

Proposal for Special Session at IEEE CASE 2022

Goal:

Modeling system behavior plays a vital role in controlling systems and in monitoring systems health. Recently the machine learning-enabled modeling technology has become a powerful technique and tool for developing models for explaining, predicting, and describing system behaviors. In particular, the machine learning-enabled predictive modeling has been widely applied to develop the data-driven models from the “big” data in different applications such as system prognostics, system control, and system health management. The objective of this special session is to solicit the papers which reflect the state-of-the art of predictive modeling technologies and provide a small forum for researchers and engineers to share and exchange the ideas on machine learning-enabled modeling technologies and its applications to system control and system monitoring. Over last decade, the National Research Council Canada initialized a research program on machine learning-enabled modeling technologies, focusing on the application of machine learning to real-world problems such as control, prognostics, and fault diagnostics. This research program has achieved the promising results and successful applications. This special session will mainly introduce the successful stories from the research program along with a few of the recent research work from other institutions.

Based on the response from the invited researchers, Professors, we have got several committed submissions (two more potential submissions may be available later) which cover the following main topics:

- The machine learning-enabled modeling for system behavior explanation
- The machine learning-enabled modeling for system behavior prediction
- The machine learning-enabled modeling for system behavior description
- The machine learning-enabled predictive modeling for real-world applications such as prognostic and health management for complex systems, digital twin, healthcare, and so on.

Session Title: Machine Learning-enabled Modeling Technology and Its Applications

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Contributions:

1. “A deep learning approach for heating and cooling equipment monitoring”, by Yunli Wang, Research Scientist, National Research Council Canada
2. “Machine learning-enabled predictive modeling for digital twin”, by Chunsheng Yang, Senior Research Officer, National Research Council Canada
3. “Using machine learning to predict crop harvesting period and shipping time” , by Ali Aharari, Associate Professor, Sojo University, Japan
4. “Distribution shift analysis for transfer learning-based predictive modeling”, By Yifeng Li, Associate Professor, Brock University