliability engineering.



**April 15, 2022 10:00AM MST Peralta 132**

Seminar is free and available via  
[Zoom Video Conferencing Link](#)

**ASU** Ira A. Fulton Schools of  
**Engineering**  
Arizona State University