CRII: CPS: A Self-Learning Intelligent Control Framework for Networked Cyber-Physical Systems

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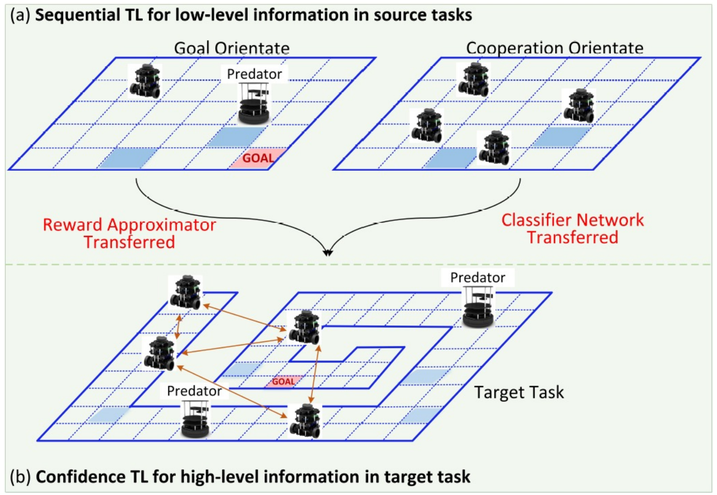
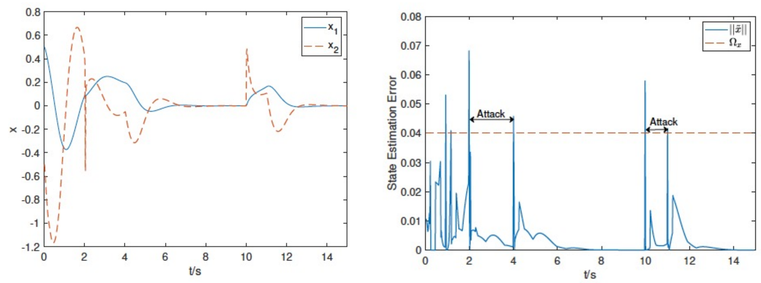
Challenge:

- Scale reinforcement learning techniques to networked CPS environment to build intelligent systems.
- New generation of intelligent networked CPS is required the abilities of self-learning.

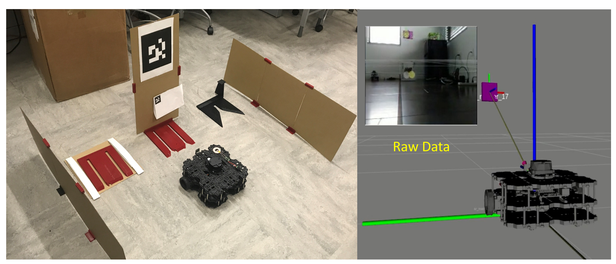
Solution:

- Design self-learning intelligent RL algorithms without external supervisions.
- Develop novel transfer learning architectures to scale RL algorithms.
- Establish robotics testbed to advance the learning in real-world applications.





Results of the designed intelligent methods



Autonomous driving and wireless charging

Scientific Impact:

This project can advance the RL and association of intelligent control in computational intelligence and control societies. Furthermore, through the developed new RL approaches, this project bridges the connection with other disciplines, all of which will provide new understandings of machine intelligence from different perspectives.

Broader Impact:

- Advance reinforcement learning for networked CPS which can have emergent behaviors when they interact.
- Provide research opportunities for undergraduate students (e.g., senior designs and direct independent studies) on fundamental design with the established robot testbed.
- Cultivate the scientific curiosity of K-12 students, and students from underrepresented groups, and motivate their interests in Science, Technology, Engineering, and Math (STEM) programs.

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