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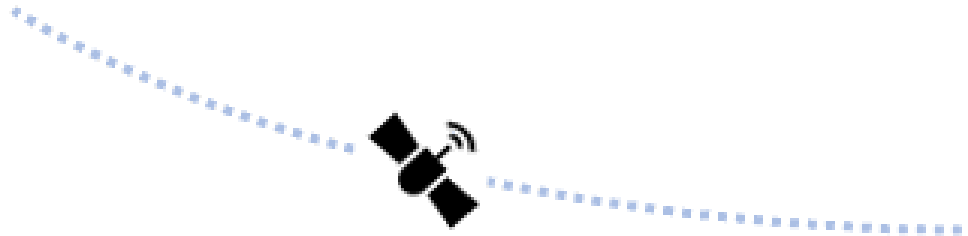
This project has received funding from the European Union Agency for the Space Programme under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101004181.

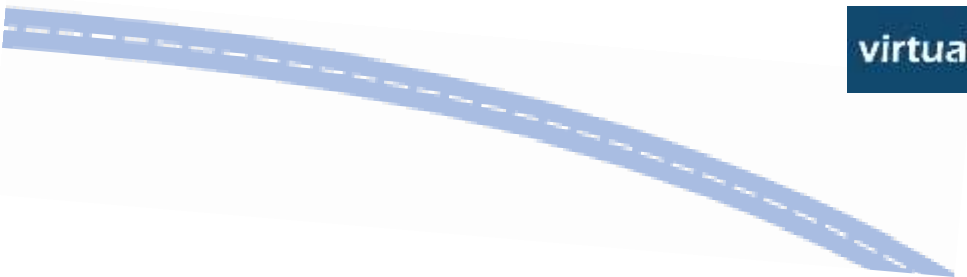


24/09/2021

Workshop on Traffic Infrastructure Mapping and Automated Damage Assessment Systems

Selim Solmaz and Martin Rudigier

virtual vehicle



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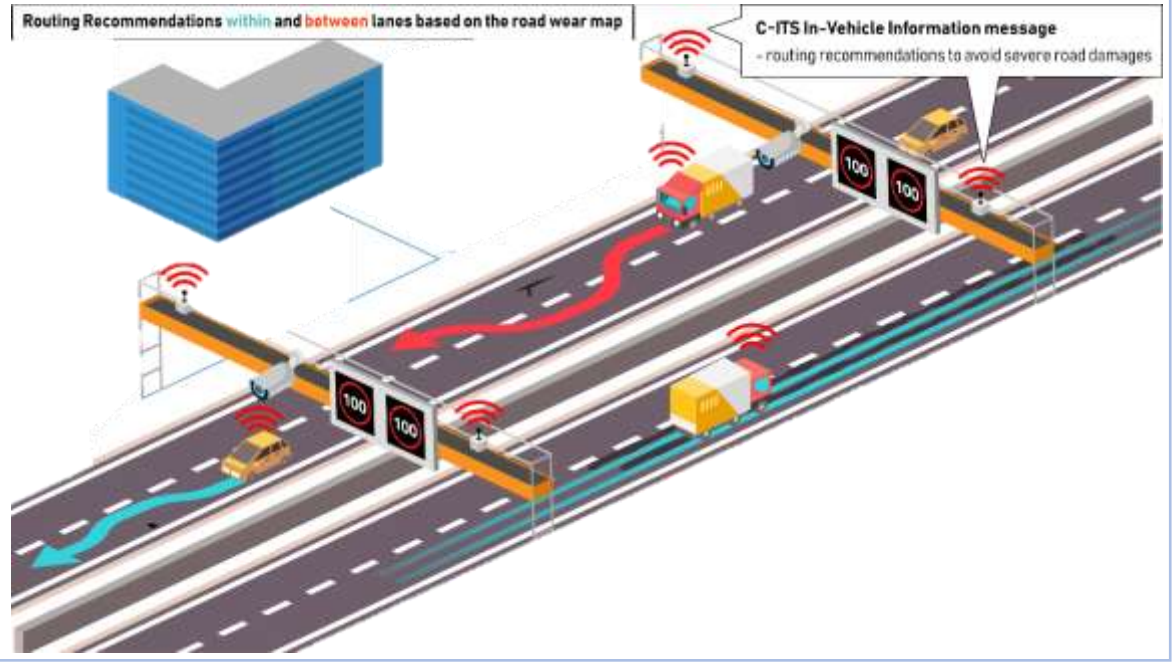
Infrastructure Assisted Driving Functions

