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Special Issue on Trustworthy AI for Automation Control of Embodied Agents in the Era of Foundation Models

Foundation models are increasingly used beyond language and vision tasks and are becoming a component of robotic systems, particularly in automation control applications. These developments have significantly impacted the development of embodied agents, including robots and autonomous systems, by enabling more adaptive and generalizable control strategies. Such foundation models have the potential to improve robotic solutions in automation control since they require little to no training on a new task that is solved in a similar solution space as the tasks used for training. This capability is especially valuable for dynamic automation environments where control policies must adapt rapidly to shifting operational demands. As robotic agents using foundation models become more integrated into society, ensuring their trustworthiness becomes paramount. This encompasses not only safety but also dimensions like explainability, robustness, accountability, and transparency in their automation control frameworks. This special issue aims to gather leading researchers and practitioners to explore recent advancements, challenges, and future directions in developing trustworthy AI for automation control of embodied agents. As a highly interdisciplinary field and we are targeting both theoretical soundness and practical importance of the papers, this special issue may risk not receiving enough high-quality papers. If that is the case, the proposed special issue will be reduced to a special section. We invite contributions that delve into various aspects of trustworthiness beyond safety, including but not limited to:

- **Adaption Foundation Models in Safe Automation Control for Embodied Agents:** Exploring how large-scale models can be effectively and safely incorporated into automation control frameworks for embodied agents.
- **Safe Robot Learning for Automation Control:** Ensuring safety in robotic control systems with learned components, especially in real-world applications.
- **Explainability and Interpretability:** Enhancing the transparency of decisions made by embodied AI-agents within automation control pipelines to foster user trust and facilitate debugging.
- **Robustness and Reliability of Automation Control System:** Ensuring consistent performance of AI-driven automation control systems for embodied agents in dynamic and unpredictable real-world settings.
- **Ethical Considerations and Accountability:** Navigating the moral implications of autonomous agents and establishing frameworks for responsibility.
- **Human-AI Interaction and Trust:** Studying how users perceive and trust embodied agents in automation control scenarios, and how these systems can safely adapt to human needs and feedback.

Important Dates

- Announcement of the special issue: May 01, 2025
- Completion of the first round of review: March 01, 2026
- Final manuscripts due: August 01, 2026
- Paper submission deadline: January 01, 2026
- Completion of the second round of review: July 01, 2026
- Tentative publication date: December 01, 2026

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Paper Submission

All papers are to be submitted through the IEEE's Manuscript Central for Transactions on Automation Science and Engineering <http://mc.manuscriptcentral.com/t-ase>. As of February 1, 2025 T-ASE uses Double-Anonymous Review. Please select the Manuscript Category "Trustworthy AI for Automation Control of Embodied Agents in the Era of Foundation Models-Based Special Issue" under "Type" in Step 1 and this specific Special Issue in Step 6 of your article's submission process. Please address inquiries to the Leading Guest Editor:

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