Diploma Thesis / Master Thesis / Internship at NEC Laboratories Europe

Large-Scale Monitoring and Simulation of Smart Power Grids

Current power grid systems have several deficiencies, including loss of energy during generation, transmission and consumption; the inflexibility of end devices forcing provisioning based on peak loads; and lack of storage capacity, among others. These century-old systems are currently evolving towards so-called smart power grids, containing flexible end devices (e.g., smart power meters), a potentially large amount of distributed, small power generation sources (e.g., a small windmill farm or even solar panels on a family home) and large numbers of small storage devices (e.g., the batteries on an electrical car). All of these present opportunities in terms of solving the problems of current power grids, but also present new challenges, especially in terms of monitoring, in real-time, large amounts of devices and data.

Within this context, the student will work towards enhancing the capabilities of a large-scale distributed monitoring system developed at NEC, with views towards monitoring large-scale smart power grids; such work will include looking at probabilistic data structures as a means to protect the privacy of power grid customers (i.e., the privacy of data collected from smart meters). Additionally, the student will perform simulation work to show the properties of the system when deployed on a large-scale smart power grid, with the aim will of submitting a paper at a high visibility conference. Time permitting, the student will look into uses of the gathered data, such as, for instance, algorithms to identify optimal ways to match local producers to local consumers or the effects of introducing smart power meters that are able to shape consumption according to current energy prices.

The applicant must have:
- strong software development skills,
- strong knowledge in C++,
- knowledge of software development with Linux (make, gcc, svn, etc),
- knowledge of networking principles (IP, TCP, UDP, ...),
- experience with simulators a plus
- knowledge of power grids a plus
- good communication skills (English).

Place of assignment: NEC Laboratories Europe, Network Division, Heidelberg, Germany
Reference person: Dr. Felipe Huici (felipe.huici@nw.neclab.eu)

Starting date: November 2010 (flexible)
Duration of the stay: minimum 5-6 months - maximum 8 months

All applications must be submitted via the following webpage (please specify Flowstream in your application):
http://www.nw.neclab.eu/jobs_2.htm