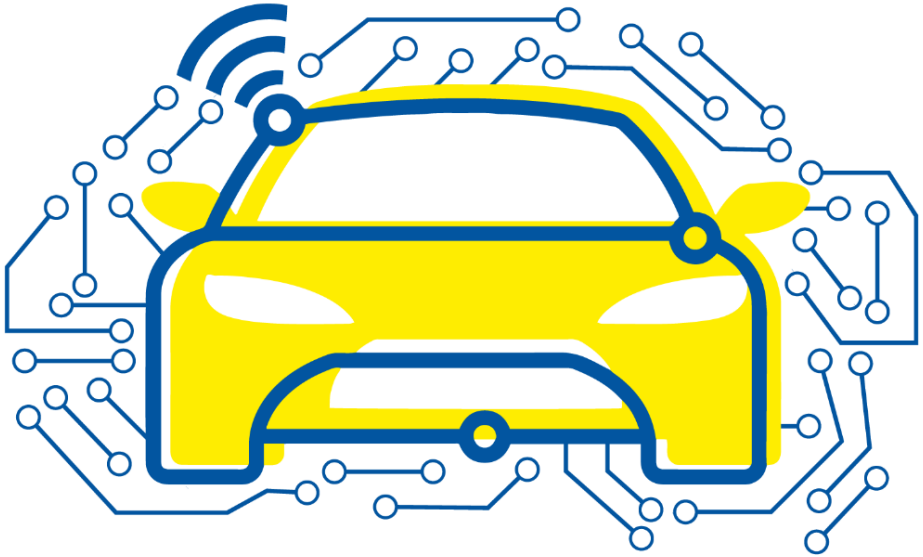
**Automated and Connected Driving Challenges**

Section 4 – Vehicle Guidance

# Vehicle Guidance on Stabilization Level

## Low-, High- and Bi-Level-Stabilization



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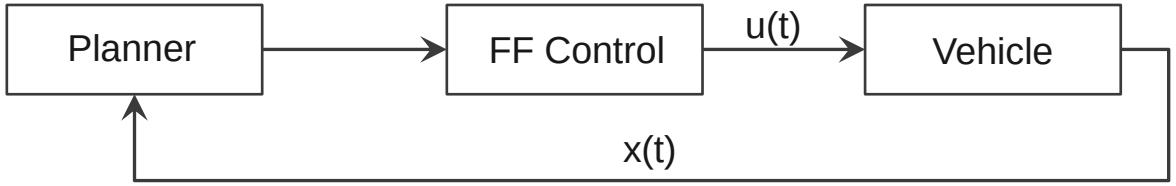
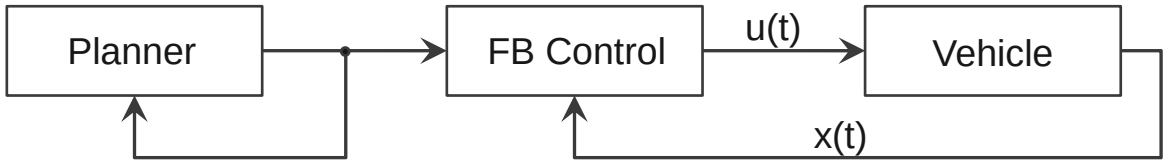
# Vehicle Guidance on Stabilization Level

## *High- and Low-Level Stabilization*

- Where is the feedback into the controller structure applied?
  - **Feed-back on Planner Level** (High-Level Stabilization; HLS)




  - **Feed-back on Controller Level** (Low-Level Stabilization; LLS)



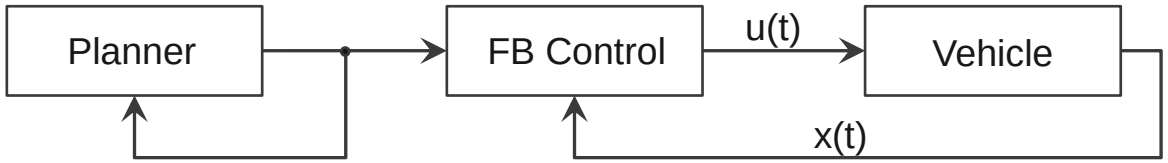

⇨ Trajectory may not be changed within the control horizon!

