Tutorial – Creating and Working with Modelica State Machines

Modelica State Machines are an easy-to-use and versatile way to create clocked controller models based on the Modelica® Synchronous technology. SimulationX comes with a user-friendly graphical user interface to create such state machines and to integrate them into Modelica-based simulation models.

In this hands-on tutorial, you will learn how to efficiently create Modelica State Machines and apply this knowledge directly on an example.

We will use a simple 1D model of a vehicle window including the drive motor and will you design the assoiated control system step by step as a Modelica State Machine. The first step is to create graphical states in your model and then link them with transitions to define switching conditions between the states. Local variables and equations in the states are defined with the SimulationX TypeDesigner. Using this tool, you define the components (here: local variables and parameters) as well as the equations in a graphical user interface, while the actual Modelica code is generated in the background. If required, you can then view the code and edit it.

Afterwards, you will learn how to efficiently model the signal transfer between the physical model and the controller model (the sensor signals entering the controller model and the outgoing control signals), using the Modelica Synchronous technology and Modelica inner/outer attributes. Finally, you will create substructures in the controller model using compound states.