MATLAB & Simulink for Project-Based Learning using LEGO MINDSTORMS NXT

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This hands-on workshop will explore how you can use MATLAB and Simulink with LEGO MINDSTORMS NXT robots to enhance student learning. Through practical exercises, you will program the robots to interact with their sensors and actuators using a simple workflow based on the popular MATLAB and Simulink environment. Learn how easy it can be to engage students' imaginations, and allow them to quickly apply theory to practice with real world examples.

This workshop aims to address the growing need for hands-on and project-based learning via a low-cost, easy to use, hardware and software platform. Since MATLAB and Simulink are used extensively within industry, students will acquire skills that are useful when entering the workforce.

Workshop highlights include:

- Learning how to easily connect MATLAB and Simulink to hardware
- Designing, simulating and testing algorithms in MATLAB and Simulink
- Programming low cost hardware with auto-generated code
- Real-time parameter tuning with hardware-in-the-loop simulations

Agenda

Time	Activity
2:00pm	Introduction to MATLAB and Simulink and Hardware Support for Project-Based Learning • Benefits of project-based learning • Introduction to MATLAB and Simulink • Overview of MATLAB and Simulink for programming low-cost hardware
2:30pm	Lab module 1: Getting started with MATLAB and Simulink and LEGO MINDSTORMS NXT • Develop a sound frequency and volume modulation model • Run MATLAB and Simulink programs on a LEGO MINDSTORMS NXT robot • Control robot program parameters remotely
3:15pm	Lab module 2: Build a line following robot • A simple line-following robot with proportional feedback • Line-following robot with different modes of operation • Extending the line-following robot with automatic calibration • Modeling robot kinematics to track position and heading
4:45pm	Teaching and classroom resources • Overview of available lab modules for use in teaching • MathWorks' curriculum support
5:00pm	End