Ethics and Privacy in Cyber Physical Systems

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Cyber Physical Systems are...

Smart Cities/Cars/Grid...

Networks + Applications

Sensors+ Actuators

Infrastructure
A Case Study: Power Grid

Generation
Transmission
Distribution
A Case Study: Smart Grid

Pro-consumers  Demand-Response
Smart Home

Efficiency

Sustainability

Load Adjustment/Curtailment

Price Discrimination
Impact on Privacy and Ethics

- Sharing of data to support efficiency → loss of privacy and misuse of data

- Automated actors connected to the power grid → political and legal issues concerning reliability and resilience

- Digital Divide been have and have-nots

- Pro-consumer liabilities and responsibilities
Personal Insight: Models for Security and Resiliency of CPS

- Natural Disasters
- Hackers Attacks
- Power Systems
- Smart Grid
- Smart Cities
- Energy Generation

 USC Viterbi School of Engineering
Center for Cyber-Physical Systems and the Internet of Things
Foundations of CPS

**Resilience**

**Cyber**
- Sensors and Comm.
- Network Infrastructure
- Applications
- Distributed Systems

**Physical**
- Power Grids
- Water Distribution
- Gas Pipelines
- Transportation

**Humans**
- Demand Response
- System Operators
- Semi-Cooperative
- Adversarial

**Empowered Actors**
CPS Projects

Exploring what-if scenarios to
• Evaluate systems in realistic environments
• Develop policies to encourage defined goals
• Evaluate complex interconnected CPS
• Establish research priorities to protect the nation’s critical infrastructure
Distributed Control and Estimation

Damping Control error spikes during attacks

Distributed estimation and Control to minimize error
Resilient Interconnected NG-Power

- Traditional power generation on decline
- With empower pro-consumers; a large cold snap can lead to severe shortages
- Solutions to ensure efficient interaction between gas and power infrastructures for resilient operation
Thank you

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