Breakthrough: CPS-Security: Towards provably correct distributed attack-resilient control of unmanned-vehicle-operator networks

- [INVESTIGATORS] Minghui Zhu (PI), Peng Liu (co-PI)
- [AFFILIATION] Pennsylvania State University
- [WEBSITE] http://php.scripts.psu.edu/muz16/index.php
- [EMAIL] muz16@psu.edu, pliu@ist.psu.edu
- [AWARD #] CNS 1505664

Description

Provably correct control-theoretic approaches for CPS security with a particular emphasis on vehicles; e.g., autonomous vehicles and drones.

- **Intrusion detection:** Detect, identify and quantify cyberattacks.
- **Intrusion response:** Ensure mission completion despite cyberattacks.

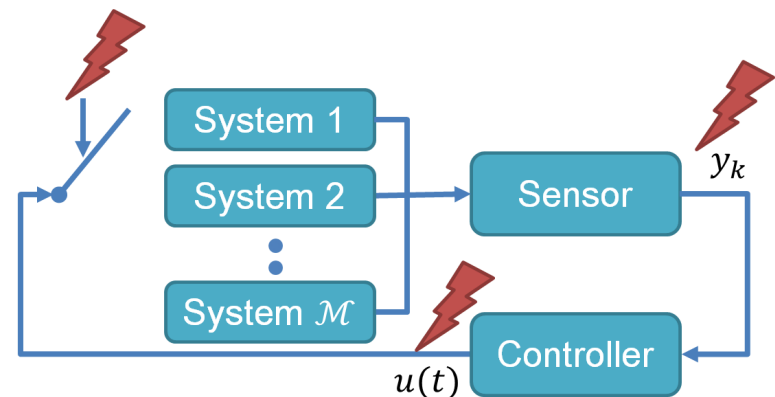Water Distribution
(Australia 2000)

Traffic Light Control
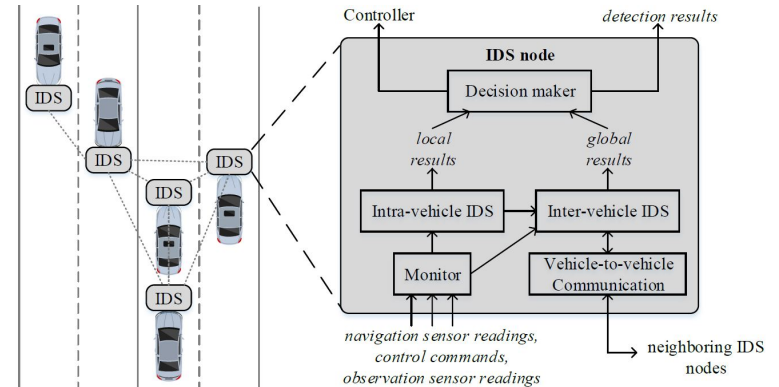(Los Angeles 2008)

Nuclear Facilities
(Iran 2010)

Jeep Hijacking
(St. Louis 2015)

System 1

System 2

System $\mathcal{M}$

Sensor

y_k

Controller

$u(t)$

Findings

Intrusion detection:
Leverage estimation theory to develop a general framework to tackle sensor attacks, actuator attacks and switching attacks on nonlinear systems.

Intrusion response:
Develop distributed resilient controllers for swarms against denial-of-service attacks, replay attacks and false data injection attacks.