The current IoT devices do not exchange data or interact with each other. They heavily depend on cloud APIs to exchange information. But, this approach has the following issues like higher bandwidth usage, dependency on network connectivity and data processing latency.

**iotX** is a scalable framework for IoT which overcomes the above issues by implementing in-network processing using Calvin framework. iotX also aims to provide the following:

- Bringing data analytics and machine learning to edge devices.
- User customizable application deployment. This project mainly focuses on the front-end and visualization of the iotX project.

### Contributions

- **Front-end**
  - Front-end is implemented using HTML, CSS and JavaScript.
  - Requests from the front-end are handled using RESTful API service.
  - Cytoscape JS is used for iotX graph topology visualization.
  - Integrated Calvin web application with iotX to view Calvin runtime information.
  - Other frameworks and libraries used – Bootstrap, jQuery, Ajax and qTip.
- **Back-end**
  - MongoDB persists the structured information of all iotX components.
  - Neo4j graph database is used for path related computations.

### Flow of the iotX Web Application

- **Creating a Topology**
  - Adding, viewing and removing an iotX graph topology.
  - Customizing number of nodes in a graph, specifications sensor and actuator type.
- **Viewing and Editing a Topology**
  - Adding and removing an application from the topology.
  - Binding actors to nodes.
- **Launching an Application**
  - Launching application in Calvin framework.
  - Creating Dockers to run the application.
  - Updating changes to the back-end.
  - Stopping the Calvin application.

### Future Work

- Extending the framework’s capability to synchronize state info. between physical device and the iotXNode object.
- Extending the UI to support user-defined Calvin applications.