2021 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

Naming, Twinning, and Observing—Towards Cyber-Physical Systems Spanning Administrative and Geographical Boundaries

Challenge:

Lack of fundamental CPS network services results in:

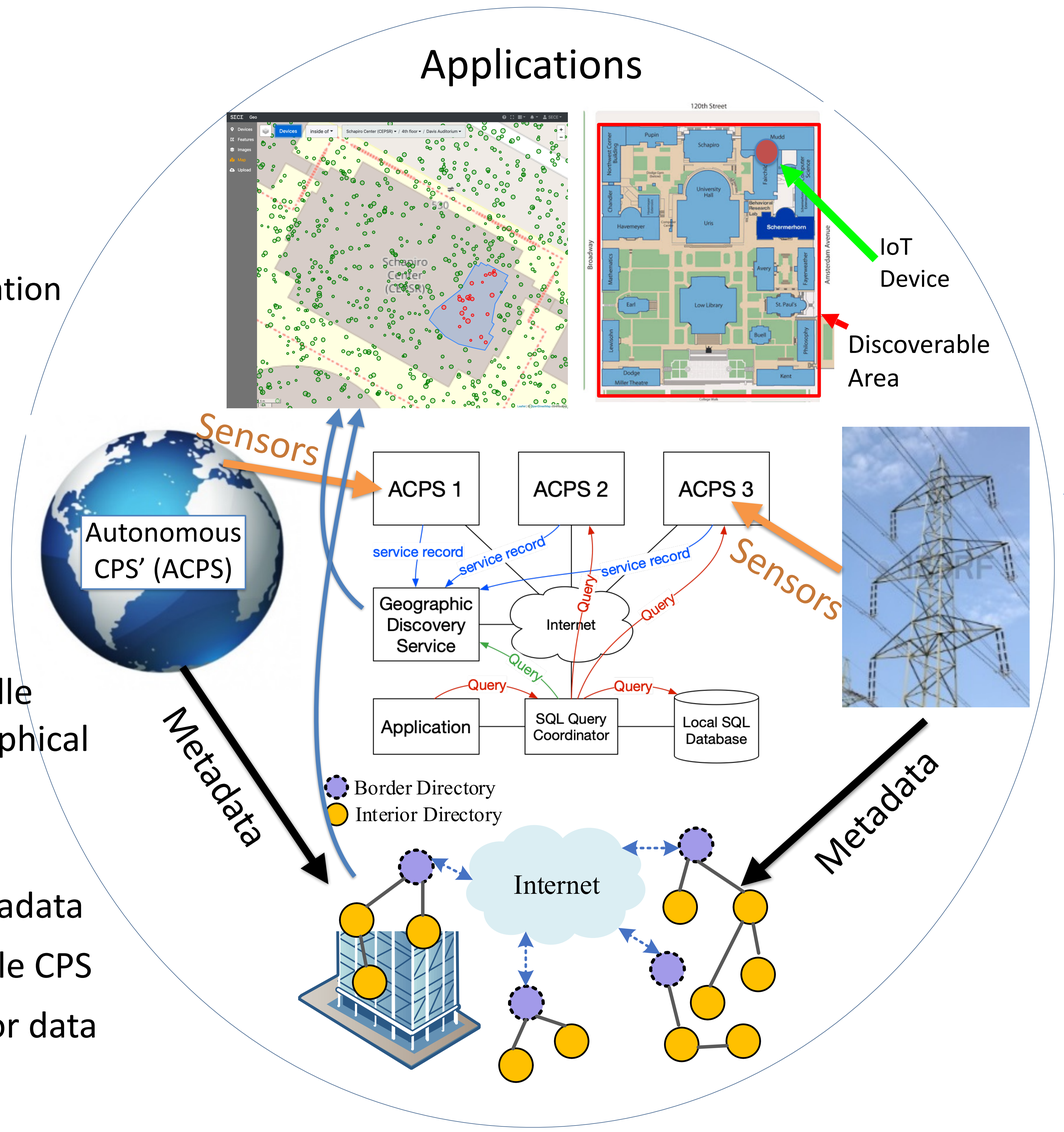
- no application flexibility (hard-wired IP addresses)
- difficult service discovery across application and system domains
- unclear data storage, query processing, and access control model

Solution:

Design network services to enable CPS applications that are cross-domain, handle evolving infrastructure, and span geographical and administrative boundaries.

Contributions:

1. Cross-domain directory for device metadata
2. Naming model & resolver for large-scale CPS
3. Decentralized storage service for sensor data



Scientific Impact:

Common network services could improve dependability and longevity of applications interacting with large-scale, evolving and heterogeneous CPS systems.

Service-oriented architecture allows faster design, software development at scale, and an ability to test against various network and environment conditions.

Broader Impact:

Help developers design dependable CPS systems and allow third-parties to test such systems. Dependability and testing is increasingly important as CPS/IoT systems become pervasive.

Example: Power grid infrastructure with secure device metadata and sensor data storage services could be black-started in days rather than weeks in case of a network-based cyber attack.

Education & outreach: The project supports 2 PhD students and two REU students (summer 2021).

Award #: 1932418, Date: October 1, 2019
PI: Prof. Henning Schulzrinne
Contributions: Luoyao Hao, Jan Janak
Organization: IRT Lab, Columbia University