An automated vehicle receives routing recommendations to avoid road damage

- Road wear map
- C-ITS messages
- EGNSS positioning
- Driving functions



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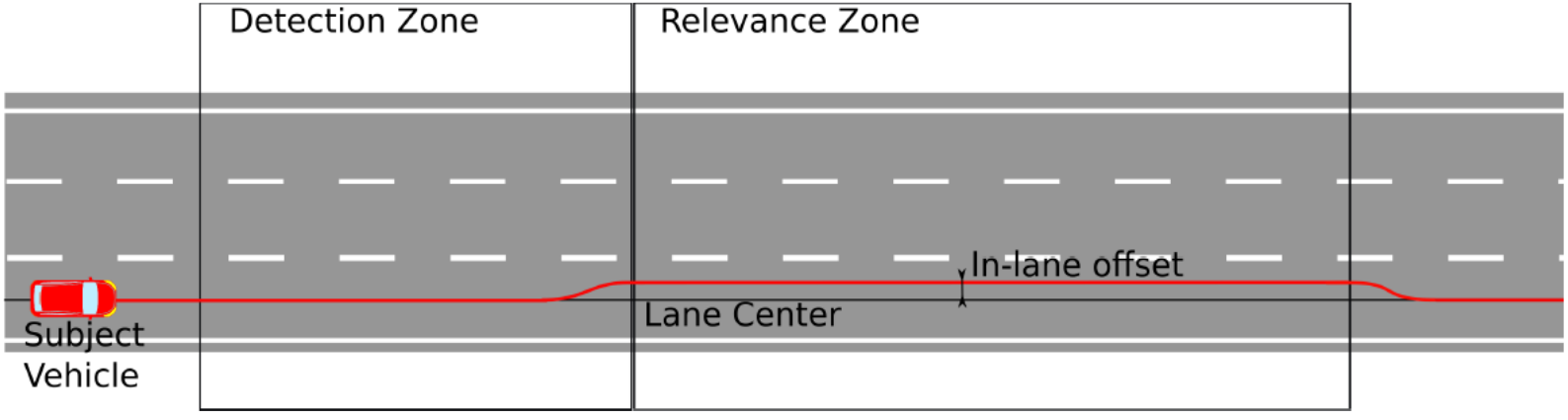
EUC-2 Scenario Descriptions

EUC-2: Routing Recommendations within and between lanes based on the road wear map, provided via C-ITS messages

