Embedded Systems
MATLAB Tutorial, Part 2

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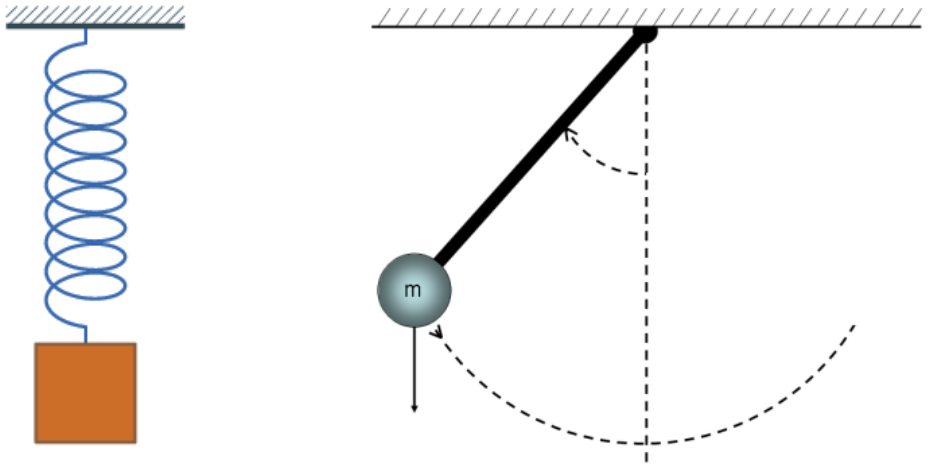
Infos

- Mail address: `es08@alan.cs.uni-sb.de`
  - File submissions (with group, names, matr.)
  - Questions
- Problem set 1
  - Exception: email submissions are allowed
  - Update to problem 4.2
- Problem set 2
  - Handout: today
  - Due: Thursday, 6th November

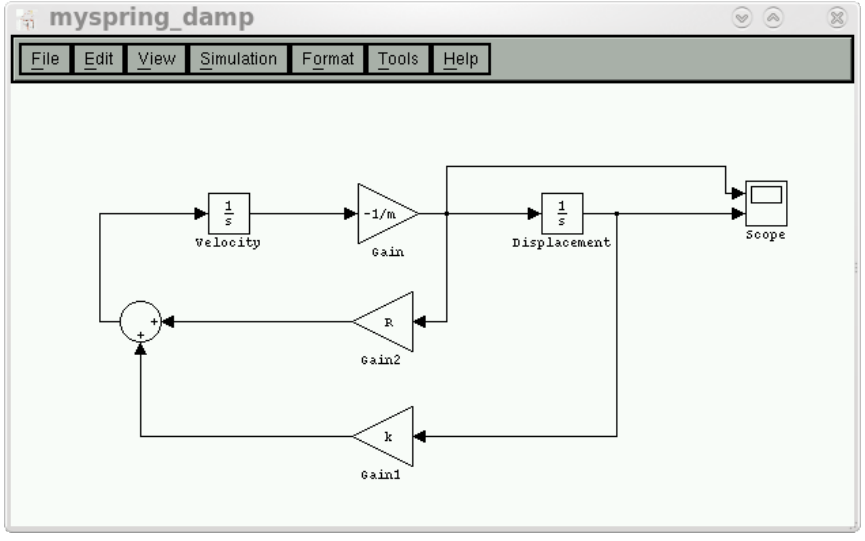
Damped Harmonic Oscillator (Review)



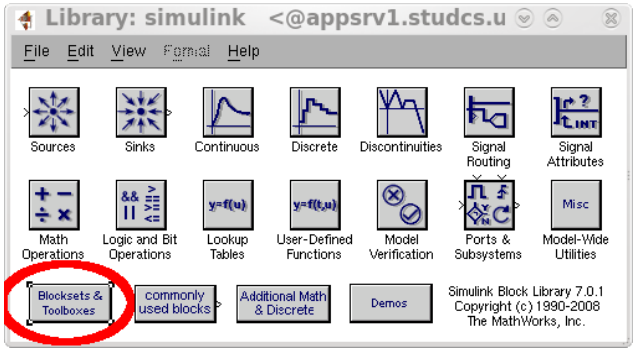
- m = mass constant
- R = damper constant
- k = spring constant
- y_0 = initial displacement
- y = current displacement
- $v = \dot{y}$ = current velocity

