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TUTORIAL

Time-Sensitive Network-Control Systems and Applications

Presented by

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Synopsis

A Time-Sensitive Networked Control System (TS-NCS) is a feedback control system wherein the control loops are closed through a real-time network with time-sensitive applications. NCS are multi-disciplinary efforts whose aim is to produce a network structure and components that are capable of integrating sensors, actuators, and control algorithms over a communication network in a manner to suit real-time applications. NCS has been gaining popularity due to their high potential in widespread applications and becoming realizable due to the rapid advancements in embedded systems, wireless communication technologies.

This tutorial presents fundamental of network control systems. We will then present several concerns including network delay, packet loss, and resource allocation about TS-NCS, and solutions to integrate distributed sensors, distributed actuators, and distributed controllers. The tutorial will describe and demonstrate the use of Predictive Gain Scheduling Control and Dynamic Bandwidth Allocation of multiple unmanned ground vehicles in a network-based integrated navigation system for illustrations.

About the Speaker

Dr. Mo-Yuen Chow is a in the Department of Electrical and Computer Engineering at North Carolina State University. Dr. Chow's research focuses on fault diagnosis and prognosis, distributed control, and computational intelligence. He has established the Advanced Diagnosis and Control

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Laboratory at NC State University. He has published one book, several book chapters, and over one hundred journal and conference articles related to his research work. He is an IEEE Fellow, and has received the IEEE Region-3 Joseph M. Biedenbach Outstanding Engineering Educator Award the IEEE ENCS Outstanding Engineering Educator Award. He is the Editor-in-Chief of IEEE Transactions on Industrial Electronics, and an Associate Editor of IEEE Transactions on Mechatronics.