# Vehicle Guidance on Stabilization Level

## *High- and Low-Level Stabilization*

- Where is the feedback into the controller structure applied?
  - **Feed-back on Planner Level** (High-Level Stabilization; HLS)


  - **Feed-back on Controller Level** (Low-Level Stabilization; LLS)

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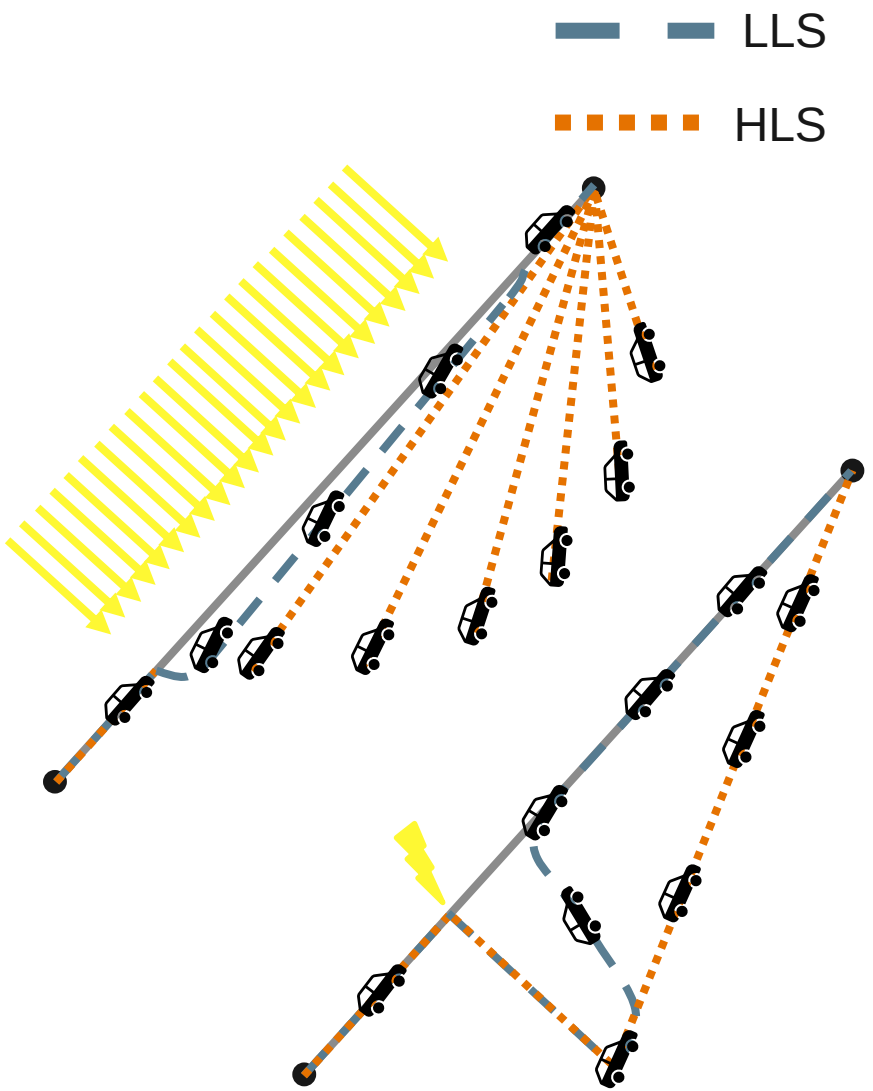


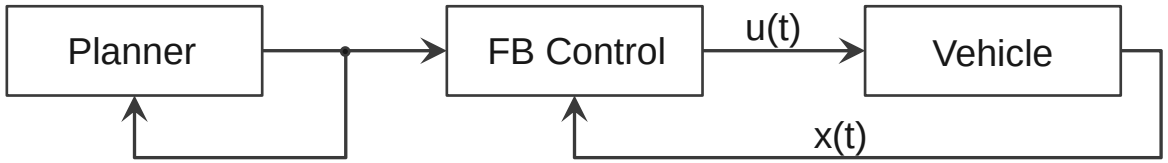

Image: ika, Werling 2011
Source: Werling 2011

# Vehicle Guidance on Stabilization Level

## *High- and Low-Level Stabilization*

- Where is the feedback into the controller structure applied?
  - **Feed-back on Planner Level** (High-Level Stabilization; HLS)


  - **Feed-back on Controller Level** (Low-Level Stabilization; LLS)

