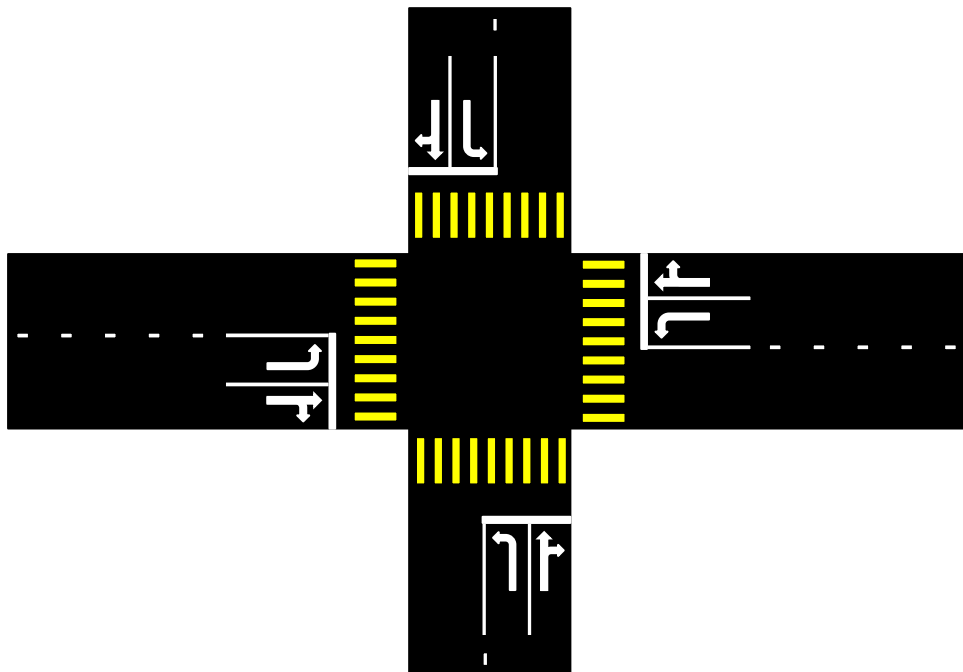# Exercise 1– Requirements & Modelling

9.10.2025, kuex

1) Requirements

Assume the following crossroad situation as introduced in the lecture:

Tasks:

- Formulate 5 traffic light control system requirements concerning its correct operation.
- Hand the requirements over to a colleague and ask for honest feedback.
- Improve your requirements according to the feedback received.
- Finally, submit (1) the initial requirements, (2) the feedback received, and (3) the improved requirements to kuex@zhaw.ch via teams or e-mail. Don't forget also to add your reviewer's name to the submission.

Submission Deadline: **Tuesday after the exercise**

2) Modelling a Washing Machine

Consider that, in your next job, you are asked by a white goods manufacturer to provide a UML state machine for a washing machine, according to the requirements specified below:

- Opening the door shall only be possible when there is no water in the machine, the drum is not rotating, and the door is unlocked.
- The status of the door ("OPEN" or "LOCKED") shall be written to the LCD of the washing machine.
- Pressing the "Waschen" button shall start the regular washing program, consisting of the following 5 steps:
  o Filling water into the washing machine
  o Rotating the washing drum to the right for 4s
  o Rotating the washing drum to the left for 4s
  o Taking-out the water from the washing machine
  o Spin-dry for 5s
- Pressing the "Schleudern" button shall start the spin-dry program for 5s
- Pressing the stop button marked "Stop" shall be possible at all times and result in the washing machine possibly taking out the water, turning off the water heater, and stopping all operations.
- The water temperature shall be increased to HOT before rotating the washing drum.
- The water heater must be switched off before rotating the washing drum.

Assume that the following sensor events are supporting your washing machine control system (i.e. you can rely on these events in your UML state machines):

- Event "TIME_OUT" to indicate that a specific time has passed.
- The level of water in the washing machine shall be controlled by a sensor that can trigger 2 different events (Event "FLOATER_HIGH" and "FLOATER_LOW")
- The water temperature shall be controlled by a sensor triggering the event "TEMPERATURE_HOT", when the water has reached a hot temperature.

Your washing machine control system shall control the following actions (i.e. you can use these actions in your UML state machines):

- Start Timer for "X" seconds
- Door lock / Door unlock (controlling the lock of the door)
- Motor left fast on / Motor left slow on / Motor right slow on / Motor off (controlling the speed and direction of the drum's motor)
- Heater on / Heater off (controlling the temperature of the water for washing)
- Valve open / Valve close (controlling whether or not water is added to the drum)
- Pump on / Pump off (controlling whether or not water is taken out of the drum)

Tasks:

- Model the washing machine according to the above requirements as UML state machine.
- Where requirements are not clear, write down your own assumptions.
- Send the model to kuex@zhaw.ch via teams/e-mail.
- Bring your model to the lab next week.

Submission Deadline: **Tuesday after the exercise**