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Overtaking with approacher

Paderborn, January 2015

This document summarizes the requirements for the Overtaking scenario with approacher. In Chapter 1, we shortly describe the scenario. The basic requirements are listed in Chapter 2. Finally, more advanced requirements are listed in Chapter 3.

1 Scenario

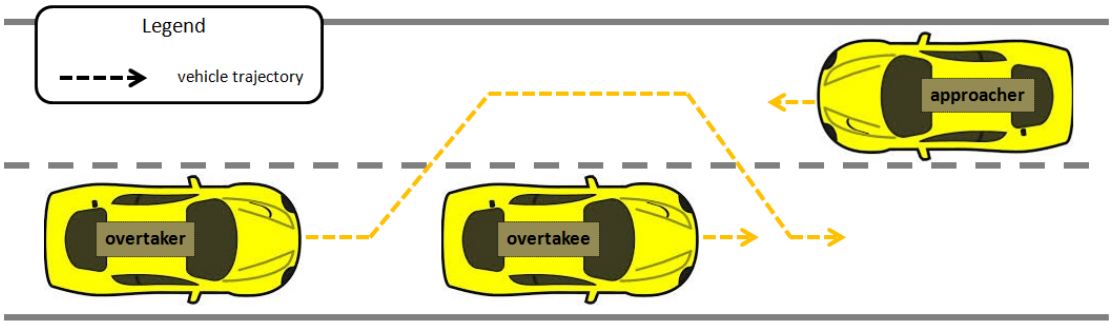

Figure 1.1: Scenario

In this scenario, there are three vehicles driving in two-lane road. Figure 1.1 shows the road and the three vehicles. Two vehicles drive one after another in one direction, while the third vehicle drives on the other lane in the opposite direction. The first two vehicles are named *Overtaker* and *Overtakee*. The third vehicle is named *Approacher*.

The *Overtaker* wants to overtake the *Overtakee* in a safe manner. This means that the *Approacher* should be far enough during the overtaking. Otherwise, the overtaking should not be allowed. The vehicles can exchange messages in order to assure the safety in this scenario.

2 Basic requirements

The scenario from Chapter 1 is modelled in MechatronicUML. From the model, we generate C code and deploy it to LEGO mindstorm robots representing the vehicles. The following is a list of our basic requirements:

- The vehicles drive by following a black line representing one lane. Therefore, there are two black lines for the two lanes.
- There are two modes of velocity for each vehicle: fast and slow. The mode changes periodically.
- The road is divided in seven sections. Each vehicle knows the section number of the section where it is driving at the moment. When it drives in new section, it informs the section control by sending a message.
- When the *Overtaker* gets close to the *Overtakee* it asks for permission for overtaking. The *Overtakee* agrees if it is currently driving in slow mode.
- The overtaking needs to be approved also by the section control which checks the position of each vehicle, and agrees on overtaking if the *Approacher* is at least two sections away from the *Overtakee*.
- The *Overtaker* start the overtaking only if the *Overtakee* and sections control approve the requests.
- If the request is not approved, the *Overtaker* has to change to slow mode. When the distance increases it may send new request
- During overtaking, the *Overtakee* and the *Approacher* drive in slow mode.

3 Advanced requirements

Here, we list additional requirements which make the scenario more complicated. We define them as optional.

- The vehicles should be able to detect any obstacle on the road and break when they get too close.
- There is only one type of vehicle. Each vehicle can be *Overtaker*, *Overtakee*, and *Approacher* at any time.
- The road is circular.
- The velocity mode of each vehicle can be remotely managed. There is a user interface for this purpose.