

Title: Introduction to Simulink

Duration: 50 minutes

Objective:

By the end of this lab, you should be able to create and simulate a simple Simulink model, understand basic Simulink blocks, and connect them to build a functional system.

Prerequisites:

MATLAB and Simulink installed

Basic understanding of MATLAB

Lab Outline:

### Part 1: Getting Started

1. Launch MATLAB and open Simulink.
2. Create a new Simulink model.
3. Familiarize yourself with the Simulink interface.

### Part 2: Building Your First Model

1. Drag and drop a "Sine Wave" block from the Simulink Library Browser.
2. Connect the "Sine Wave" block to a "Scope" block.
3. Configure the "Sine Wave" block to produce a 1 Hz sinusoidal signal.
4. Run the simulation and observe the output on the scope.

### Part 3: Adding Logic

1. Drag and drop a "Relational Operator" block.
2. Connect the "Sine Wave" block to the first input of the "Relational Operator" block.
3. Set the second input of the "Relational Operator" block to a constant value, e.g., 0.
4. Connect the output of the "Relational Operator" block to the "Scope."

### Part 4: Simulation and Analysis

1. Run the simulation.
2. Observe how the "Scope" display changes as the sine wave crosses the zero threshold.

### Part 5: Adding a Controller

1. Drag and drop a "Step" block.
2. Connect the "Step" block to the "Scope."
3. Configure the "Step" block to generate a step input at time  $t=2$  seconds.
4. Add a "Gain" block and connect it to the "Step" block's output.
5. Connect the "Gain" block to the second input of the "Relational Operator" block.

## Part 6: Running the Final Simulation

1. Run the simulation.
2. Observe how the "Scope" display changes when the step input is applied.

### Conclusion:

In this lab, you've learned how to create a simple Simulink model, use basic blocks like "Sine Wave," "Scope," "Relational Operator," and "Step," and analyze the system's behavior during simulations. These foundational skills will serve as a basis for more complex simulations and modeling in Simulink.