# Socially Informed Services Conflict Governance through Specification, Detection, Resolution and Prevention
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# Project Overview

## Project Vision

- **Design** a socially informed conflict management theory in an uncertain environment to address city service conflicts
  - Resource Conflicts
  - Environment Conflicts
  - Human Conflicts

- **Ensure** *social inclusion* and *equity* when managing service conflicts for
  - City operators,
  - Service providers,
  - Residents

**Community Stakeholders**

City Operators, Service Providers, Residents

**Research Tasks**

Conflict Prevention

⬆

Conflict Resolution

⬆

Conflict Detection

⬆

Conflict Specification

**Deliverables**

- Conflict Management Theory
- Dashboard Tools
- Smartphone App
- Digital Literacy Outreach

Social Science, Civil Engineering, Computer Science and Engineering

# Project Overview

## Use-Inspired Research

- Managing conflicts between city services of Newark NJ

- Designing a Dashboard Tool to formally specify, detect, resolve and prevent conflicts for
  - City operator (e.g., Newark Office of IT)
  - Service providers (e.g., Newark Depts. of Public Work and Public Security)

- Augmenting a Newark Connect App based on Newark Community Partner Needs
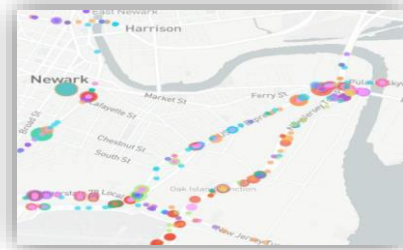
## Fundamental Research Contributions

- An Equitable and Inclusive Approach to Designing Smart Services

- A Socially Informed Computational Service Conflict Management Framework

- A Social Intervention Approach to Making an Impact on Diverse Community Stakeholders
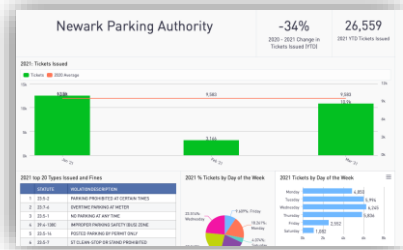
# Project Update

## 3 City Infrastructures

**1. TransCom Sensing Platform**
(Event Detection)



**2. Newark Connect APP**
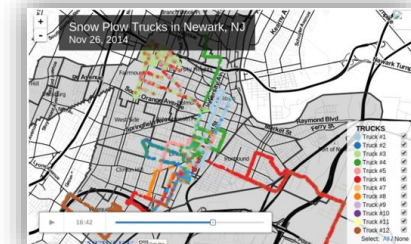(Crowdsourcing for Service Requests )



**3. Mayor Data Dashboard**


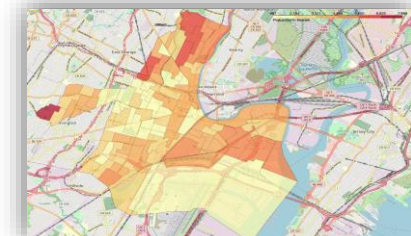
## 3 City Services

**1. Traffic Signal Control**
(Dept. Engineering)



**2. Newark City Fleet**
(Dept. Public Work)



**3. Newark Special Event**
(Office of Mayor)



- 8 Meetings with City Officers
- 2 Paper Accepted by ICCPS'21 and IEEE IoT Journal
- 10 Supported PHD/REU Students
- Community Partnership through Advisory Council

- Conflict Specification via Formal Methods
- Conflict Detection based on Attention Capsule Network
- Conflict Resolution via Fairness-driven Control
- Conflict Prevention via Stochastic Game Theory

# Project Evolution

| | What we learn from community? | How we adjust our activities? |
|---|---|---|
| Newark Sensing Infrastructure | Some City Sensors are malfunctioning<br>• Cameras<br>• Pedestrian Counters | We readjust our pilot study locations to focus on areas with high quality sensor data |
| Newark City Service Scope | • Escooter Sharing Program NewarkGo was delayed due to COVID<br>• Its data is not available for now | • We postpone our service related to E-scooter sharing<br>• We focus on a special event service related to current city priority such as COVID |
| Newark Community Engagement Tool | Poor Existing Resident Engagement App<br>• Not tailored for Newark Services<br>• No support for resident request followups | We conduct an in-depth study on the existing app for potential customization |

