

Name: \_\_\_\_\_ Roll No: \_\_\_\_\_

Score: \_\_\_\_\_ Signature of the Lab Tutor: \_\_\_\_\_ Date: \_\_\_\_\_

DEPARTMENT OF ELECTRONIC & TELECOMMUNICATION ENGINEERING  
MEHRAN UNIVERSITY OF ENGINEERING & TECHNOLOGY, JAMSHORO

Feedback Control Systems (1<sup>st</sup> Term, Third Year, 03TL)

Lab Practice # 3

## Introduction To Simulink

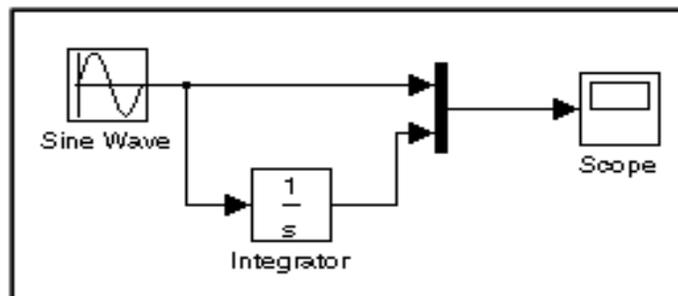
### 1. Introduction

Simulink is a software package for modeling, simulating, and analyzing dynamic systems. It supports linear and nonlinear systems, modeled in continuous time, sampled time, or a hybrid of the two. One can easily build, analyze and visualize models.

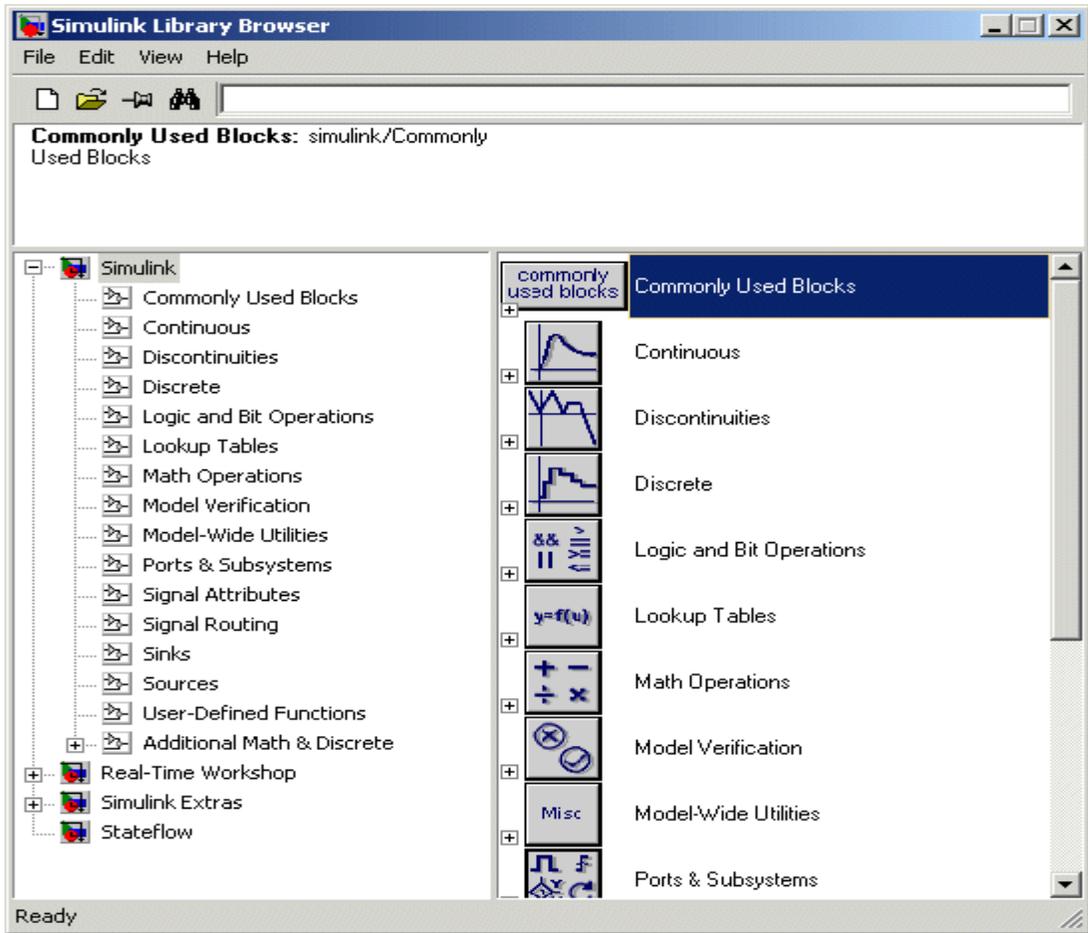
Thousands of engineers around the world using it to model and solve real problems. Simulink provides a graphical user interface (GUI) for building models as block diagrams, using click-and-drag mouse operations. With this interface, you can draw the models just as you would with pencil and paper. Knowledge of this tool will serve you well throughout your professional career.

