NEXT LEVEL INNOVATION IN ROBOTICS AND AUTONOMY

Author: **Dr. I. N. Kar**

Title: Robust Event-Triggered Control as an Optimal Control Problem

In Cyber-physical System or Networked Controlled Systems, multiple physical systems are interconnected and exchange their local information using a shared network. Due to shared nature of the communicating medium, the continuous or periodic transmission of information incurs a large bandwidth requirement. In the recent past, it isshown that aperiodic sampling has more benefits over periodic sampling to reduce the consumption of resources. Specifically, the event-based sampling exhibits the effective reduction of network bandwidth within the feedback loop. In event-based sampling, a new information is exchanged among the cyber components only when truly needed. The key deficiency with classical event-triggered control is the need to have access to an accurate model of the studied system in order to devise the event-triggering rule. In practice, system modelling inevitably simplifies the actual system operation and thereby introduces a certain level of inaccuracy, which have practical implications. Such uncertainties have several possible origins: nonlinearities, variations in the system's parameters, components unaccounted for in the dynamical model, and pervasive perturbations. These issues thereby necessitate the development of a robust controller. In this talk, I will focus on optimal control strategy to design an event-triggered feedback policy using aperiodic feedback information. The essential idea of optimal control approach to robust control design isthat an optimal control input is derived for a virtual system by minimizing a suitable quadratic cost-functional. The optimal input for a virtual system is shown to be the robust solution of original uncertain system. The designed control law acts on the physical system where state model is affected by both matched/mismatched uncertainties.