IoT monitoring solutions through web-enabled real-time data collection and business management systems

This project dealt with a wide range of parameter monitoring, i.e., wildlife control, temperature, electricity, natural gas, water, steam and equipment status. Typically, this type of Internet-of-Things (IoT) solution consists of electronic devices in the field that gather data and transmit it to a cloud application so the data can be viewed, alerts communicated to the appropriate individuals, and messages sent to machines for further action. The primary purpose of this project was to develop a new cloud application that allowed Georgia Tech’s partner to address a variety of industries, customers and devices.

A comprehensive cloud-based software application was developed that can assist the partner to serve multiple industries. In order to build an application that is flexible, scalable, maintainable and easily expandable, a layered architecture was used among the major components. Interfaces among the layers were precisely defined, so that any of the components can easily be swapped-out with an alternative if the need arises. A software architecture of this type provides a more formalized method of constructing an application so errors and performance parameters can be measured among the various interfaces. A layered approach also allows developers to focus on their particular area of expertise (i.e. database, server programming, user interface) because the interfaces provide them with a clear line of demarcation and functionality.

Various technologies were used to implement the application. The Georgia Tech hosting service was the primary platform used to host the development, which is a Parallels virtualized environment running Red Hat enterprise Linux. The application and web server are Apache 2.2 that runs PHP scripts to accomplish server-side scripting. The database is MySQL and significant effort went into developing the stored procedures that provided functionality for the PHP code. Drupal 7 is used as the content management system. JavaScript based
upon the YUI framework is embedded into Drupal pages to provide the user with a dynamic experience. The exchange of information between the JavaScript and the database was accomplished using XML over HTTP. Bit Bucket was used as the distributed revision control system for all of the source code.

More information can be obtained from Georgia Tech’s Factory Information Systems (FIS) Laboratory (http://fis.gatech.edu/)