Control Group Seminar
Tokyo Institute of Technology

# Hacking Control Systems, or Protecting Them

**Date: 13:30-14:30 November 27th (Mon.), 2017**
**Room: W8 E-1001**


## Prof. Hyungbo Shim

Department of Electrical and Computer Engineering,
Seoul National University



**Abstract**: As cyber-physical systems become prevalent, its security issue is gaining much attention. In this talk, we discuss several ways to attack dynamic systems, which is hardly seen by fault/anomaly detectors. Among them, the so-called zero-dynamics attack is discussed in detail, which is followed by recent result of 'robust zero-dynamics attack.' In particular, we point out the 'sampling-zero-dynamics attack' is a headache since most physical systems are controlled by sampled-data fashion. On the other hand, we also discuss how to protect control systems from the attacks. Three ideas are sketched. First one is against sensor attack, which is based on sparsity of compromised sensors. Second one is utilizing generalized holder to shift the location of zeros. The last one is using homomorphic encryption technique taken from cryptography community.

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**Biography** :

Hyungbo Shim received the B.S., M.S., and Ph.D. degrees from Seoul National University, Korea, and held the post-doc position at University of California, Santa Barbara till 2001.

He joined Hanyang University, Seoul, Korea, in 2002.

Since 2003, he has been with Seoul National University, Korea.

He served as associate editor for Automatica, IEEE Trans. on Automatic Control, Int. Journal of Robust and Nonlinear Control, and European Journal of Control, and as editor for Int. Journal of Control, Automation, and Systems.

He was the Program Chair of ICCAS 2014 and Vice-program Chair of IFAC World Congress 2008.

His research interest includes stability analysis of nonlinear systems, observer design, disturbance observer technique, secure control systems, and synchronization.