Scenario 1: In-lane offset recommendations



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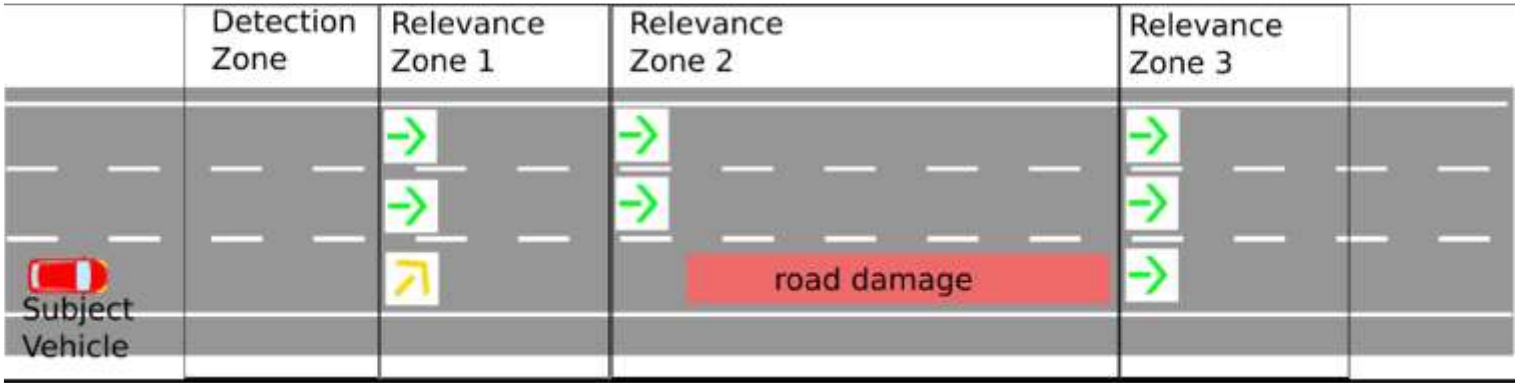
EUC-2 Scenario Descriptions

EUC-2: Routing Recommendations within and between lanes based on the road wear map, provided via C-ITS messages

Scenario 2: Lane change recommendations



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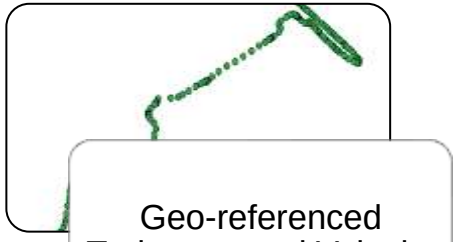
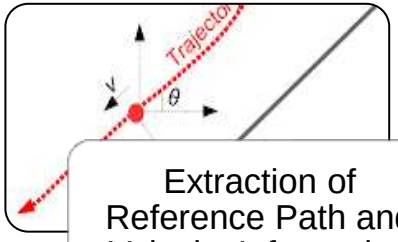
EUC-2 Scenario Descriptions

EUC-2: Routing Recommendations within and between lanes based on the road wear map, provided via C-ITS messages

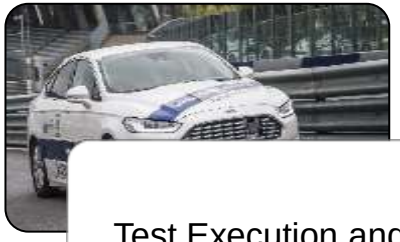
Scenario 3: EGNSS-based local lane recommendations



