Supplementation Assignment

1DT059: Model-based Design of Embedded Software
Uppsala University

January 27, 2023

In this assignment you produce Stateflow (and Simulink) models. They should be implemented in .slx-files that are named after the exercise (the solution to Supplement, Problem 1a) should be in file `supple1a.slx`). Also include a file `suppl.pdf` with a short high-level description of the ideas of your solutions (you do not need to include obvious things). Include your name at the top of all submitted files.

Assignments are to be solved by students individually. You can discuss ideas and concepts with fellow students, but it is absolutely forbidden to share or copy (even parts of) solutions, lines of code, or similar.

Exercise 1 Simple Watch (30p)*:*
Make a Simulink/stateflow model of a simple Watch. The watch has a display with three parts: showing (in digital form) hours, minutes, and seconds. During normal operation, they are updated with time, each second in the way you expect.

The Watch also has input buttons that can be pressed: These are

M a major mode switch,

m a minor mode switch,

up for increasing the value of a display

down for decreasing the value of a display

Intuitively, **M** is used to change the major mode, **m** is used to switch from hours to minutes and from minutes to seconds within a major mode. and **up** and **down** incease and descrease the value of a display.

The major modes are to:

- Normal mode

- Change (correct) the time on the display
- Set an alarm

The clock cycles through the major modes by pressing **M**. Within the two non-normal modes, the display is frozen (but the actual time is still running as normal). Upon entering the "change" mode, the **up** and **down** arrows are used to set the hours, then after pressing **m**, the **up** and **down** arrows are used to set the minutes, then after pressing **m**, the **up** and **down** arrows are used to set the seconds, then after pressing **m**, the **up** and **down** arrows are again used to set the hours. Upon pressing **M**, the (internal) time is set to the new value (but not yet shown on the display). The major mode is changed to "Set alarm", which can be changed in the analogous way using the buttons **m**, **up**, and **down**. After another press of **M**, the Watch resumes "Normal mode", displaying the internal time.

You should make the major part of the model as a Statechart. You should also provide an animation of the model, i.e., the user should be able to see the values of the display, and interact (in "real-time") with the animation by pushing buttons as described above. The animation should also show when the alarm goes off (e.g., by some "lamp"), which can be switched off by (e.g.,) the button-press **m**.

Submission

Solutions (all files) to this assignment are to be submitted by the deadline indicated in Studium.