#### **IEEE CASE 2025 Special Session**

# Neuro-Symbolic AI: Empowering Trustworthy and Embodied

### **Robotic Autonomous Life Cycle Manufacturing**

## **Call for Papers**

The IEEE 21st International Conference on Automation Science and Engineering (CASE 2025) will be held on August 17 – August 21, 2025, in Los Angeles, California, USA. CASE is the flagship conference of the IEEE Robotics and Automation Society (RAS) and constitutes the primary forum for cross-industry and multidisciplinary research in automation. The conference will focus on **Secured and Trustworthy Automation**: Automation systems such as collaborative robotics, self-operating systems and vehicles, smart manufacturing, healthcare, farming, transportation & logistics, and smart cities, increasingly rely on secured and trustworthy automation. Research is needed to overcome vulnerability and bias due to imperfect system design, data collection, machine learning, or control.

CASE 2025 will feature a Special Session on "*Neuro-Symbolic AI: Empowering Trustworthy and Embodied Robotic Autonomous Life Cycle Manufacturing*" organized by the Neuro-Symbolic AI Home. We sincerely invite scientists, scholars, engineers, and entrepreneurs engaged in related research fields to submit their contributions and join us in exploring the latest advancements and application prospects of neuro-symbolic AI in robotic autonomous lifecycle manufacturing. For more information, please visit:

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- CASE 2025 Conference Website: *https://2025.ieeecase.org/*Neuro-Symbolic AI Home Website: *https://www.nsaihome.org.cn/*
- Conference Date and Venue:
- August 17 to August 21, 2025
- Millennium Biltmore Downtown Los Angeles, California, USA

### 1. Introduction to CASE 2025 Special Session

### Title: Neuro-Symbolic AI: Empowering Trustworthy and Embodied Robotic Autonomous Life Cycle Manufacturing CODE: w8ghk

# The integration of neuro-symbolic AI with embodied robotics presents a transformative opportunity for the field of autonomous life cycle manufacturing. Traditional AI approaches often struggle with the complex, real-world environments encountered in

processing, assembly, disassembly, end-of-life treatment tasks, which require both high-level reasoning and precise physical interaction. Neuro-symbolic AI, which combines the strengths of neural networks (for learning and adaptability) with symbolic reasoning (for interpretability and robustness), offers a promising solution to these challenges.

The primary objective of this special session is to explore the integration of neurosymbolic AI techniques in the context of robotic autonomous life cycle manufacturing, including design, processing, assembly, disassembly, end-of-life treatment with a focus on enhancing autonomy, agility, trustworthiness, and embodiment.

# 2. Sub-topics

Including but not limited to:

- Neuro-Symbolic AI Frameworks for Robotic Autonomous Life Cycle Manufacturing
- Multimodal Perception, including Vision, Tactile Sensing, etc, in Processing, Assembly, Disassembly, End-of-life Treatment
- Planning and Sequencing in Autonomous Processing, Assembly, Disassembly, End-of-life Treatment
- Human-Robot Collaboration in Processing, Assembly, Disassembly, End-of-life Treatment Tasks
- Trustworthiness and Transparency in Neuro-Symbolic Systems
- Neuro-symbolic AI in Circular Economy Initiatives
- Embedding knowledge into Neural Networks for efficient learning
- Interdisciplinary Approaches to Autonomous Processing, Assembly, Disassembly, End-of-life Treatment
- Future Directions and Research Gaps in Neuro-Symbolic AI and Embodied Robotics

# 3. Organizers

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- Wang Zhigang, Research Scientist, Intel Labs China. E-mail: zhi.gang.wang@intel.com
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## 4. Requirements for Special Session Papers

- Special session papers undergo the same review and selection process as regular papers.
- The number of pages (including text, figures, tables, acknowledgement and references) is limited to six, but two additional pages will be permitted at an extra page charge. Special session papers exceeding 8 pages will be returned without review.
- All papers must be submitted in PDF and must follow the standard IEEE conference double column format. Please refer to the guidelines below for templates and additional requirements:

https://2025.ieeecase.org/call-for-papers/#guidelines

- Special session papers will be included in the conference program and published in IEEE Xplore.
- Special session paper submission deadline: March 1, 2025.

### 5. How to Submit a Special Session Paper

To submit your special session paper please follow these steps:

(1). Create an account (if you don't have one already) on the **RAS Papercept** submission portal (*https://ras.papercept.net/*). Generate a PIN by clicking on the "**PIN**" tab, and then select "**Register a new PIN**". Kindly request all your co-authors to follow the same process if they don't have an account in the system yet. Make sure to note down the authors' PINs as this information is necessary for manuscript processing.

(2). Download the LaTeX or MS-Word template from the guidelines provided in *https://2025.ieeecase.org/call-for-papers/#guidelines*. Utilize these templates and adhere to the specified requirements to write your paper. After completing your paper, save it in PDF format.

(3). The special session code is: **w8ghk**.

(4). Access the **RAS Papercept submission portal** (*https://ras.papercept.net/*) and click the link "Submit a contribution to CASE 2025".

(5). Click on "**Special Session Paper**" and follow the submission instructions provided on the submission portal, indicating the special session code.

# For more information, please visit:

- CASE 2025 Conference Website: https://2025.ieeecase.org/
- Neuro-Symbolic AI Home Website: *https://www.nsaihome.org.cn/*