**Abstract:** Recent years have seen an increasing industrial push to mature additive manufacturing technology to production ready stage. Widespread adoption of the additive manufacturing technology is challenged by lack of quality assurance arising from part-to-part and machine-to-machine variability. This is a major concern for safety-critical applications where component failures cannot be tolerated. The AM community is expressing that qualification and certification are the “long poles in the tent”. Numerous government agencies, such as NAVY, NIST have identified multiple challenges that can accelerate qualification process. Real-time process monitoring and control via an intelligent fusion of data and physics have always emerged as the potential leading factor for accelerated qualification of AM process and components. Both academic and industrial researchers are working on demonstrating the capability of in-situ monitoring and closed-loop controls in the AM process. Significant gaps relating to in-situ monitoring and control still exist to push the AM technology from research to industrialization. The objective of this workshop is to explore and discuss how these gaps can be bridged.

**Target Audience:** This workshop is designed to facilitate researchers from academic communities and engineers from relevant industries interested in understanding how modeling, learning, and control can accelerate the AM process development. The workshop will include guest speakers spanning from academia to industry, sharing their past experience and thoughts on the above mentioned topics. It is intended to share with audiences the motivation, rationale, challenges, and achievements in the field of in-situ monitoring and control of AM. The workshop will also have a panel discussion to summarize the thoughts and learning from the workshop. The attendants will find the workshop beneficial in terms of concepts, applications and production ready deployment of in-situ monitoring and control in AM processes and how can it help accelerate the part qualification.

**Agenda:**

**9:00-9:15: Introduction and Overview**

**Session 1: A review from Academia**

**9:15-10:00** Jyoti Mazumder, University of Michigan: Quality Assured Additive Manufacturing of Metallic Materials

**10:00-10:45** Eric Feron, Georgia Tech: Model-based control of the macroscopic characteristics of 3D printed parts

**Session 2: A review from Government**

**11:00-11:45** Ted Reutzel, Applied Research Lab at Penn State: Flaw Detection in PBFAM enabled by application of machine learning with registered heterogeneous sensors and computed tomography

**11:45-12:30** Ibo Matthews, Lawrence Livermore National Laboratory: Accelerated Certification of Metal AM Components: Online Sensing, Ultrafast Modeling and Machine Learning

**Session 3: A review from Industry**

**1:45-2:30** Abhijit Chakraborty/Amit Surana, United Technologies Research Center: An Interdisciplinary approach to monitoring and control in AM

**Session 4: Combined Panel Discussion**

**2:30-3:15** Members TBD

**Session 5: On the Horizons**

**3:30:4:00** Kira Barton, University of Michigan: Advanced modeling and learning-based control for high-resolution additive manufacturing

**4:00:4:30** Sandipan Mishra, Rensselaer Polytechnic Institute: Data-driven Modeling and Predictive Control for Additive Manufacturing

**4:30-5:00** Xu Chen, University of Connecticut: Mechanisms of Powder Bed Fusion Additive Manufacturing: Machine Design, Sensing Limits, and Controls to Break the Limits

**5:00-5:15** Conclusions and Wrap Up