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

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Project Vision: Managing city service conflicts with social *inclusion* and *equity* by integrating Social Science (e.g., Deliberation, Focus Group Study) and Engineering/Computer Science (e.g., Formal Methods, Multi-Task Learning, Robust Control of Hybrid Systems), which synergistically improve each other to benefit a diverse set of stakeholders from city operators, to service providers, to regular citizens in an open environment with *uncertainty*.

- **Community Problem**: Uncoordinated City Services leading to conflicts between them in an uncertain environment
 - Resource Conflicts
  - Environment Conflicts
  - Human Conflicts

- **Intellectual Merits:** Developing a socially-aware conflict management theory and its deployment for smart cities, consisting of 5 sequential components:
  - Specification
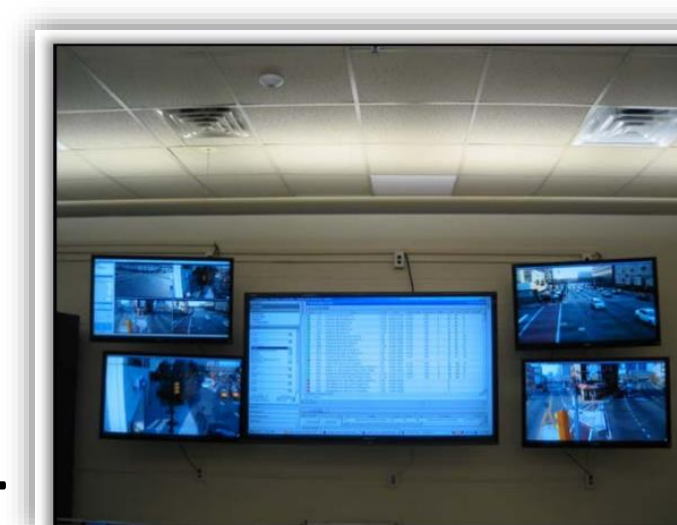 - Conflict
  - Detection
  - Resolution
  - Prevention

3 City Infrastructure Analyzed
- TransCom Platform
- Newark Connect APP
- Mayor Data Dashboard
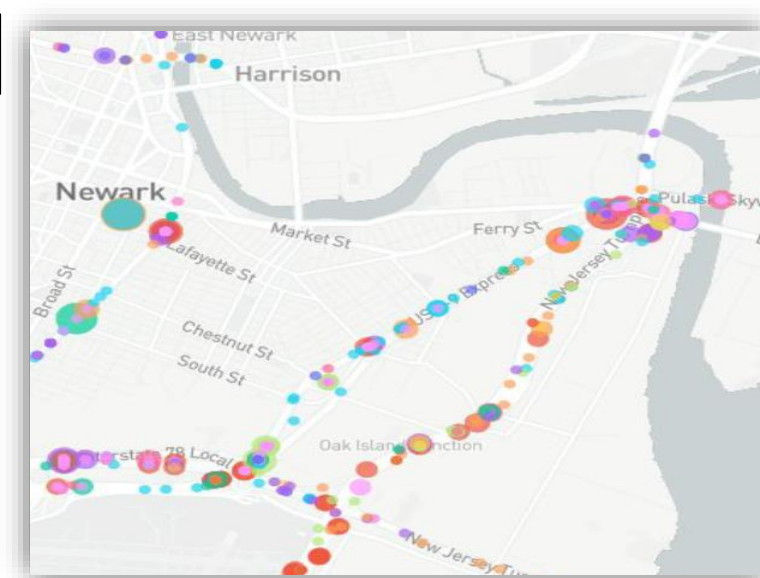
3 City Services Targeted
- Traffic Signal Control
- Newark City Fleet
- Newark Special Event

Technical and Social Science Models Developed
- Conflict Specification via Formal Methods
- Conflict Detection via Attention Capsule Network
- Conflict Resolution via Fairness-driven Control
- Conflict Prevention via Stochastic Game Theory
- Conflict Management Behavioral Model

Stakeholders	Tools	Training
City Operators	An Operator Dashboard tool for service management	Tech Training & Tutorial
Service Providers	A Request Dashboard tool for request submission	Technology Dissemination & Training Tutorial
Average Residents	A Resident Engagement App	Data Literacy & Education Tutorial

A Three Step Plan for Lasting Impact

- **Personnel Support:** Student Internship and Potential Employment by the Community
- **Internal Support:** Connect our project to Newark Forward Development Plan
- **External Support:** Conduct Technology Transfer for Smart City Decision Support Systems at Microsoft and Siemens

A Case Study for Service Conflicts

- Transportation and Special Event Services
- Impact of Their Conflicts and Existing Conflict Management

A Prototype Conflict Management System

- A front-end preliminary user interface
- A back-end conflict management module