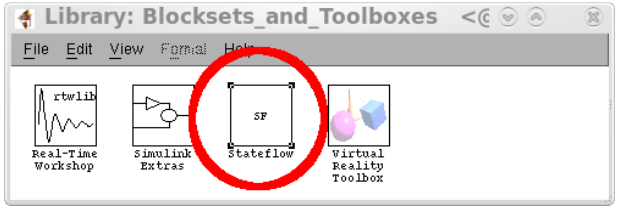
$$m\ddot{y} + R\dot{y} + ky = 0$$
$$\Leftrightarrow \quad m\dot{v} + Rv + ky = 0$$

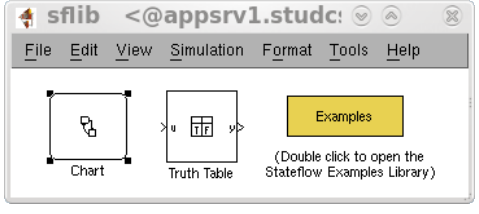
Damped Harmonic Oscillator in Simulink (Review)



Stateflow (Review)







Semantics: Statemate vs. Stateflow (Review)

Standard (Statemate)

- Any finite number of active events.
- Emitted events are collected and then passed to the entire chart.

Stateflow

- At most one active event.
- Emitted events are immediately passed to the receiver.

Semantics: Statemate vs. Stateflow (2) (Review)

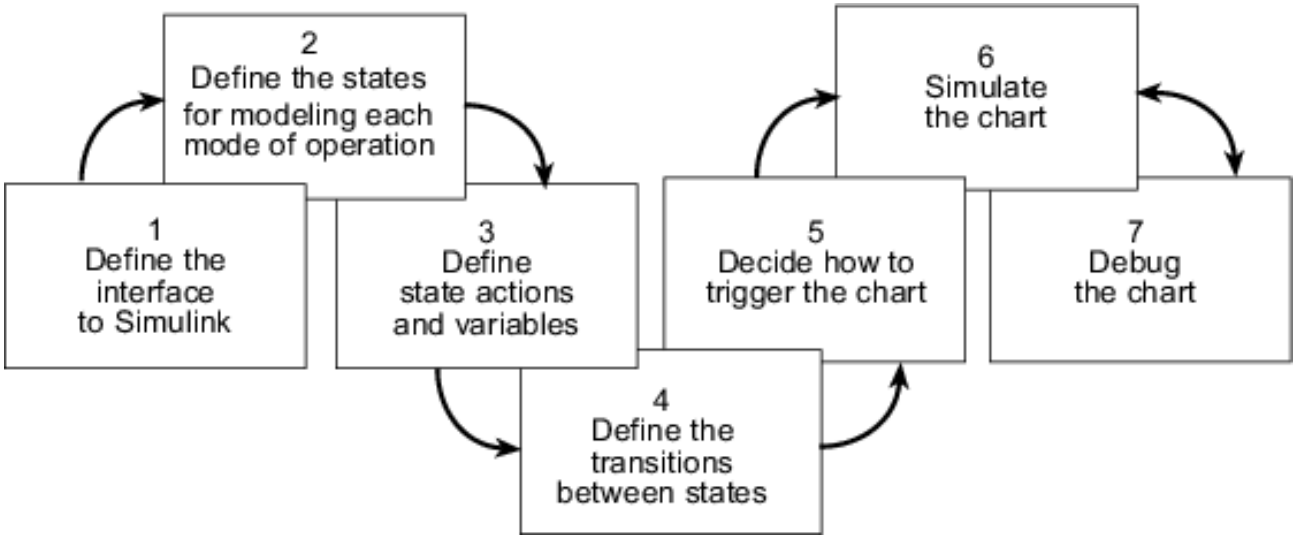
Standard (Statemate)

- Non-determinism is allowed.
- Synchronous execution of AND-states.
- Variable changes at the end of the step.

Stateflow

- Non-determinism is not allowed.
- Sequential execution of AND-states.
- Immediate variable changes.

