# Proposal for Special Session at IEEE CASE 2022

**Goal:**

- Digital Twin technology can build virtual replicas of physical entities to observe, analyze and control the physical processes and systems. It opens the potential of developing ultra-intelligent automation systems via embedding complex models, expensive deep learning algorithms and ubiquitous communication. However, open questions exist for harvesting the ultimate potential of digital twin towards autonomous system behaviors, such as self-organization. How can digital twins autonomously communicate, coordinate and control on their own and in a network of digital twins? On digital twin development, how can we develop reconfigurable, measurable, explainable, computable and scalable digital twins that are just fit-for-purpose for the target application? This special session calls for fundamental scientific advancements on digital twin technology for achieving autonomous system behaviors. We are particularly interested in breakthroughs in the following aspects:
  - Self-configurable, self-optimizing, and self-healing digital twins
  - Performance quantification of digital twin
  - Resource-efficient digital twins
  - Communication, coordination and control between digital twins
  - Learning and reasoning in digital twins
  - Deep learning and explainable AI in digital twins
  - Knowledge-driven digital twins
  - Real-time digital twins
  - Process mining in digital twin automation systems
  - Validation and calibration for digital twin automation systems
  - Case studies of digital twin-driven automation

**Session Title:** [Digital Twin Towards Smart Automation]

**Organizers:** [Yuqian Lu], [Senior Lecturer]
[The University of Auckland]
E-mail: [yuqian.lu@auckland.ac.nz]
Phone: +[64] – [09 923 1584]

[Jinsong Bao], [Professor]
[Donghua University]
E-mail: [bao@dhu.edu.cn]
Phone: +[86] – [02167792564]

[Fei Tao], [Professor]
[Beihang University]
E-mail: [ftao@buaa.edu.cn]
Phone: +[86] – [01082338591]

[Ying Liu], [Professor]
[Cardiff University]
E-mail: [liuy81@cardiff.ac.uk]
Phone: +[44] – [(0)29 2087 4696]

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**Contributions:**

1. "Transportation job scheduling and process mining in shipbuilding factory based on digital twin" by Jinsong Bao etc.
2. "Semantic-aware digital twins towards self-assembly system automation" by Yuqian Lu etc.
3. "Deep learning-based controllable digital twins in 3D printing monitoring" by Ying Liu etc.
4. "Digital twin-driven smart shop floor control" by Fei Tao etc.
5. More to be confirmed.

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