Abstract — Cyber-physical system (CPS) is a novel system framework that endues physical systems with powerful computational abilities and abundant knowledge via the infrastructure of ubiquitous networks around the world. By connecting to the internet worldwide, physical systems become a portion of the communication nodes and have the ability to access other computer nodes in the cyberspace. This project studies robot control in CPS.

Motivation

Networked robotic systems have been widely studied under the assumption of continuous communication network or periodic sampled-data control algorithms without packet loss from unreliable network. However, most of cyber-physical robotic systems rely heavily on higher sampling rate and network access frequency. Therefore, robotic systems have to exchange information with each other continuously or with fixed sampling instant so that the communication between robots cannot be interrupted.

Research Method

- Propose Passivity-Based Packet Modulation (PBPM) to cope with packet loss in communication network.
- Propose Event-triggered Control for nonlinear bilateral teleoperation.

Main Results

- **Passivity-based control framework for task-space bilateral teleoperation with parametric uncertainty over unreliable networks**[1,2]

With the proposed event-triggered control, the master and slave robots exchange their output signals when the triggering condition is satisfied so that the network access frequency can be reduced significantly.

**References**