Geo-referenced Trajectory and Velocity Provision



Extraction of Reference Path and Velocity Information for ACC and LKA Functions



Test Execution and Function Validation

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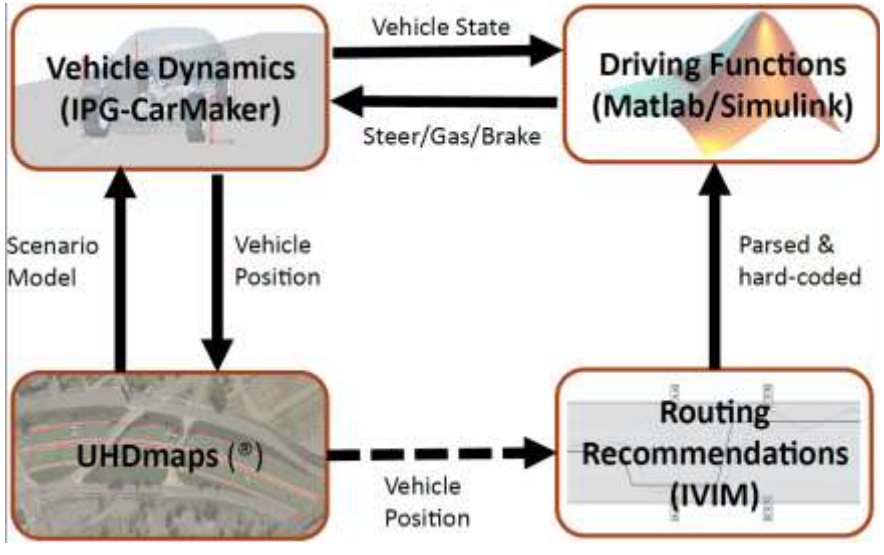
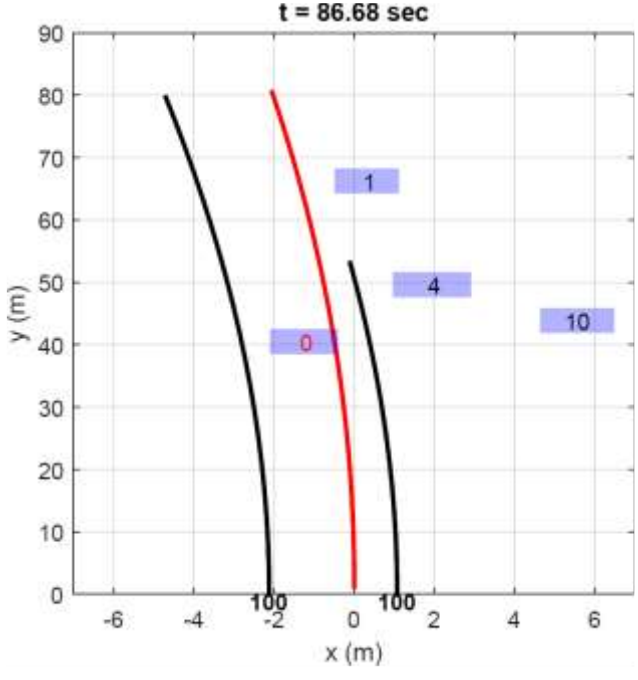
Development/Simulation Environment





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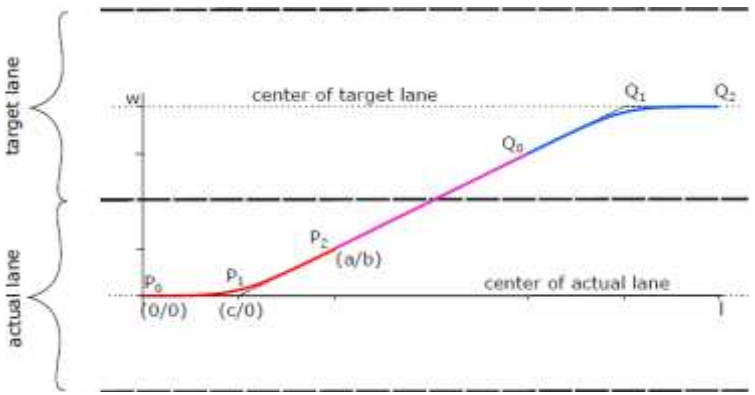
Driving Function (Trajectory Planner)

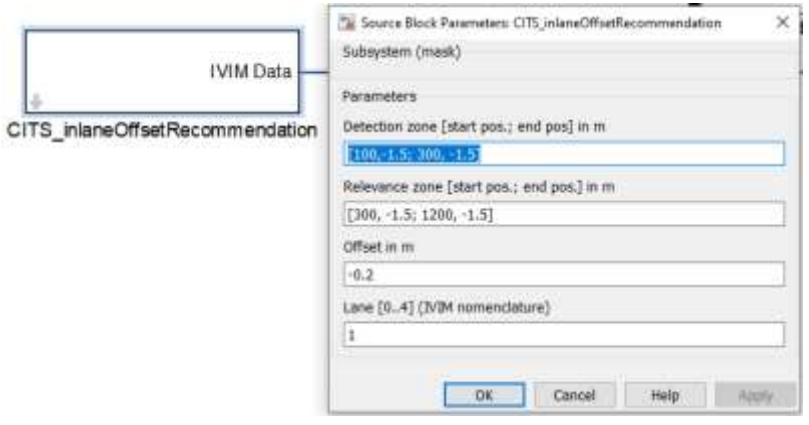
- Rule-based trajectory planner (finite state machine)
- Set of discrete decisions to trigger lane changes or to keep the vehicle on the current lane
- Suitable for structured environment like highways (well defined ODDs)
- Default behavior: keep in the middle of the right most lane
- Lane change: Bezier curve



