2021 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

Statistical Performance Analysis and Resource Management for Cyber-Physical Internet of Things Systems

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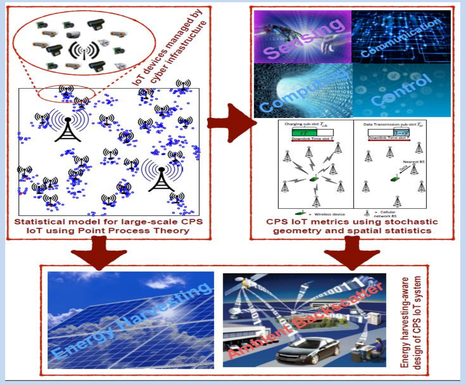
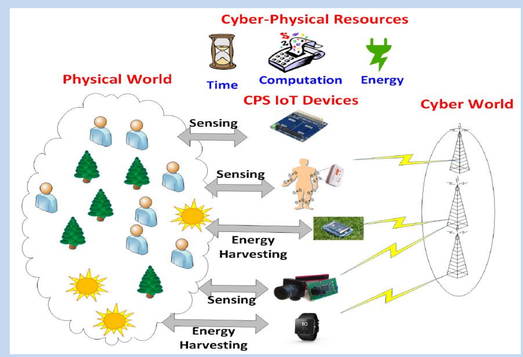
Project Goal: Develop novel and comprehensive CPS science that will enable modeling, designing, and optimizing the IoT as an integrated cyber-physical system while turning the relationships between its cyber and physical elements into system-wide efficiency.

Novel statistical CPS models and CPS performance indicators for the IoT



Thrust I: Statistical Framework for the Performance Characterization of CPS IoT

New resource management framework that exploits the models and metrics from Thrust I to guarantee desired performance targets at each CPS IoT device



Thrust II: Cyber-Physical Resource Management with Finite Device Capabilities

Experimental Evaluation and Validation

Evaluation of the proposed framework using simulations and Android testbed

Rep. Technical Contributions

Age-optimal CPS IoT design: New results on the structure of age-optimal policies using deep reinforcement learning; and quantification of spatial disparity in age of information using ideas from stochastic geometry.

Distributed learning in the sky: New approach to perform distributed learning with a swarm of UAVs while accounting for communication, control, and learning metrics.

Broader Impacts

In addition to interdisciplinary advances to multiple fields, the broader impact has been through curriculum development, student training, tutorials, outreach, and dissemination.

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