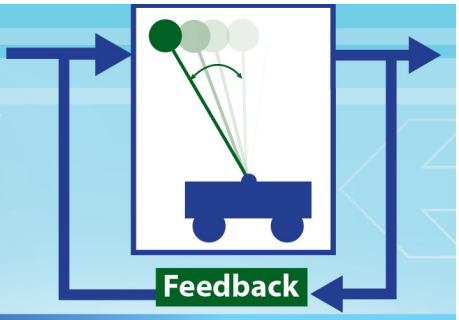
COLLEGE OF ENGINEERING

Control Seminar



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Stochastic Control of Engine Knock

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Friday, February 17, 2017

3:30 – 4:30 pm • 1500 EECS

ABSTRACT: The ability to operate a gasoline engine at peak efficiency is often limited by knock, an undesirable combustion phenomena which must be controlled if rapid engine damage is to be avoided. However, knock behaves as a cyclically independent random process, so it is not possible to control knock intensity directly or to use conventional / deterministic control system design methodologies. This talk outlines new approaches in stochastic knock controller design which aim to control the distribution from which knock events are drawn, based on the cumulative summation or likelihood ratio of the observed knock events. The random nature of knock also means that the transient performance of the system cannot be assessed from a single instance or experiment, and new methods are therefore described for predicting the statistical properties and distribution of the closed loop system response.

BIO: James Peyton Jones received the B.A from Oxford University, and Ph.D. from the University of Sheffield, both in the UK. He then taught at the University of Sussex before moving to the USA and joining Villanova University. He is currently a full professor in the Department of Electrical & Computer Engineering and has also served as director of Villanova's research Center for Nonlinear Dynamics & Control (CENDAC). His primary interests are in dynamics, system identification, nonlinear frequency response analysis, and control, often with application to automotive powertrain systems. He is a senior member of IEEE and recently received the SAE Lloyd Withrow distinguished speaker award.