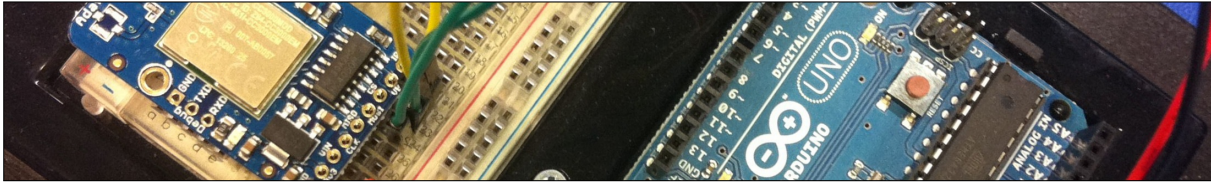


# CURIE Academy 2014

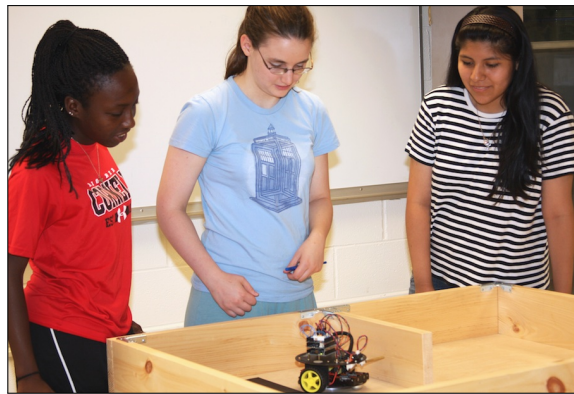
## Design Project: Exploring an Internet of Things

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<http://www.csl.cornell.edu/curie2014>



Although the Internet has traditionally been thought of as interconnecting computing systems such as servers, workstations, laptops, and smartphones, in reality, the Internet interconnects people. Human beings must collect, enter, publish, and analyze almost all of the information that is transmitted over the Internet.

The Internet of Things (IoT) is a new trend where the Internet is used to interconnect everyday physical objects augmented with inexpensive embedded controllers, sensors, and actuators such that these objects can autonomously collect information and interact with the real world.



*Students working with a teaching assistant to test their mobile autonomous robot control application.*

IoT wearable devices can monitor our health and notify our doctors of issues in real-time. IoT devices in smart buildings can carefully track the behavior of its occupants to automatically optimize energy efficiency. IoT devices can be attached to bridges for traffic profiling, structural monitoring, and early flash-flood detection. IoT has the potential to be a disruptive technology impacting many diverse aspects of our society including health care, energy, environmental conservation, manufacturing, retail, commerce, and transportation.

Designing new IoT devices requires an interdisciplinary background, and the field of computer engineering is well-situated to serve as a foundation for students interested in this emerging area. Computer engineering sits at the interface between hardware and software, and it involves blending the traditional fields of electrical engineering and computer science. Computer engineers are equally comfortable building embedded computers and exploring new sensor circuits as they are programming web applications and analyzing algorithms. Students studying computer engineering over the next five years will have a unique opportunity to shape how IoT will change our society.

The 2014 CURIE Scholars will explore the Internet of Things by designing, building, and testing one of several simple IoT devices inspired by real-world applications of IoT. The week-long design project will begin with three laboratory sessions. In the first lab, scholars will learn about computer engineering from the hardware perspective by incrementally building a simple calculator out of basic logic gates. In the second lab, scholars will learn about computer engineering from the software perspective by incrementally building a mobile robot control application using the popular Arduino micro-controller. In the third lab, scholars will put hardware and software together to create their first basic IoT system: a "smart door" that includes an IoT device to send the door status to the cloud and a different IoT device to poll the cloud and display the door status using a small light. After these three laboratory sessions, scholars will work in groups on an IoT device in one of several themes including: smart home, early disaster warning, wearable health monitoring, wildlife tracking, and smart electrical power grids.