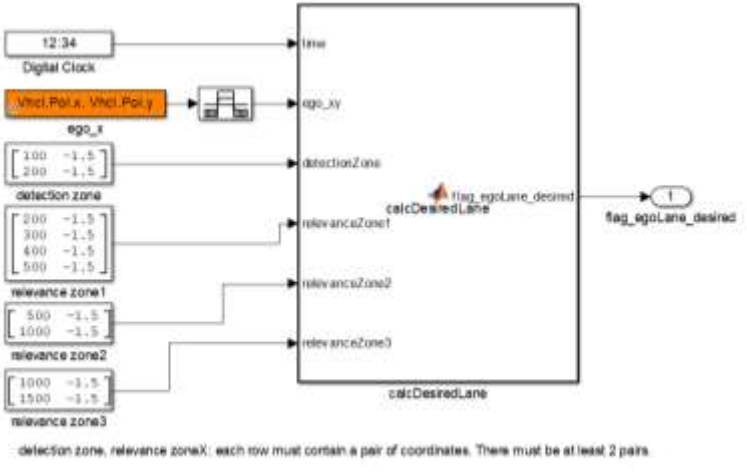
Driving Function (Trajectory Planner)

Additions for the different Scenarios:

Scenario 1: Inlane offset recommendation



Scenario 2: Lane change recommendation



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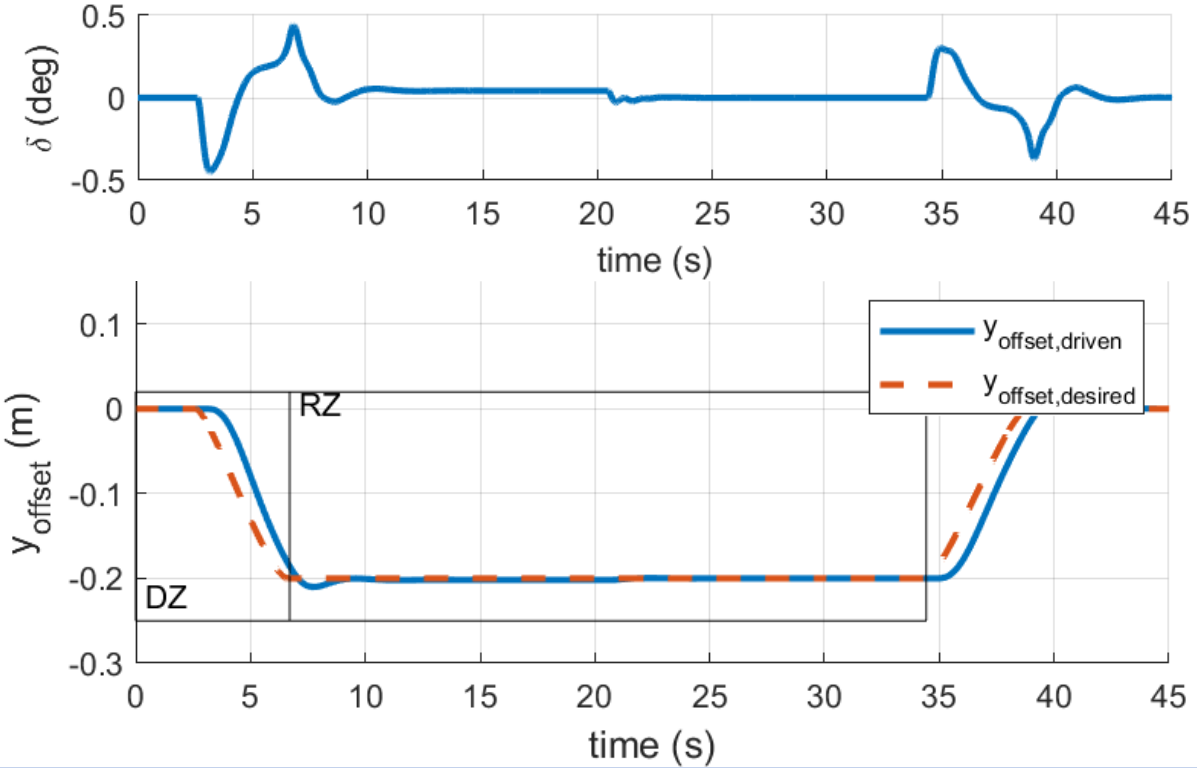
Simulation Results