### 2. Building a model

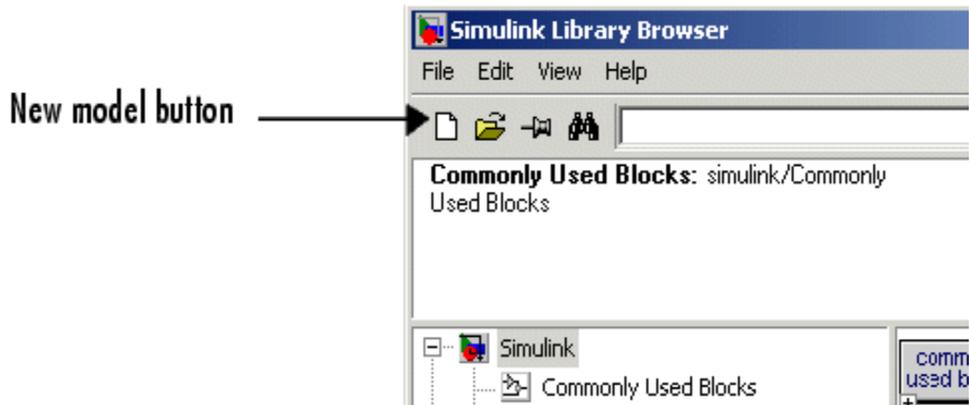
This example shows you how to build a model using many of the model-building commands and actions you will use to build your own models. The model integrates a sine wave and displays the result along with the sine wave. The block diagram of the model looks like this.



To create the model, first enter Simulink in the MATLAB Command Window the Simulink Library Browser appears.



To create a new model click the New Model button on the Library Browser's toolbar. Simulink opens a new model window.

