**The lecture 12**

**Stateflow diagrams**

• Simulink model of a power switch that toggles on and off at zero crossing of a sine input.

• At each switch, a counter is incremented



• Two states of the power switch: on and off

• Transitions between the States happen whenever the event “switch” occurs.

• When a transition occurs, the variable “counter” is incremented

• By default, the initial state is “off”



• Open Scope by clicking on it

• Run simulation by selecting “start” from the Simulation menu



• If the Scope does not display the entire sine waveform, go to the Scope parameters menu,

navigate to the History submenu and turn off the “Limit data points” option.

• Change the size or colors of the plotted lines using the Graphics submenu.



Add Statechart to Simulink Model

• Drag Statechart to the Simulink model

• Change name from “Chart” to “On\_off”





• Open Statechart “On\_off” by double‐clicking

• Drag two states from the menu at left into the chart.

• Name them “Power\_on” and “Power\_off”



• To create a transition between states, hold the cursor over the border of the starting state – it will turn into crosshairs.

• Hold down the mouse button, drag the mouse to the terminal state – this will create a transition (denoted by an arrow) connecting the states

• Click on the transition and write the name of the event that causes the transition.



Specify the initial state (Power\_off in this case) by adding a default transition



• Add an event that is “Input from Simulink”

• A window will open allowing you to name the event (call it Switch), and to specify what triggers the event. In our case, use rising edges of a sine wave.

• If you add multiple events input from Simulink, the Port menu will have more than option



• Open the Model Explorer by selecting the Tools/Explore option from the Statechart menu

• This menu allows you to edit the event you have just defined, and to add new events

• On a small screen, you may need to scroll the menu left and right to see the “Trigger” option

• Return to the top‐level Simulink diagram

• The Statechart “On--‐off” now has an arrow entering it.

• Add a Sine Wave input from the View/LibraryBrowser/Sources menu

• Add a Scope from the View/Library Browser/Sinks menu

• Use the mouse to connect these blocks.

• Double click on the Sine Wave block and specify the parameters as shown.



Running the simulation

• Execute the simulation by selecting Simulation/Start

• The state changes from “Power\_on” to “Power\_off” at each rising zero crossing of the sine wave.



Counting transitions

• Add data that is “Output to Simulink”

• A window will open allowing you to name the data (call it “counter”), and to specify its data type: leave it set to the default “double”.

• Leave “initial value” blank to use the default value of zero

• Increment the counter every time the event “Switch” occurs by placing “counter++” in curly braces following each occurrence of Switch

• Don’t forget to use a semicolon to prevent the value of counter from being printed to the screen each time it is incremented.



Add a display block from the View/Library Browser/Sinks menu