Scenario 1:
Inlane offset recommendation



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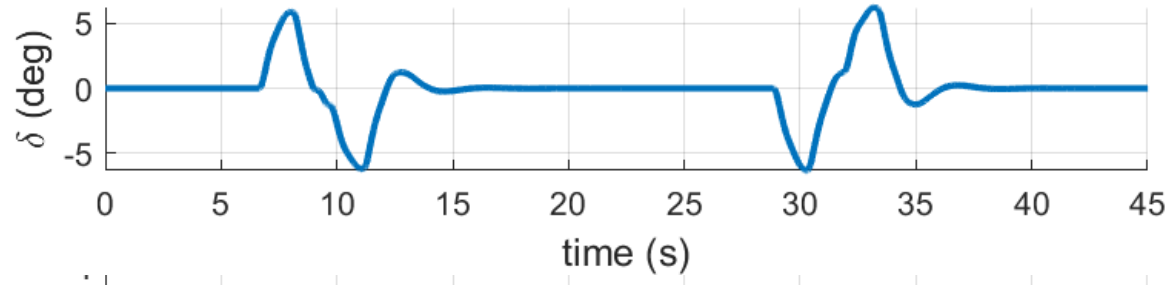
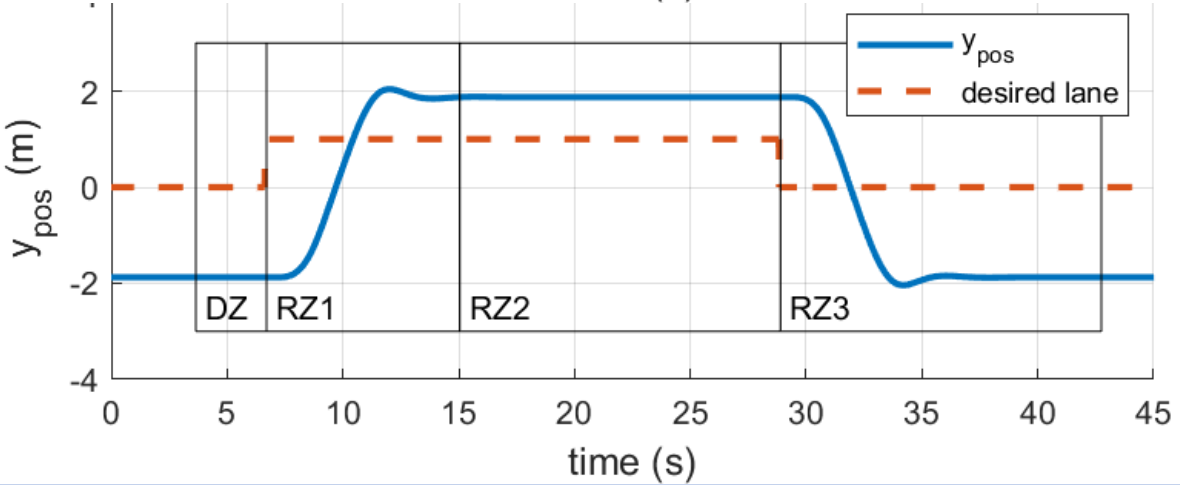
Simulation Results

