## Processing and Visualization of Cyber-physical Model

### Background
The purpose of this project was to take the cyber-physical model of the power and water grid developed by Dr. Jacobson and his team and display it in a graphical format for users. Basically the final product allows the user to see at a glance whether various elements within the model are functioning normally.

### Objectives:
- Research and select tools for displaying data on a map
- Get and process status information from CIMoRE (Critical Infrastructure Modeling and Response Environment) database
- Display graphical representation of data on map

![Diagrams of the power and water grids from the model](image1)

![Diagram of my system](image2)

### Methods:
- Researched tools for map overlays, eventually settling on Mapbox GL JS
- Found locations in Des Moines to use as an example
- Wrote JavaScript and HTML files to display the map from Mapbox with locations
- Wrote PHP script to query the CIMoRE database for statuses of the points
- Used AJAX (Asynchronous JavaScript and XML) to pass statuses from PHP to JavaScript, then color the points accordingly from JavaScript

### Results:
The system displays a map with points showing the location and status of six elements from the model, colored blue if the status of the individual element is good and red if it is not.

### Conclusion:
This system is a useful prototype of a graphical display for a cyber-physical model. As the model expands in the future, this system will also expand to display more information in a clear and intuitive manner.

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