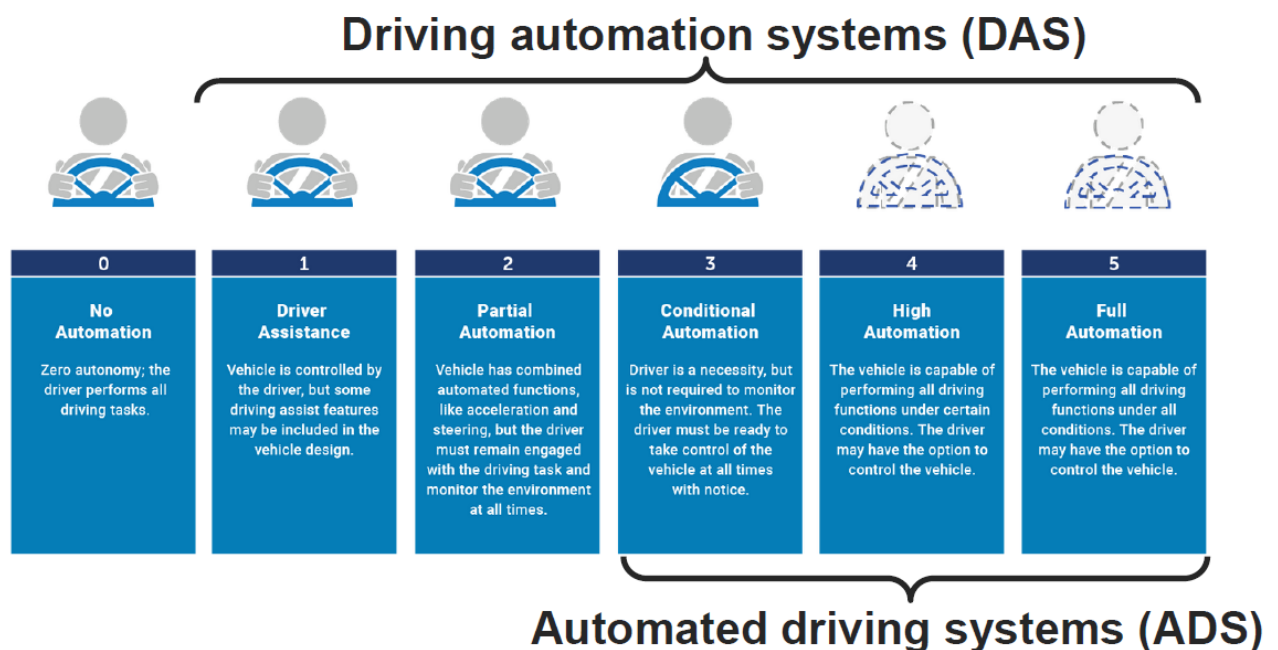


## Assignment

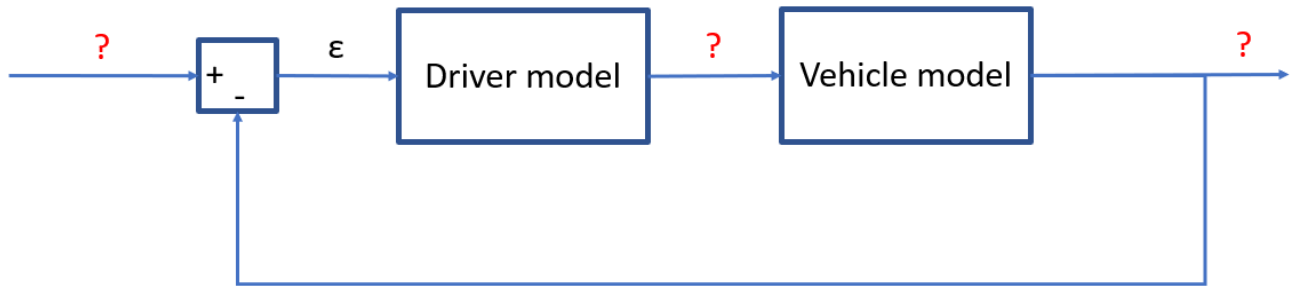
Companies involved in the development of *Automated driving systems* (ADS) are conducting intensive testing of ADS, both through real world driving and simulation testing. These activities are fundamental to improve the performance of ADS and therefore increase road traffic safety. Several driving scenarios/use cases are especially critical for ADS in mixed traffic, including:

1. Sideswipe/rear-end (ADS striking) conflicts with manually driven vehicles cutting in front of ADS.
2. Straight crossing path conflicts with Vulnerable Road Users, at unexpected locations.
3. Rear-end conflicts (ADS struck) with manually driven vehicles.



You are working in one of these companies and your role is to design how the ADS with level 3 of automation would react in driving scenario/use case 1 (when the other vehicle cuts in front of ADS). For completing the assignment, you would like to develop a driver model describing how drivers usually react in the same driving scenario/use case, during manual driving. Please proceed through the following steps:

- a) Outline why this driving scenario/use case could be critical for ADS. For this task, please focus on the complexity of the interaction among the ADS and the other road user.
- b) Considering the general structure of the control model shown below, which variables/measurements could be replacing the red questions marks? Please think about the possible input and output of the driver model that you would like to develop ( $\epsilon$  is the error between the output of the vehicle model and the reference input variable).



- c) Describe which type of data you would need, to develop the driver model.
- d) Discuss who (driver vs. ADS) is responsible for each level of the driving task (reference to hierarchical model seen in Monday's lecture), during the driving with the ADS activated. Would your response change for a system with higher level of automation and for the case of manual driving?
- e) Prepare a Power point to be presented to another group on the last day (max 15 minutes per group).
- f) If you have time, explain how you could use the driver model to test how safe the ADS is in the specific driving scenario/use case. How you would measure safety?

Please note that for most of the questions, there is not a unique answer. The problem can be approached from different perspectives and therefore different solutions of the task are possible.