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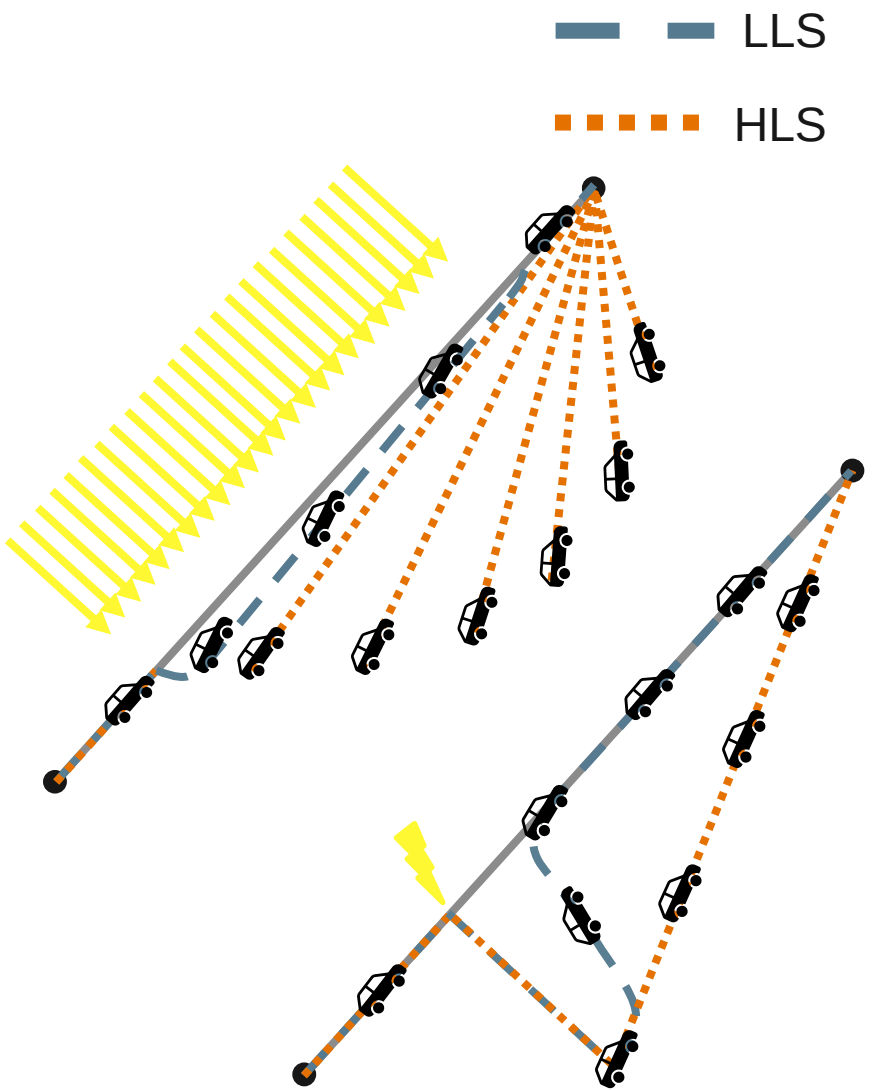


Image: ika, Werling 2011
Source: Werling 2011

# Vehicle Guidance on Stabilization Level

## *Concept of Bi-Level Stabilization*

- Planning of trajectory is done at lower frequency
- Low-level stabilization at higher frequency ensures, that trajectory is followed with low deviations of the planned states despite of any disturbances
- If too high deviation from trajectory is detected, re-planning of the trajectory from actual vehicle state is triggered

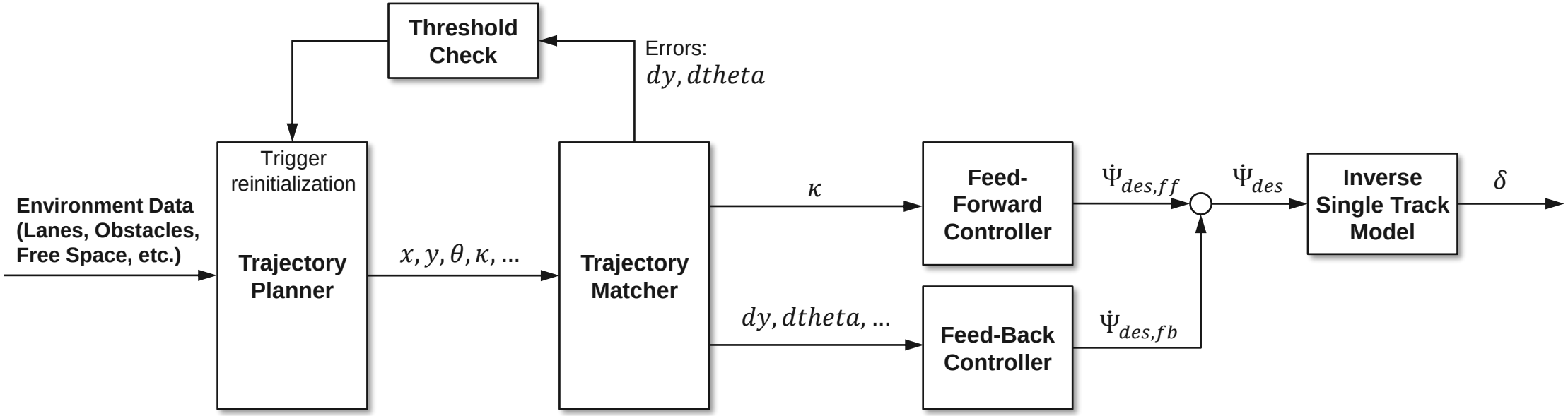


Image: ika
Source: Werling 2011