2021 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

Safe Learning in Co-Robots--Theory, Experiments and Education

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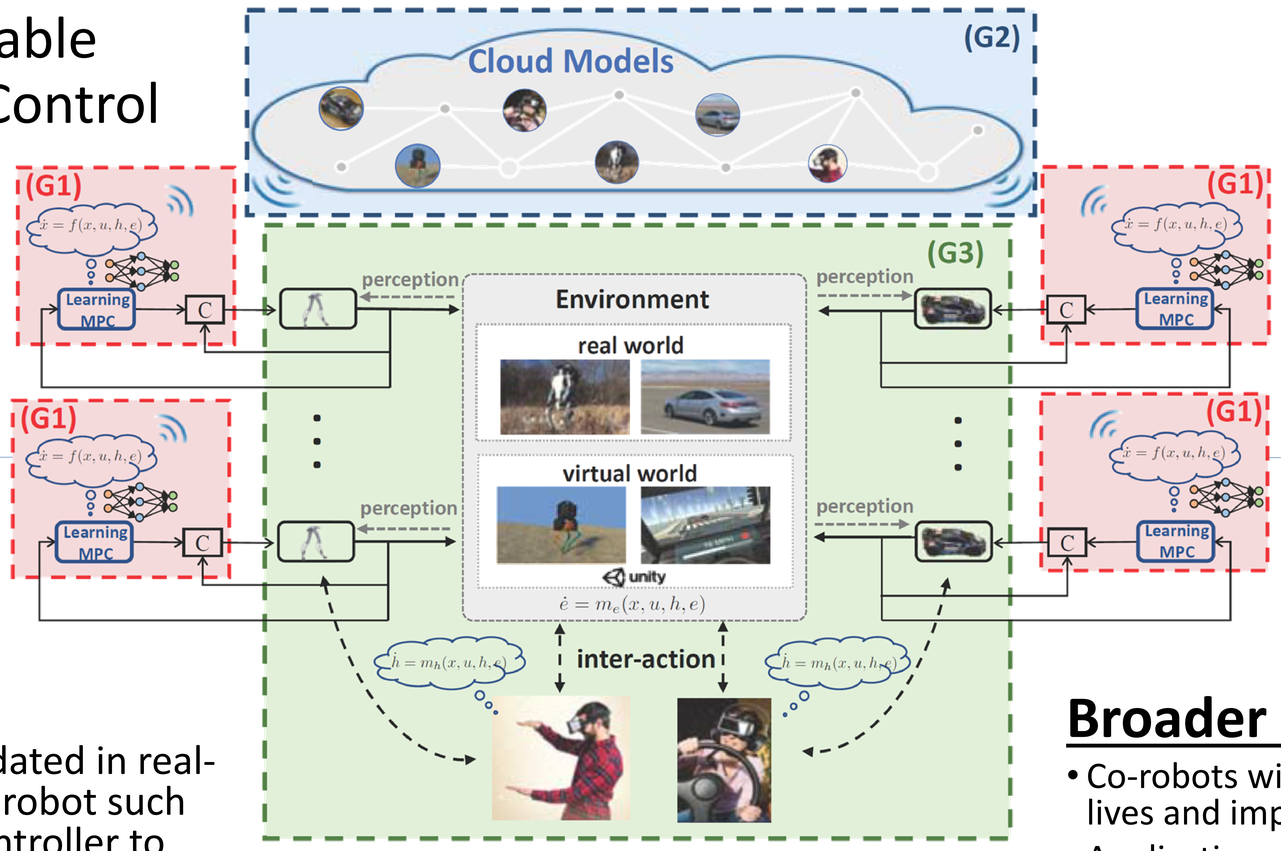
Challenge:

- Design of Safe and Scalable Collaborative Robotics Control Systems



Solution:

- Robots and human models are updated in real-time using data feeds. Within each robot such models are used by a predictive controller to forecast robot motion and human interaction, and take corresponding safe and collaborative actions
- The theory will provide guarantees of performance improvement and safety during the learning process

Project info: www.mpc.berkeley.edu

Scientific Impact:

- Addressing the fundamental challenge of safety and performance guarantees as one moves from model-driven co-robots CPS to data-driven co-robots CPS

Broader Impact:

- Co-robots will cooperate with people in order to save lives and improve life quality
- Applications include disaster relief, rescue missions, homeland security and assisted healthcare. For such systems, today, there is no scalable methodology to introduce effective and performing co-robots in the task executed by a human team
- A Human-and-Hardware-in-the-Loop (HHIL) platform will be designed to drastically lower the existing barriers for teaching co-robots in large classes