**Home exercise 3**

**Course name: Object oriented programming and design for engineering**

**Course number: 157109**

**Subject: Statecharts, sequence diagrams**

You are given the following requirements for a system representing a water bar:

The water bar has four buttons (events): 'cold', 'hot', 'protection on/off', 'safety'.

The water bar has four operations:hotWaterOn(), hotWaterOff(), coldWaterOn(), coldWaterOff(). These operations control the water flow.

The water bar has a child-protection mechanism. When an object is initialized, this mechanism is enabled.

In the initial state ('waiting'):

* Pressing the 'cold' button causes the coldWaterOn function to be called and after 10 seconds the coldWaterOff will be called.
* Pressing 'protect on/off' toggles the child-protection mechanism between disabled and enabled.
* If child protection is disabled, pressing the 'hot' button causes the hotWaterOn function to be called and after 10 seconds the hotWaterOff will be called.
* If child protection is enabled, it is possible to have hot water only by first pressing the 'safety' button, then, within a 2-second window, pressing the 'hot' button.

While hot/cold water is flowing, the 'cold' and 'hot' buttons are inactive, but the other buttons are active. After 'safety' was pressed and while waiting for 'hot' (for at most 2 seconds), only the 'hot' and 'cold' buttons are active. This means that we cannot press 'safety' multiple times to get more than 2 seconds for pressing 'hot'.

Guidance: use orthogonal components.

**Part A**

draw a statechart diagram implementing the requirements

**Part B**

Add a sequence diagram to describe the following case study:

* Press the hot button
* Press the 'safety' button
* Press the 'hot' button in less than two seconds
* Wait for 11 seconds (This does not show in the sequence diagram)
* Disable child protection
* Press the 'hot' button
* Wait for 11 seconds (This does not show in the sequence diagram)
* Press the 'cold' button
* Wait for 11 seconds (This does not show in the sequence diagram)

An event is represented by an arrow coming from outside the waterbar.

**Part C:**

What change should we make in order to enable setting the initial value of the child protection without needing to recompile the water bar class? What design principle did you consider in your answer?

You can find [here](https://drive.google.com/file/d/1-ULR4iCIUSUjut3zKEASeeF6gPYg5xW9/view?usp=sharing) a video demonstration on how the water bar should operate

The assignment must be submitted as a PDF which contains the students’ details and the answers. The pdf file will be named based on the submitters’ ID number (for example 12346\_12345.pdf).

Tip: You can use a service or application that supports UML diagrams. One option is [WhiteStarUML](https://sourceforge.net/projects/whitestaruml/). Another is a cloud service called [draw.io](https://app.diagrams.net/). You can also choose not to use any software and draw the diagrams on a page and scan it to a pdf file. The file must be clear and readable.

Good luck!