Modelling and Simulation Made Easy with Simulink®

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What will you learn in this presentation?

- For those who are not familiar with Simulink and for those who are about to start using Simulink, you might have been wondering:
  
  - What is Simulink?
  - Why Simulink?
  - Where and how can Simulink be used?

In this presentation you will be able to find out the answers to these questions.
What is Simulink?

An Environment for Modelling and Simulation.
What is the purpose of modelling and simulation in the first place?

- To run tests that are impossible or hard to reproduce with the actual object in the real world.
  - Dangerous
  - High Cost
  - Physically Impossible / Difficult

- To investigate the functionality and performance of the phenomenon in interest.
  - Insights of Physics Based Phenomenon
  - Parameter Study
  - Visualization of Phenomenon that are not Visible to Eyes.
Why Simulink?

- User friendly block diagram environment
  - Clear data and processing flow.
  - Easy to realize and to share ideas.
- Flexible environment that covers a wide range of different application areas
  - Dynamic System, Event-Driven System.
  - Physical Modelling, Control System, Signal Processing.
- Complete integration with MATLAB environment.
  - Batch simulation by scripts.
  - Access to various design, analysis and technical computing libraries.
Diverse needs met by Simulink

Automotive Control Development
Motor Control Design and Microcontroller Implementation
Remote Operation Robot Control Development
Precision Positioning Control of Machine Tools
Mechanical and Power Electronics Design
System Analysis for Thermal Power Plant
Coupled Analysis with In-house/Third-Party Simulators
A/D Converter Design
Noise Canceller Design
PLL Circuit Design for Home Cooker
SoC Implementation for Laser Printer Engine
Digital Modulator/Demodulator Design and FPGA Implementation
Software-Defined Radio Method Study
Change in Blood Sugar Concentration During Insulin Medication
Theory Practice Education for Students and Employees
Information Propagation Mechanisms Analysis of the Nervous System
Demo: The Clapper
A System Modelling and Simulation Demo

Detecting the “Clap” via microphone.

Switching On/Off based on the numbers of claps.
Flexible Modelling Environment of Simulink

**Dynamic System**
- Fixed/Variable Step ODE Solvers
- Discrete/Continuous, Mixed System
- Multi-rate System

**Event-Driven System**
- Nondeterministic Discrete System
- State Transition Diagram, Truth Table
- Flow Chart

**Signal Processing / Communication System**
- Digital Signal Processing System
- Communication System
- RF System

**Control Design / Physical System**
- Linear Analysis (Time/Frequency Domain)
- Controller Tuning
- Multi-domain Physical Modelling
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Motor Control Design and Microcontroller Implementation
Remote Operation Robot Control Development
Precision Positioning Control of Machine Tools
Mechanical and Power Electronics Design
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“Model-Based Design!”

A/D Converter Design
Noise Canceller Design
Design for Home Cooker
Printer Engine
SoC Implementation for Laser Printer Engine
Digital Modulator/Demodulator Design and FPGA Implementation

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What is Simulink?

A Platform for Model-Based Design

Executable Specification
- **Models** that complement the paper based specifications
- Improve team communication

Design by Simulations
- **Modelling** complex domains in the same environment.
- Trade-off and interaction verification

Automatic Code Generation
- Automatic C / HDL code generation from **Models**
- Efficient prototype testing

Continuous Testing / Verification
- Test generation by re-use of **Models**
- Simulation / test automation
Demo: The Clapper (cont’d)
What Happens After Modelling and Simulation?
What is Model-Based Design?
A Development Flow Centered on the Executable Models

**Executable Specification**
- Models that complement the paper based specifications
- Improve team communication

**Design by Simulations**
- Modelling complex domains in the same environment.
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**Automatic Code Generation**
- Automatic C / HDL code generation from Models
- Efficient prototype testing

**Continuous Testing / Verification**
- Test generation by re-use of Models
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**Model**
- Executable Specification
- Design by Simulations
- Automatic Code Generation
- Continuous Testing / Verification
By Now You Should Know…

- **What Simulink is**
  - An environment for modeling and simulation
  - A platform for Model-Based Design

- **Why Simulink has been used**
  - User-Friendly Block Design Environment
  - Flexible environment that covers a wide range of application areas
  - Complete integration with MATLAB environment

- **Where and how Simulink could be used**
  - The Clapper demo
  - Meet diverse needs regardless of industry and application
Related Information

- Useful Resources
  - Model Examples
  - User Stories
  - User Community

- Event Information
  - Webinars, Seminars and Conferences

- Services
  - Technical Support
  - Training Services
  - Consulting Services

- Free Product Trials
  - Get Trial Software