

Real-Time Testing with Simulink Real-Time and Speedgoat Hardware

OEM: MathWorks • Code: MW-REAL-TIME-TESTING-WITH-SIMULINK-REAL-

COURSE DESCRIPTION

This hands-on four half-day course focuses on real-time testing workflows, including rapid control prototyping (RCP) and hardware-in-the-loop (HIL) testing, using Simulink Real-Time™ software and Speedgoat real-time computers. Attendees will convert desktop-based simulation applications into real-time applications that run on the target machine and interface with physical hardware. Emphasis is placed on interacting with the application in real-time and analyzing the outputs for validation. This course is intended for intermediate to advanced Simulink® users who are adopting real-time testing in their development process.

AUDIENCE PROFILE

- IT professionals and technical staff seeking hands-on training in this course's subject area.

PREREQUISITES

- Simulink Fundamentals (or Simulink Fundamentals for Automotive Applications or Simulink Fundamentals for Aerospace Applications)
- Knowledge of Simscape™ preferred

COURSE OBJECTIVES

By the end of this course, participants will be able to:

- Set up the real-time testing hardware and test communications between host and target computers.
- Use Speedgoat driver blocks to convert a desktop-based test bench into an RCP application.
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- Use Dashboard blocks and App Generator to create interactive user interfaces to a real-time application.
- Use Simulink Test to create and execute an automated test suite.
- Configure IO blocks to interface the target machine with standard communication protocols.
- Use the desktop model to validate model fidelity with respect to optimization considerations, and optimize the plant model to execute on target hardware.
- Convert a simulation test bench into a HIL testing configuration, and use a real-time plant model to validate system requirements.

COURSE OUTLINE

Module 1: Day 1 of 4

Workflow Overview

- Real-time testing overview
- Setting up the host and target computers
- Running a real-time application
- Tuning parameters
- Monitoring and visualizing Signals
- Creating a standalone application

Developing Real-Time Applications

- Permanent magnetic synchronous motor (PMSM) hardware introduction
- Converting plant models into plant hardware interfaces
- Implementing Speedgoat I/O drivers

Module 2: Day 2 of 4

Developing Real-Time Applications

- Testing sensors and actuators
- Executing closed-loop real-time simulations with physical hardware
- Buffering signals

Building Interactive Interfaces

- Using Simulink Dashboard blocks
- Generating MATLAB Apps
- Deploying MATLAB Apps

Module 3: Day 3 of 4

Automating Real-Time Tests

- Building a harness for automated testing
- Creating test sequences
- Iterating input and parameter sets
- Analyzing test results
- Automating real-time tests with MATLAB

Using Communications Protocols

- Simulink Real-Time protocol support
- Real-time UDP
- I2C loopback testing

Module 4: Day 4 of 4

Optimizing Plant Models for Real-Time Execution

- Measuring plant model accuracy
- Analyzing real-time performance
- Optimizing model solvers
- Evaluating alternative implementations

Hardware-in-the-Loop Testing

- Hardware-in-the-loop (HIL) workflow overview
- Running the controller algorithm on production hardware
- Setting up a HIL system
- Running HIL tests