

# Workshop - Enhancing First Year Engineering Education through Student-Own Design Kits

Alex Wong, John Schneider  
Digilent, Inc., awong@digilentinc.com, schneidj@eecs.wsu.edu

**Overview** - In May of this year, the McKinsey Global Institute published a report entitled “Disruptive Technologies: Advances that will transform life, business, and the global economy.” The report identified 12 technologies deemed to have the greatest potential for causing “disruptions.” These technologies included autonomous and near-autonomous vehicles, 3D printing, and advanced robotics. Engineers clearly have a large role to play in the development and deployment of these technologies. However, many of these technologies span traditional engineering disciplines. For example, gone are the days, it seems, when all mechanical devices are purely mechanical. So many mechanical systems now include embedded systems and smart control, i.e., they incorporate systems traditionally considered the domain of electrical engineers.

Attendees of the workshop will learn about the ways project-based “physical computing” can be used to motivate first-year engineering students in a host of educational pursuits related to these disruptive technologies, ranging from physics to electrical engineering, from math to computer science. “Physical computing” involves a combination of computing hardware and software, as well as electrical and/or electronic devices to build systems that sense and interact with the physical world. Workshop participants will be guided through one of the project-based and will understand where this project fits within a larger framework. Projects within this framework can be tailored to meet the needs of students at the beginning undergraduate level. Participants will learn how these projects can be used to teach algorithmic thinking, engineering design, and several other skills that are vital to a successful career in numerous high-technology fields.

## DESCRIPTION

Participants will receive a chipKIT microcontroller board that they will use in the completion of a project. (Participants should also plan to bring a laptop. The laptop will be used to program the chipKIT board.) Participants will also consider several other active learning modules that have been designed to teach both practical and theoretical concepts and to stimulate student engagement. The design of hands-on activities, the value of supporting instructional materials, and methods to incorporate these activities into the curriculum will be discussed.

## PRESENTER

John Schneider is the Director of Educational Initiatives at Digilent, Inc., and an associate professor in the School of Electrical Engineering and Computer Science (EECS) at Washington State University (WSU). He has taught courses ranging from introductory programming at the freshman level to advanced electromagnetics at the graduate level. He is a Fellow of the IEEE and has been selected as the WSU EECS Researcher of the Year and the School's Teacher of the Year.