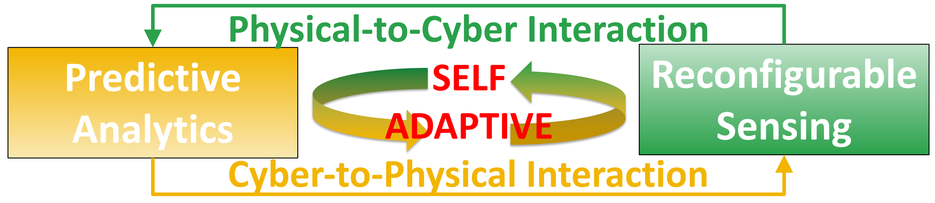
Collaborative Research: CPS: Mutualistic Cyber-Physical Interaction for Self-Adaptive Multi-Damage Monitoring of Civil Infrastructure

Kaijian Liu, Lead PI (Kaijian.Liu@stevens.edu)[‡]; Nora El-Gohary, PI[†]; Vikram Adve, Co-PI [†]; Yi Bao, Co-PI [‡]
[‡] Stevens Institute of Technology; [†] University of Illinois at Urbana-Champaign

Mutualistic CPS

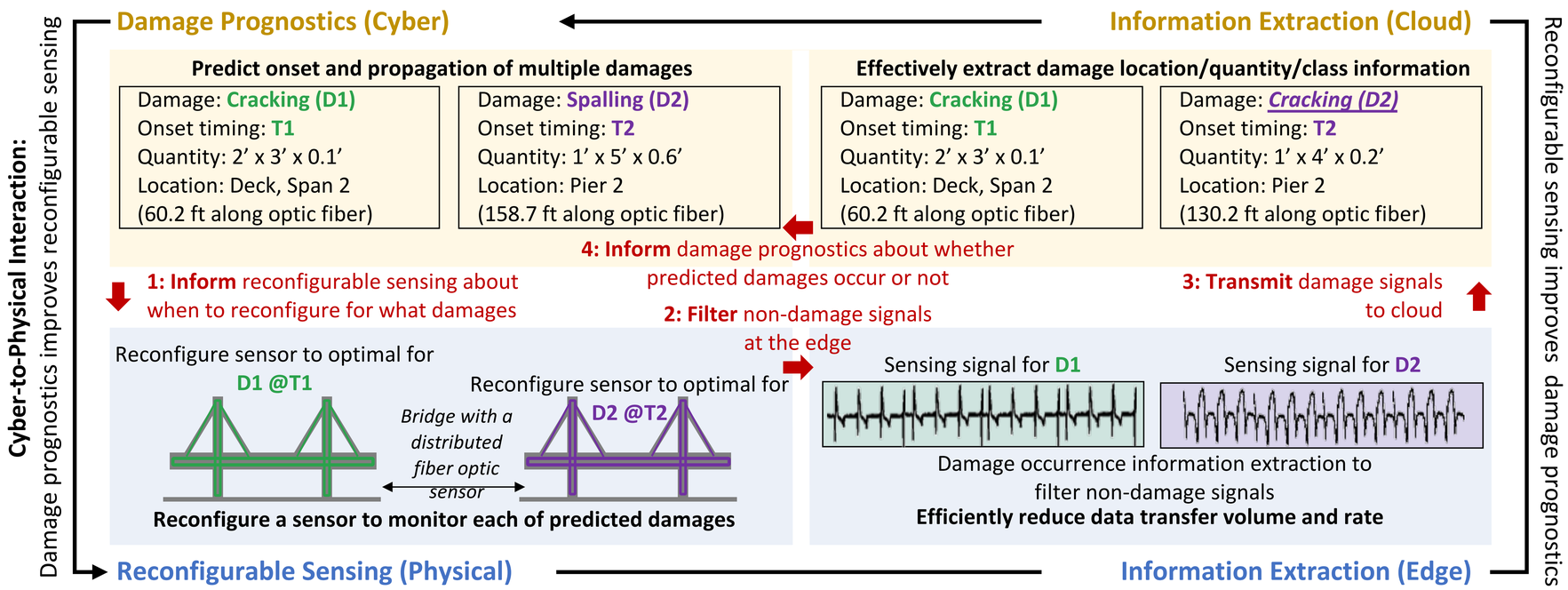
- Predictive analytics & reconfigurable sensing mutually benefit each other
- Improve the ability of CPS to predict, reconfigure, and adapt



Challenge:

- Generalizable and knowledge-consistent predictive analytics
- Optimization and adaptive control for reconfigurable sensing
- Efficient and effective information extraction

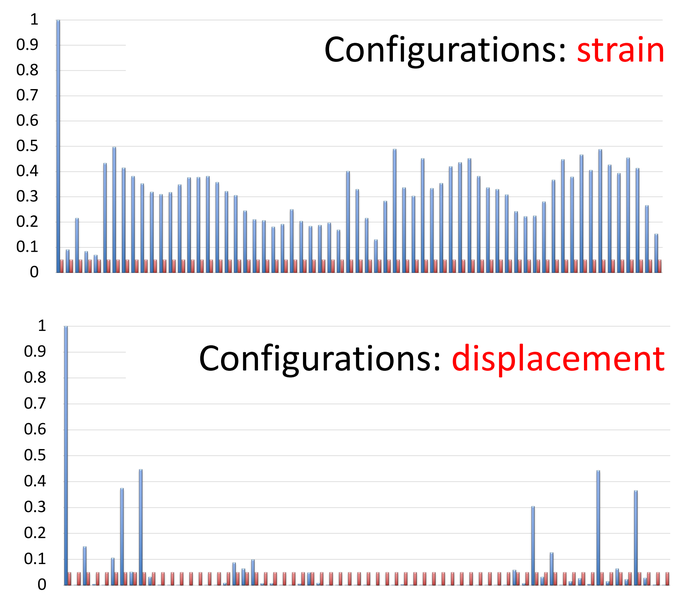
Solution:



Scientific Impact:

- Enable self-adaptive, cost-effective infrastructure monitoring
- Offer knowledge-informed ML, sensor reconfiguration, and quality-aware efficiency optimization methods translational to other CPS

Need reconfigurable sensing for infrastructure monitoring (Liu et. al 2024)

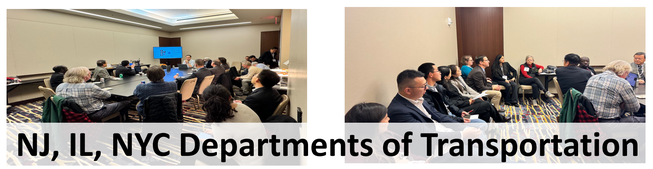


Broader Impact:

- Cost-effective infrastructure monitoring
- Resilient infrastructure & public safety

Education and Outreach:

- K-12 engagement (2024)
- CPS competition: Resilient infrastructure (2024)
- TRB Workshop (01/2024)



NJ, IL, NYC Departments of Transportation

Award Start Date: 08/01/2023

Award ID#: 2305882 & 2305883