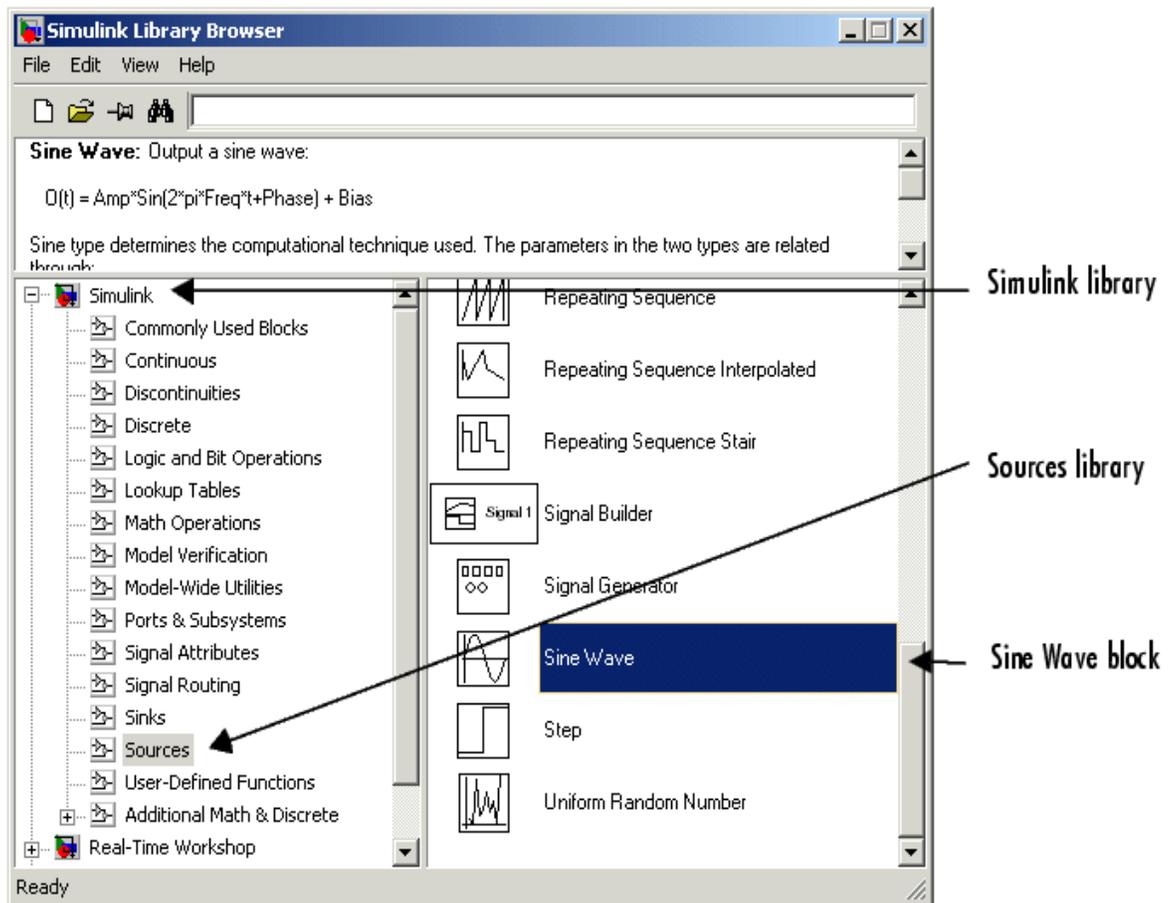


To create this model, you need to copy blocks into the model from the following Simulink block libraries:

- Sources library (the Sine Wave block)
- Sinks library (the Scope block)
- Continuous library (the Integrator block)
- Signal Routing library (the Mux block)

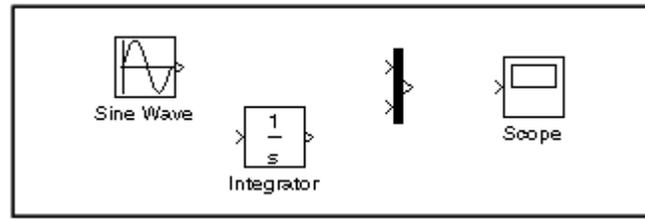
To copy the Sine Wave block from the Library Browser, first expand the Library Browser tree to display the blocks in the Sources library. Do this by clicking the Sources node to display the Sources library blocks. Finally, click the Sine Wave node to select the Sine Wave block.

Here is how the Library Browser should look after you have done this.

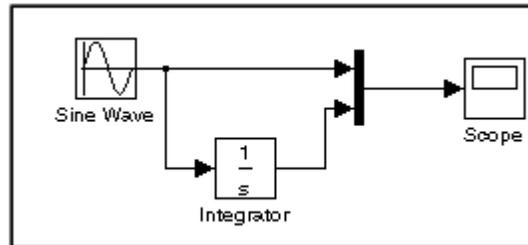


Now drag a copy of the Sine Wave block from the browser and drop it in the model window. Copy the rest of the blocks in a similar manner from their

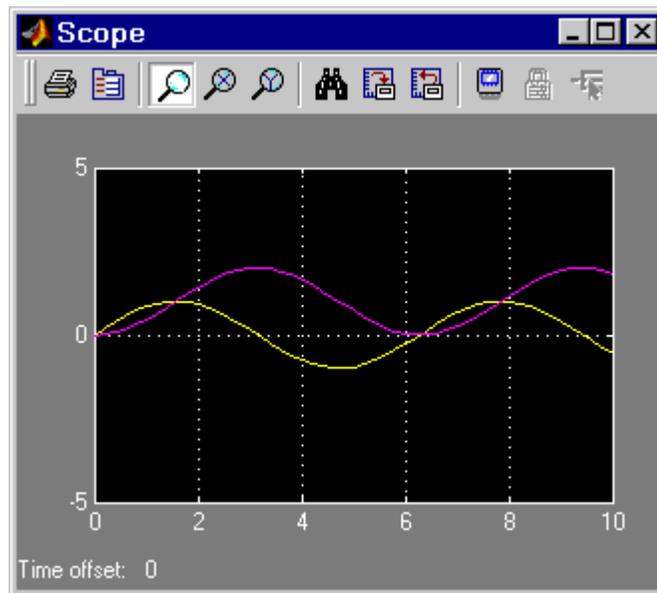
respective libraries into the model window. With all the blocks copied into the model window, the model should look something like this.



Now it's time to connect the blocks. Connect the Sine Wave block to the top input port of the Mux block. Similarly connect all the components as shown in the figure. When all the blocks are connected with each other your model should look something like this.



Now double-click the Scope block to open its display window. Finally, choose **Start** from the **Simulation** menu and watch the simulation output on the Scope.



**Exercise#1:** - Perform the indicated tasks using SIMULINK.

(a) Find the step response of the following transfer function.

$$G(S) = \frac{1}{S+1}$$

(b) Differentiate the ramp function and check the result on the scope.

(c) Amplify sine wave using gain block.

(d) Simulate the JK flip-flop in toggle mode and copy resultant waveform in your answer book.

(e) Explain briefly the function of each block you have used.

(f) Also explain in which library or sub-library this block is present?