CPS: Small: Neuro-Symbolic Learning and Control with High-Level Knowledge Inference

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Challenge: Application of AI to CPS:

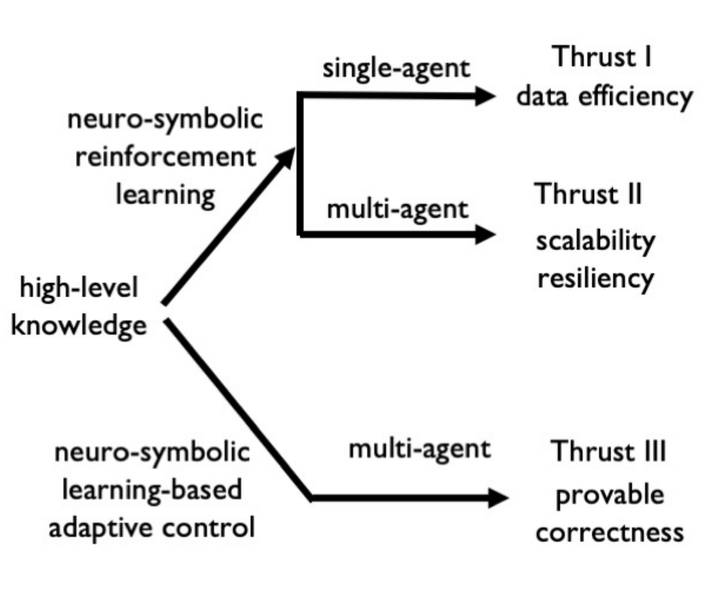
- Extensive need for data and online interactions
- Lack of interpretability and transparency
- Lack of robustness and transferability

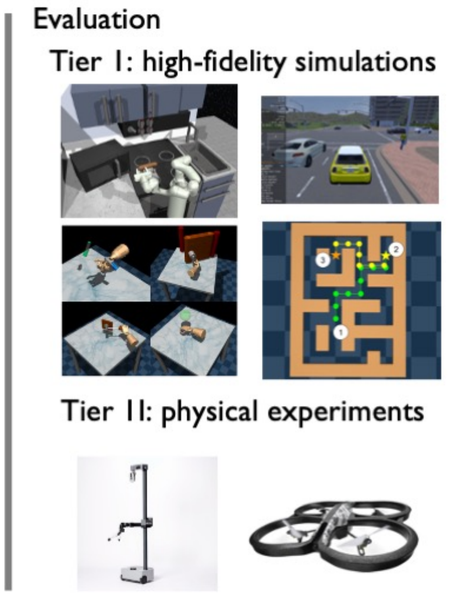
Solution:

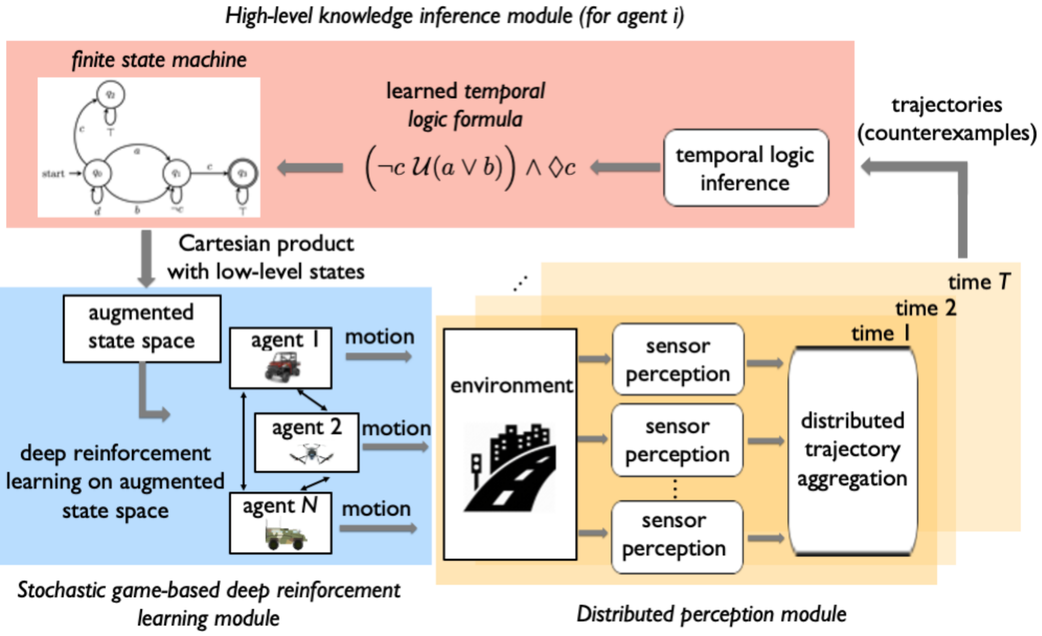
- Data-efficient neuro-symbolic reinforcement learning with high-level knowledge inference
- Scalable and resilient neuro-symbolic multi-agent reinforcement learning with high-level knowledge inference
- Provably correct neuro-symbolic multi-agent learning-based adaptive control with unknown dynamics and high-level specifications

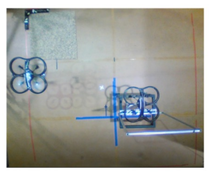
Scientific Impact:

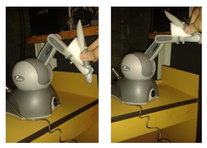
- To address the cross-cutting issues of applying the neuro-symbolic approaches to CPS so that data efficiency, interpretability, scalability, and resiliency be significantly improved.








extracting strategies of quadrotors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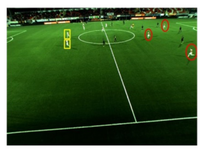
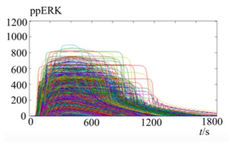
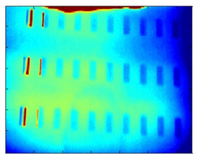

extracting soccer strategies



model discrimination for biological systems


explaining additive manufacturing patterns


explaining privacy-preserving fault detection

Broader Impact:

- Proposed effort has a special focus on CPS, including but not limited to robotic systems, autonomous systems, and networked CPS.
- Undergraduate and graduate courses and research workshops
- K-12 outreach by participating in the campus-wide activities at ASU

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