# Anticipated outcomes & success measures for next year
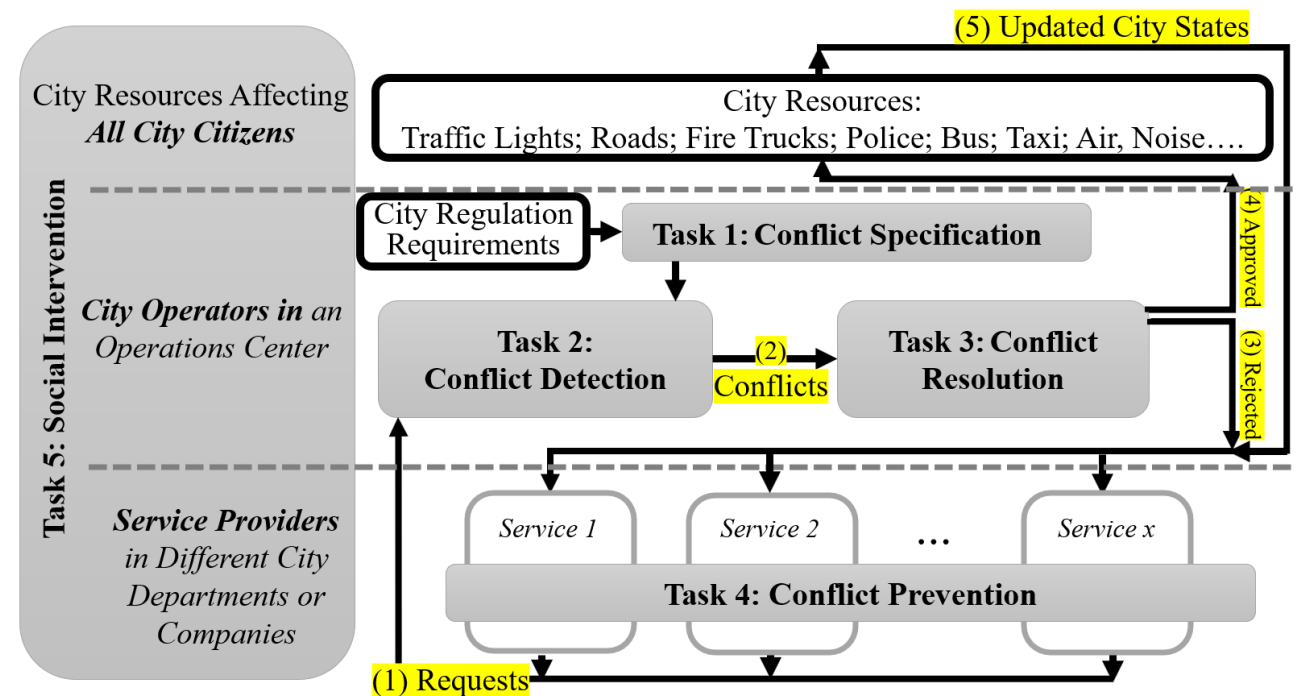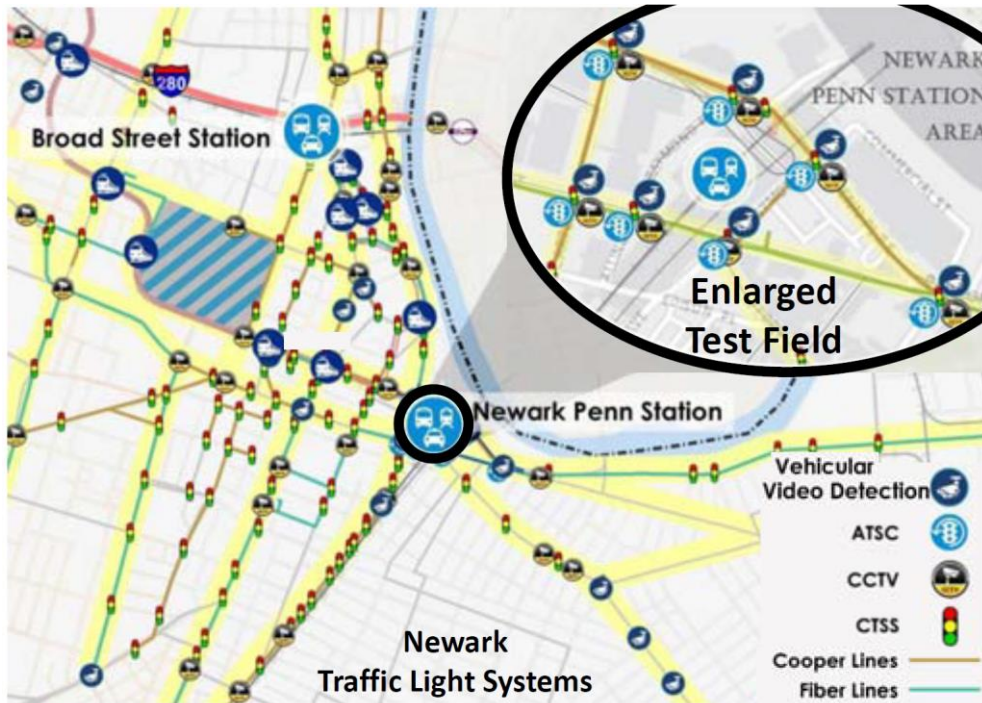


**Creating Impacts with A Case Study for Service Conflicts**
- Newark Transportation and Special Events Services
- Impact of Their Conflicts and Existing Conflict Management Approach
- **Measures**: Delay, Flow, Safety, Resident Satisfaction

**a Prototype of Conflict Management System**
- A front-end preliminary user interface module
- A back-end conflict management module
- A set of user survey and user interviews
- **Measures**: Accuracy, Useability, Expressiveness, Equity, Fairness, Resilience, Representativeness