

# INF2270, exercise in sequential logic

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## Abstract

In this exercise you can test your skills in designing simple sequential logic

Imagine you want to construct a simple control circuit for the floor heating in your bathroom. As input signals you have a clock signal with a clock period of 15 minutes, and a control switch with 5 different positions (coded as binary numbers, e.g. '000', '001', '010', '011', '100', '101', or '00001', '00010', '00100', '01000', '10000'). The output signal is one bit where '1' means that the heating is on and '0' that the heating is off. If the control switch is in position 0, the floor heating should be switched off all the time, if it is in position 1, the floor heating should be turned on 15 minutes per hour, in position 2 30 minutes per hour, in position 3 45 minutes, and in position 4 all the time. You may assume that the heat distribution in the floor is so slow that effectively this control mechanism results in 5 different floor temperatures.

1. Construct a Moore FSM to achieve this controller. Draw the state transition diagram and draw the sequential logic circuit. Use D-flip-flops and/or T-flip-flops as memory cells. Hint: you will need 8 states, i.e. coding for each 15 minute period within an hour combined with the heating being on or off.
2. Construct a Mealy FSM for the same task. Hint: you will only need 4 states since you can deduce the on/off signal for the heater from a combination of the control switch position and from which 15 minute period the controller is in. So you need only states to code for the 4 15 minute periods within an hour.