Research Experience for High School Students Project Description

Sensors, Data Rendering and the Internet of Things: IT Systems Student Assistant

Overall Project Description:

The core of science is to create a hypothesis, collect data, and evaluate the outcome. For large scale system deployments like those at SDSC, we have thousands of available data points from built-in sensors. We'd like your help sifting through the available data AND to help us use Arduino or Raspberry Pi to collect even more data!

As a team member within SDSC's division of IT Systems and Services, you would help deploy a large sensor network to collect a variety of metrics. A system at SDSC may have 50 temperature sensors, 10 fan tachometers, power meters, intrusion sensors, the list goes on. Add to that performance metrics like CPU utilization, network bandwidth, memory throughput, and we have the possibility of gathering thousands of metrics per system. Our division has over 300 servers so we need help!

Currently we gather about 300,000 metrics per minute (we'd love to be over 2 million by the end of summer) -- with all of these sensors reporting data, we start to ask some interesting questions:

Can you detect when a nearby server is pulled out of a data center rack?
Can audio sensors be used to help model server power consumption?
How much hotter is the top of a rack from the bottom? Can we fix that?
The data center is "clean" -- how much particulate matter remains?

Some of the questions we've thought of can be solved with just scripting and web page design. Others will require circuit design and writing custom applications perhaps in totally new languages.

Please consider joining us to weave a web of sensors and make the results awesome!

2. Number of Students to be supported: 1-2

3. Name of Lead person: Andrew Ferbert, Server Systems, San Diego Supercomputer Center, UCSD

4. Plan to Integrate Student into Group Activity

The student will be a part of the IT Systems research team. He or she will attend the group meetings. The student will work closely with the lead person and the other personnel involved.

5. Number of hours per week: 15-20 hours

6. Relevant link:

San Diego Supercomputer Center:

http://www.sdsc.edu/