City University of Hong Kong
Department of Electronic Engineering

Presents a Faculty Candidate Seminar on

Optimal Privacy-aware Estimation: An Entropy Constrained Approach

by

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Venue: **Room G6302, Yeung Kin Man Academic Building, City University of Hong Kong**

Language: **English**

Abstract

Networked systems play major roles in our society by providing critical services such as intelligent transportation systems and the smart grid. The operation of networked systems relies on the estimation procedure which computes the values of the desired variables based on noisy information collected by sensors. However, sensors' measurements might contain private information. Thus, revealing the output of an estimator to an untrusted party might result in the loss of privacy. For example, the occupancy level of a building, which is considered as private information, can be inferred from temperature estimates.

In this talk, we will study the design of the optimal privacy-aware estimator of a public (non-private) random variable based on noisy measurements which contain private information. The privacy metric is defined as the discrete conditional entropy of the private random variable, which carries the private information, given the output of the estimator. The objective is to design an estimator for the public random variable such that the leakage of the private information, via the estimation process, is kept below a certain level. We will show that the optimal privacy-aware estimator is the solution of a convex optimization problem. The notion of perfect-privacy is introduced which ensures that the estimator's output is independent of the private information. It will be shown that the optimal perfect-privacy estimator is the solution of a linear optimization problem. A sufficient condition for the existence of the optimal perfect-privacy estimator will be presented.

Biography
Dr Ehsan Nekouei received the B.Sc. degree from Shahid Bahonar University of Kerman, Kerman, Iran, in 2003, the M.Sc. degree from Tarbiat Modares University, Tehran, Iran, in 2006, and the Ph.D. degree from The University of Melbourne, Melbourne, Australia, in 2013. He is currently a postdoctoral researcher at the department of automatic control, KTH Royal Institute of Technology, Stockholm, Sweden. He held various research positions at The University of Melbourne from 2013 to 2016. His research interests include privacy in networked control systems, wireless communication systems and electricity markets.