Toward a statewide public Internet of Things (IoT) network

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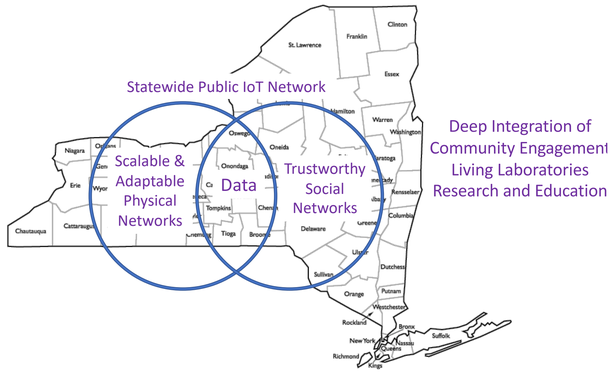


Motivation

- The project is motivated by an imperative need to bridge the digital divide between rural and urban areas, such as in New York State, which has contributed not only to information disparities, but also greater social, democratic, educational, and economic disparities.
- Researchers team up with Cornell Cooperative Extension (CCE) offices in 62 New York State Counties to bridge the digital divide.

Vision

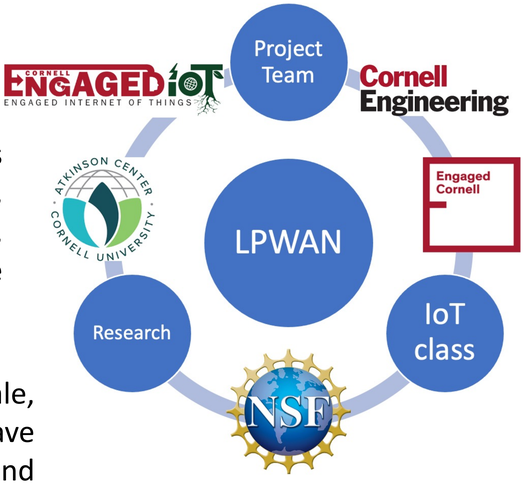
- Our vision is that, connected through a coordinating entity, municipalities across the New York State operates their own public IoT networks, offering services as basic utility, and those distributed IoT networks form a statewide network that provides 100% coverage to New York residents and effectively bridges the digital divide.
- This project explicitly sees rural communities as opportunities for developing new networked technologies which can leapfrog traditional wired broadband technologies and create new opportunities for local technological development and innovation

Testbed

- To adapt our project to the challenges posed by COVID-19, we refocused the proposed testbed development on Tompkins County, home to Cornell University.
- We are co-designing several IoT applications with community partners on energy, water, poverty, public transportation and healthcare in our local community with broad impact across the country.
- The co-design efforts have not only made compelling cases for a public IoT network, but also enabled our social scientists to investigate how community members' perception of IoT changes before and after being exposed to it

Deep integration of research, education and engagement

Enabled by the NSF support, PI Dr. Zhang has integrated three pillars in academic activities, i.e., an externally funded research project (this grant), a course and a student project team, around the theme of public IoT and community engagement.



Privacy and Trust

- As part of the proposed community-scale, appliance-level energy feedback system, we have successfully incorporated differential privacy and federated learning techniques into the energy disaggregation problem.
- We will implement those techniques in our network of building managers to test whether they help promote data sharing within the network while protecting data privacy.

Anticipated outcomes for next year

- We expect to deliver a preliminary roadmap for deploying a statewide public IoT network as an interdisciplinary team effort (e.g., network optimization, infrastructure economics and community development). The roadmap will detail the costs, benefits and financial sustainability of the network. We are hoping the roadmap will generate momentum as part of the renewed push to expand broadband access in rural communities.
- Our social science team has started interviewing community partners and organized participatory workshops. We expect to gain insight on how to build trust among communities of public IoT networks and then develop strategies to improve the trust.
- We expect to carry out the proposed testbed development in three types of municipalities (city, town and village).

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