Scenario 2:
Lane change recommendation





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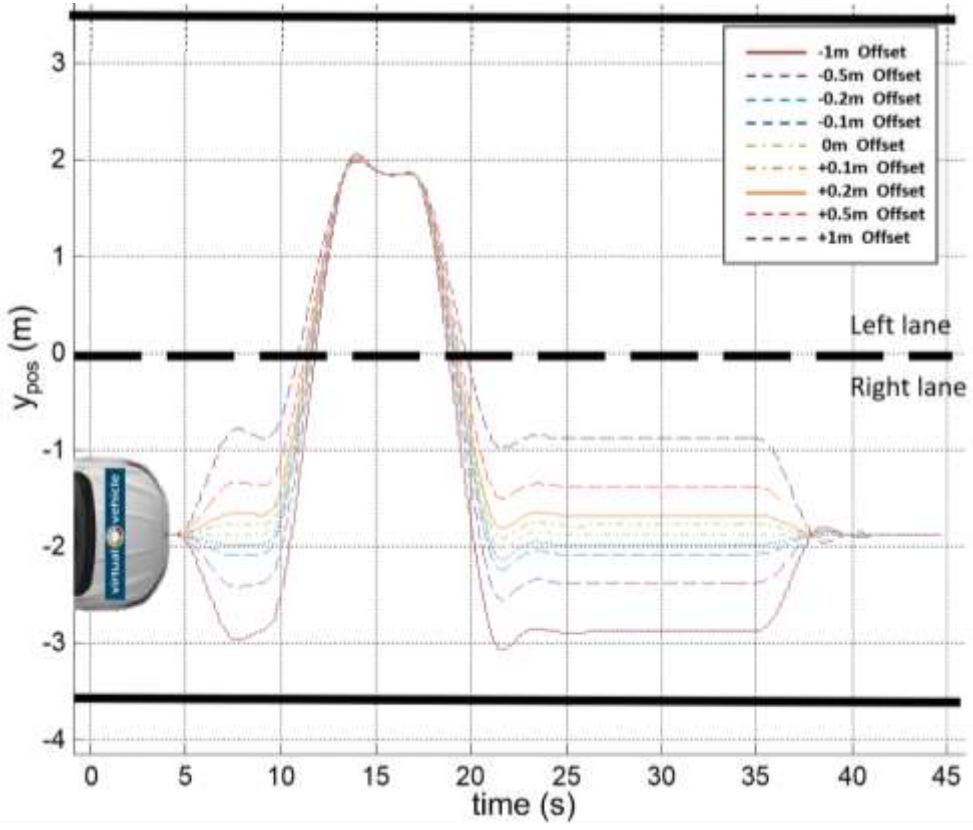
Simulation Results

Combined scenario 1 & 2 :

