

Signal Processing with Simulink

OEM: MathWorks • Duration: 3 Days (24 hrs) • Code: MW-SIGNAL-PROCESSING-WITH-SIMULINK

COURSE MODULES & TOPICS

Day 1 of 3

What is Simulink?

- System Design Process
- Model-Based Design with Simulink
- What Can You Do with Simulink?
- Simulink add-ons

Creating and Simulating a Model

- Creating and editing a Simulink model
- Defining system inputs and outputs
- Simulating the model and analyzing results
- Performing automatic initialization of Simulink model parameters
- Visualizing signals with signal viewers

Modeling Discrete Dynamic Systems

- Modeling a discrete system with basic blocks
- Finding sample times of block outputs
- Using frames in your model
- Using buffers
- Comparing frames vs. multichannel signals
- Viewing frame-based signals
- Understanding behavior of delay blocks with frame-based signals
- Working with multichannel frame-based signals

Modeling Logical Constructs

- Modeling logical expressions
- Modeling conditional signal routing
- Understanding zero-crossing detection
- Modeling with the MATLAB Function block

From Algorithm to Model

- Modeling from algorithmic specifications

- Controlling model behavior under some error conditions
- Iterative algorithm development through modeling and simulation
- Verifying models against specified algorithms

Day 2 of 3

Mixed-Signal Models

- What is a mixed-signal model?
- Modeling an analog-to-digital Converter (ADC) with aperture jitter and nonlinearity
- Case study: Modeling TI's ADS62P29 ADC

Solver Selection

- Understanding the Simulink solver
- Solving simple models
- Solving models with discrete and continuous states
- Solving models with multiple rates
- Fixed-step and variable-step solvers
- Choosing a continuous-state system solver
- Handling zero crossings
- Handling algebraic loops

Subsystems and Libraries

- Creating subsystems
- Understanding virtual and atomic subsystems
- Using a subsystem as a model component
- Masking subsystems
- Creating custom block libraries
- Working with and modifying library blocks
- Adding custom libraries to the Simulink Library Browser

Conditional Subsystems

- Modeling conditionally executed subsystems
- Creating enabled subsystems
- Creating triggered subsystems
- Working with an example using the AGC model

Spectral Analysis

- Performing spectral analysis with the Spectrum Analyzer block
- Choosing spectral analysis parameters
- Analyzing power spectrum of a fan motor noise
- Building a spectral classifier for speech
- Determining frequency response of a discrete system

Designing and Applying Filters

- Designing filters in Simulink
- Modeling filters in fixed-point

Multirate Systems

- Modeling multirate systems
- Exploring blocks for multirate signal processing
- Resampling oversampled data
- Designing and implementing anti-imaging and anti-aliasing filters
- Using multirate filter blocks
- Case study: Converting professional audio to CD format
- Converting the design to fixed point

Incorporating External Code

- Working with custom and external code
- Incorporating MATLAB code with the MATLAB Function block
- Incorporating C code with the C Caller block

Combining Models into Diagrams

- Exploring model referencing and subsystems
- Setting up a model reference
- Setting up model reference arguments
- Exploring model reference simulation modes
- Viewing signals in referenced models
- Browsing model reference dependency graph

Automating Modeling Tasks

- Automating test runs
- Checking and modifying parameter settings
- Finding blocks with specific parameter values
- Constructing and modifying block diagrams