

Cyber-Physical Systems Security

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Monday, June 4, 2012



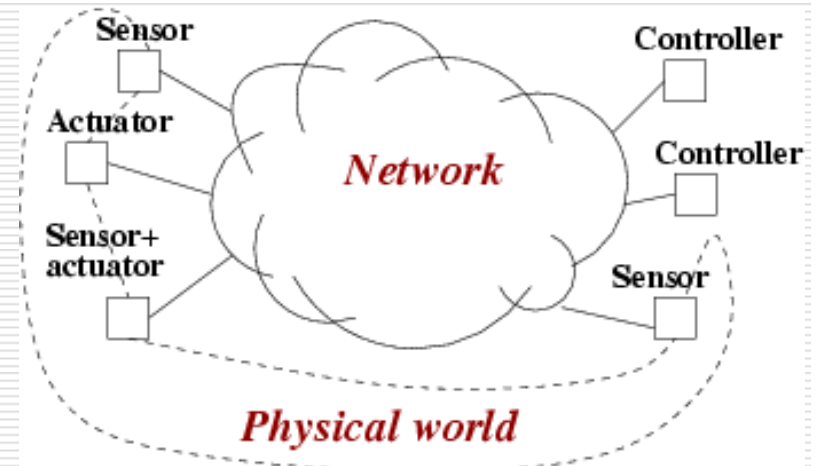
Research Interests

- Broad areas
 - Networks
 - Distributed systems
- Particular Subjects
 - Cyber-Physical Systems
 - Smart power grid
 - Congestion control
 - Congestion control for CPSs
 - Theoretical results for TCP-AQM feedback loop
 - Middleware for real-time applications
 - Distributed, multi-agent framework for remote interaction with intelligent systems



Main Projects

- CPSs & Smart power grid
 - Interconnection of sensors, controllers & actuators over a communication Network
 - Remote interaction/control with the physical world
 - NCSs, DCSs, SANETs, ...
 - Applications:
 - Industrial automation & process control
 - Space exploration
 - Smart power grid





Main Projects (cont'd)

- CPSs & Smart power grid
 - Activities
 - Simulation & emulation tools
 - Tightly integrate fine-grained models of power grid and of communication dynamics
 - CPSs security
 - Critical infrastructure
 - Power grid, nuclear power, gas pipelines, water treatment facilities, air traffic system & stock market
 - Threats: communication infrastructure, GPS
- FFNs (with Basheer)
 - Activities
 - Characterization and Detection of Fast Flux Networks



Pilot Projects

- Leveraging online social networks for a real-time malware alerting system
 - Beyond single-point signature-based anomaly detection
 - Exploiting the power of crowd sourcing
 - Update/post messages
 - Radically very divers in topics
 - Represent a fertile environment for mining for useful information
 - Activities
 - Data mining of Twitter's tweets
 - Utilizing OSNs to alarm against the spread of new malware, e.g., viruses, worms, and Trojan horses



Pilot Projects (cont'd)

- Undoing sending an E-mail
 - Reasons
 - Sending an e-mail with no subject
 - Accidentally pressing the “Send” button instead of the “Spell check”
 - Sending a sensitive e-mail to a friend instead of a family member
 - Forgetting attaching a necessary file
 - Activities
 - Modifying the SMTP by adding a new “DELETE” command

Questions



- Thank you!
- Selected Recent Publications
 - Ahmad T. Al-Hammouri. A comprehensive co-simulation platform for cyber-physical systems. *Computer Communications*, (0):–, 2012.
 - Ahmad T. Al-Hammouri, Lars Nordström, Moustafa Chenine, Luigi Vanfretti, Nicholas Honeth, and Rujiroj Leelaruji. Virtualization of synchronized phasor measurement units within real-time simulators for smart grid applications. In *IEEE Power and Energy Society General Meeting (PES GM 2012)*, San Diego, California, USA, July 2012.
 - Kun Zhu, Ahmad T. Al-Hammouri, and Lars Nordström. To concentrate or not to concentrate: Performance analysis of ICT system with data concentrations for wide-area monitoring and control systems. In *IEEE Power and Energy Society General Meeting (PES GM 2012)*, San Diego, California, USA, July 2012.
 - Isra' Al-Qasem, Sumaya Al-Qasem, and Ahmad T. Al-Hammouri. Leveraging online social networks for a real-time malware alerting system. In *Undergraduate Research Conference on Applied Computing (URC 2012)*, Dubai, UAE, April 2012. Short Abstract.
 - Vincenzo Liberatore and Ahmad T. Al-Hammouri. Smart grid communication and co-simulation. In *IEEE EnergyTech 2011*, Cleveland, OH, USA, May 2011.
 - Amro J. Awad, Hatem S. Mashaqi, Abdirahman S. Alasow, and Ahmad T. Al-Hammouri. Undoing sending an E-mail. In *Undergraduate Research Conference on Applied Computing (URC 2011)*, Dubai, UAE, May 2011. Short Abstract.