- combined with lane change,
- simulated with different desired offsets



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Simulation Results

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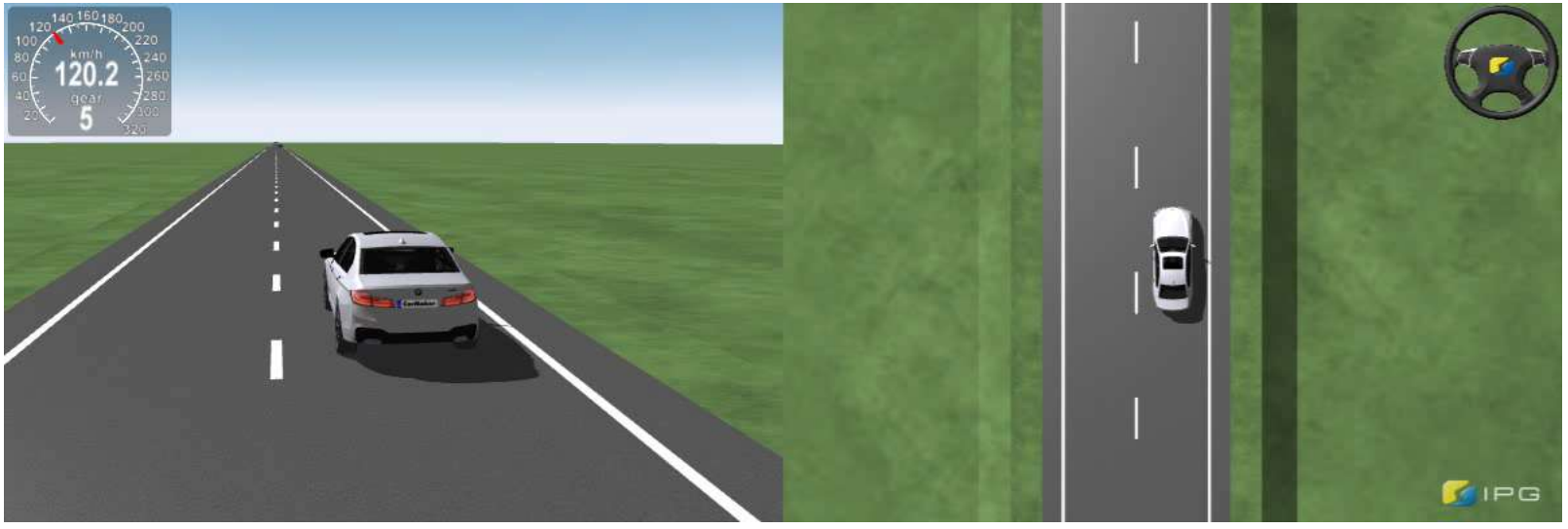
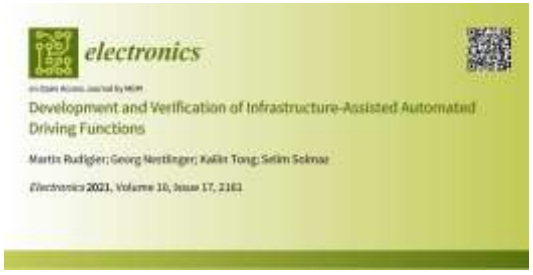
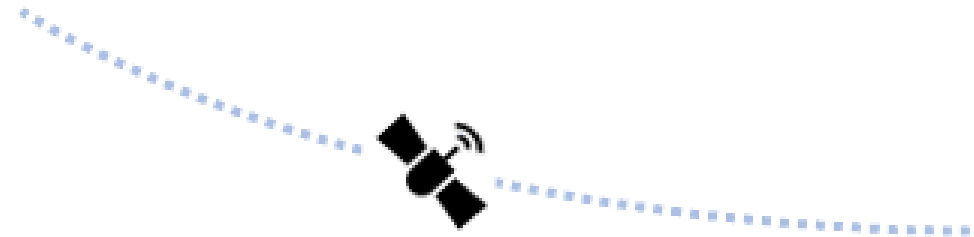


Future Work/Outlook

- First paper on the developed driving functions has recently been published at MDPI/Electronics Journal
- A conference paper is in preparation for the KPI analysis of the driving functions for the IEEE-ICCVE 2022 Conference (Florida, USA)
- Next step is the implementation on the vehicle and road tests
  - EGNSS / ITS-G5 OBU system integration on the vehicle
  - EGNSS localisation tests with ASF utilizing RTCM data
  - Test track evaluation of the scenarios





24/09/2021

Thank you!

Selim Solmaz and Martin Rudigier

virtual vehicle