Name and Title: Peter Marbach, Professor
Department: Computer Science

TITLE OF RESEARCH PROJECT: Network Protocols for the Internet of Things

Number of 299Y Spots: 2
Number of 399Y Spots: 2

OBJECTIVES AND METHODOLOGY:
The Internet of Things (IoT) represents a major transition in the history of the Internet, as connections move beyond computing devices and to connecting "smart things" laden with sensors. Things, in the IoT, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, automobiles with built-in sensors, or field operation devices that assist fire-fighters in search and rescue.

Due to the ubiquitous nature of connected objects in the IoT, an unprecedented number of devices are expected to be connected to the Internet. According to estimates, more than 30 billion devices will be connected to the Internet of Things by 2020. This will lead to revolutionary changes in networking, and in our everyday lives, that is similar to the fundamental changes and impact that the Internet brought and had.

One of the main challenges in creating this vision of the IoT is create the networking infrastructure that is able to provide the wireless networking connectivity on the scale that is required for the IoT. In our research group, we developed a novel wireless networking protocol that showed for the first that it is possible to create a high-performance wireless networking infrastructure using simple, distributed networking protocols.

The goal of the project is to use to implement the protocol and use the protocol to implement a novel mobile app. We have already implemented the Medium Access Control of the protocol, the next step (and the goal of the project) is to implement the Routing and Rate Control as well as to build an application to demonstrate the performance of the new protocol. For the routing protocol, we will use an open source protocol that has already been implemented. The Rate Control is a new protocol that we will implement. This will require changes to the Linux network driver.

The project will use and combine concepts of computer networks, operating systems, and network applications programming.

DESCRIPTION OF STUDENT PARTICIPATION:
The students will be implementing the protocols, including
- adapting the Linux wireless network driver to implement a new rate control protocol,
- install an open source routing protocol,
- design and implement an application to demonstrate the performance of the new protocols.

Students will have weekly meetings with the supervising professor of the project to discuss the project progress and how to address challenges.

Students interested in the project are encouraged to contact the supervising professor Peter Marbach (marbach@cs.toronto.edu) for more information.

**MARKING SCHEME** (assignments with weight and due date):

Fall progress report (Week 6 of Fall) — 10%
Midterm progress report (end of Fall term) — 30%
Winter progress report (Week 6 of Winter) — 20%
Final project report (end of Winter term) — 40%