Proposal for Special Session at IEEE CASE 2022

Goal:

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In automated and intelligent engineering, industrial big data not only promotes enterprises to accurately perceive the internal and external environment changes in the system but also facilitates scientific analysis and decision making to optimize the production process, reduce costs and improve operational efficiency. With the development of data science and data-driven automation, big data analytics (BDA) have been greatly improved to effectively mine both structured and unstructured industrial data that hides knowledge and insights to enable automation systems.

Nevertheless, there still lies a big gap to achieve the adaptive automation systems in some dynamic engineering scenes, since the data-driven models trained by limited data cannot automatically adapt with changes in dynamic engineering scenarios. It lacks the ability of human intelligence to draw inferences about dynamic scenarios based on experience or knowledge. This calls for knowledge augmented BDA technologies to provide abundant "know-why" knowledge for automatically generating "know-how" decision, which might be a breakthrough to bridge the gap between artificial intelligence and human intelligence coping with the dynamic engineering scenes.

To this end, as an emerging and promising research topic, this special session is dedicated to present the state-of-the-art and methodologies, tools, systems, and practical applications to enable the readiness and realization of knowledge augmented BDA. The topics of the special session include, but are not limited to the following ones:

- Knowledge augmented BDA theories for adaptive automation and engineering
- Knowledge augmented BDA for automated modeling, simulation, and control
- Knowledge augmented BDA-enabled adaptive automation systems
- Knowledge augmented BDA-based engineering applications
- Knowledge augmented BDA-enabled automated production quality control
- Knowledge augmented BDA-aided automated fault diagnostics and prognostics
- Knowledge augmented BDA-enabled automated planning and scheduling
- Knowledge augmented BDA-enabled automated decision making and process optimization
- Knowledge augmented BDA-enabled sustainability and green automation

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Session Title: [Knowledge augmented big data analytics for intelligent automation science and engineering]

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Contributions:

1. "Big data analytics for intelligent manufacturing systems: A review" by Junliang Wang/Chuqiao Xu

2. "An energy-responsive optimization method for machine tool selection and operation sequence in flexible machining job shops" by Yan He/Yufeng Li

3. "A knowledge augmented image deblurring method with deep learning for in-situ quality detection of yarn production" by Chuqiao Xu/Junliang Wang

4. "An Evolutionary Approach for Fuzzy Knowledge Learning" by COS Barreto/Xiaoou Li

5. "Data-driven prognosis method using hybrid deep recurrent neural network" by Min Xia/Xi Zheng

6. "User experience-based product design for smart production to empower industry 4.0 in the glass recycling circular economy" by Kuo-Yi Lin

7. "Cloud-based big data analytics for customer insight-driven design innovation in SMEs" by Ying Liu /Anthony Soroka

8. "Bilateral LSTM: A two-dimensional long short-term memory model with multiply memory units for short-term cycle time forecasting in re-entrant manufacturing systems" by Junliang Wang/Jie Zhang

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