Simulink/Stateflow Development (Review)

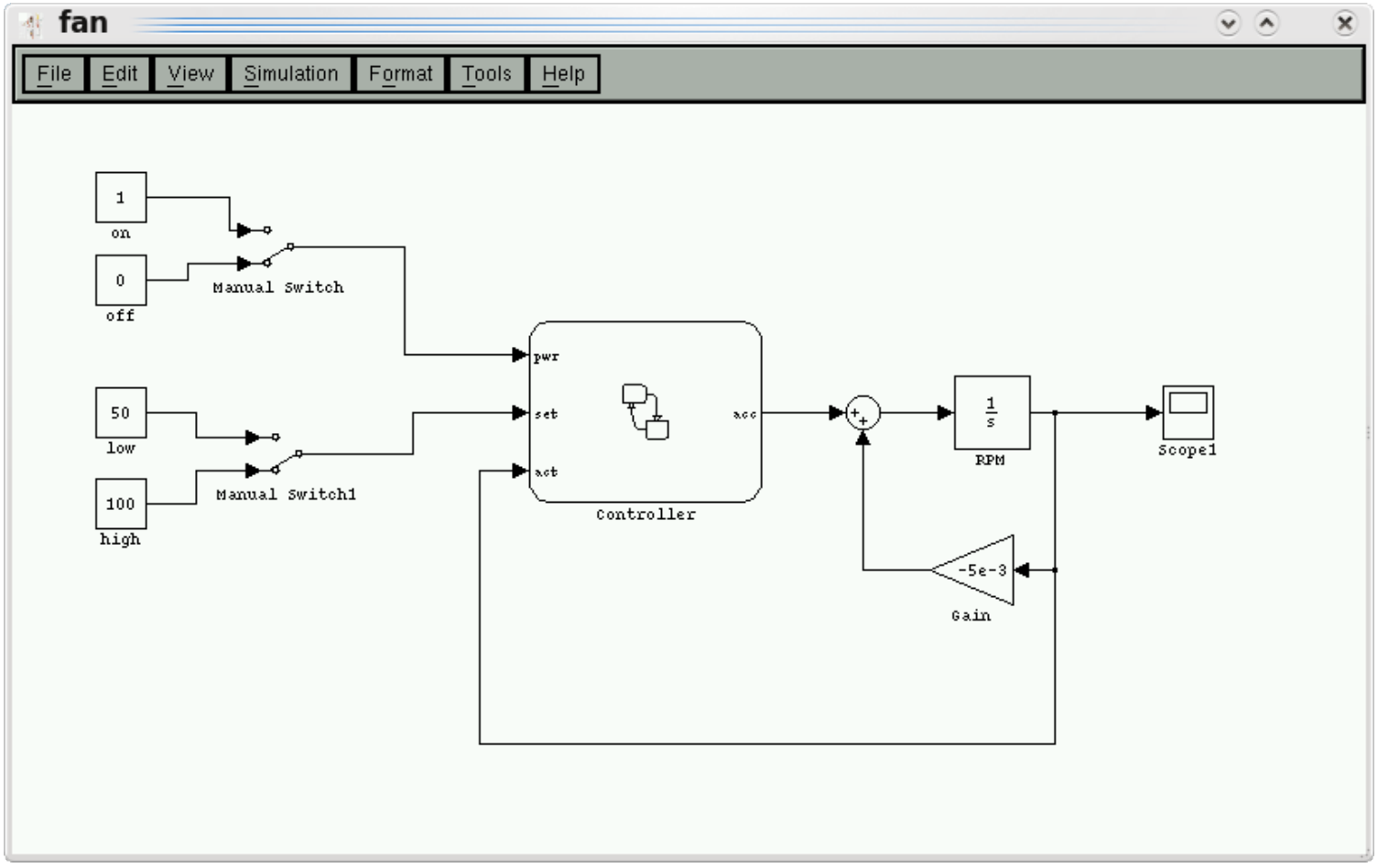


Example: Fan Controller

Specification

- Turn on / off
- Two modes: low / high
- Can only accelerate
- Damped
- Feedback

Fan Controller: Simulink Model



Fan Controller: Statechart