# Project Background and Motivation

Team Facade was focused on two aspects of the Sensor Data Service Platform — sensor visualization and the virtual sensor editor.

**Sensor Visualization**

The sensor dashboard graphically displays the status of all of the sensors via color coding. It consists of two views—a topographical view and a geographical view. The topological view shows the logical layout of the sensors and the geographical view shows the location of the sensors on a map.

**Motivation**: To know the status of each of the sensors in the building.

**Virtual Sensor Editor**

The virtual sensor editor (VSE) is a GUI-based tool that allows you to create virtual sensor output from physical sensor input. For example, you can create a virtual sensor that displays the real-time average temperature of all of the rooms on the first floor of Carnegie Mellon Silicon Valley’s (CMUSV) building 23. This can be accomplished by dragging representations of the physical sensors onto a canvas and then drawing connections between them and a function box. The function box contains a JavaScript expression that is evaluated using the connected physical sensors’ data as arguments. The resulting value can either be connected to further function boxes for further processing or saved as a virtual sensor.

**Motivation:** To be able to define and use virtual sensor data on an easy to use canvas.

**System Enhancements**

Team Facade was tasked with enhancing the dashboard and VSE by adding new features as described in the following sections.

**Dashboard visualization**

When the course started, the Sensor Data Service Platform was in a state of transition to new hardware and software. The old API was hosted on Heroku, the new one on einstein.sv.cmu.edu. At the time Team Facade forked the code from the gh-pages branch of the main repo on GitHub, the dashboard code was calling the Heroku API, which was no longer active. Team Facade started by updating the code to call the Einstein API. Next, the team worked to color code the sensors so that working sensors are displayed in blue, and sensors that are not working are displayed in red. Finally, the team fixed the data graph so that it displays historical data for a given sensor.

**Motivation:** Fix the current dashboard so it’s functional and works with the physical sensors.

**Control flows**

Team Facade implemented a true/false decision control flow object within the VSE to make it possible to make a decision based on the value of a physical or virtual sensor.

**Motivation:** To be able to make a decision based on data received from the sensors.

**Taverna Integration**

Team Facade implemented the ability for the VSE to export a virtual sensor to XML for saving and reloading in Taverna (citation: "Taverna - open source and domain independent Workflow Management System." *Taverna*. N.p., n.d. Web. 7 Dec. 2013. <http://www.taverna.org.uk/>. ), an open-source workflow management program.

**Motivation:** To be able to generate a workflow in Taverna with an existing schema.

**Geofencing**

In the future, the Sensor Data Service Platform will be able to make use of mobile devices as ad hoc sensors. To make this work, it is necessary to know when a device is within a room so that its data can be associated with the correct location. Team Facade implemented two algorithms to detect when a point is within a polygon so that future teams can determine when a mobile device is within a given geofence.

**Motivation:** To be able to integrate with mobile devices in the future.