



Towards Collaborative Perception for Automated Vehicles in Heterogeneous Traffic

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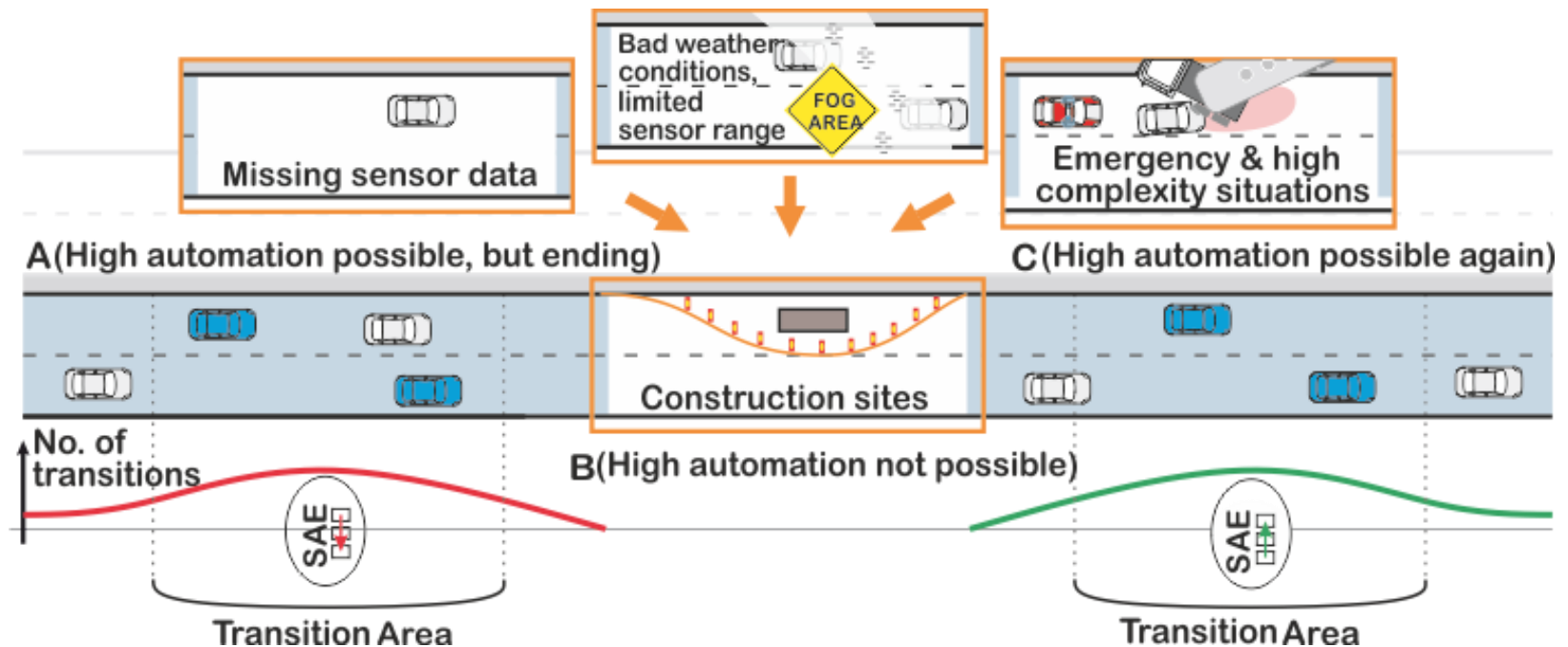
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Objective and Approach

Develop and demonstrate **infrastructure-assisted** traffic management procedures and protocols for smooth **coexistence** between automated, connected, and conventional vehicles especially at **Transition Areas** in an **urban** environment.

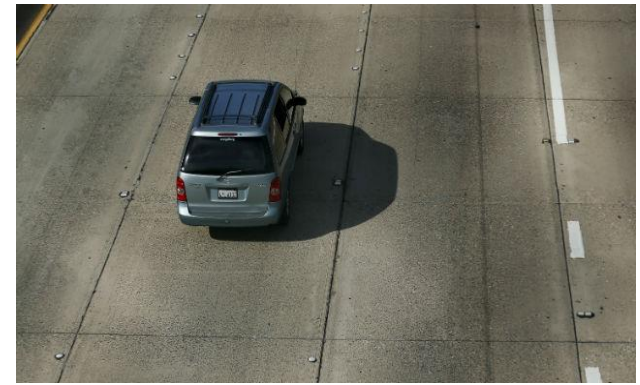
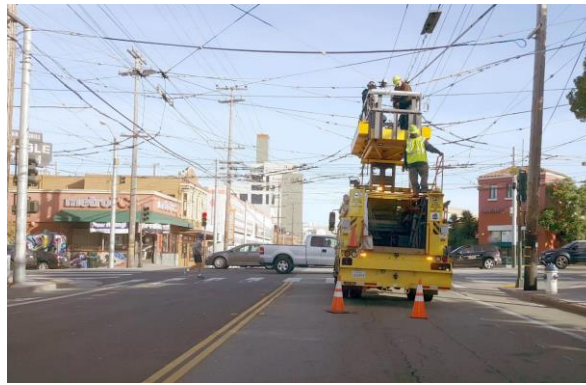
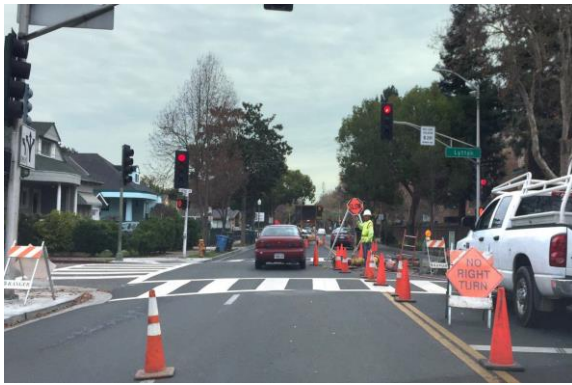
Transition Area



Transition Areas are areas on the road where many highly automated vehicles (blue) are changing their level of automation due to various reasons.

What if...

- ...your automated vehicle is not able to solve the situation ahead?



- ...this happens not to single vehicles only, but to several?
- ...it always happens on the same location?

Collective Sensor Data Processing Architectures

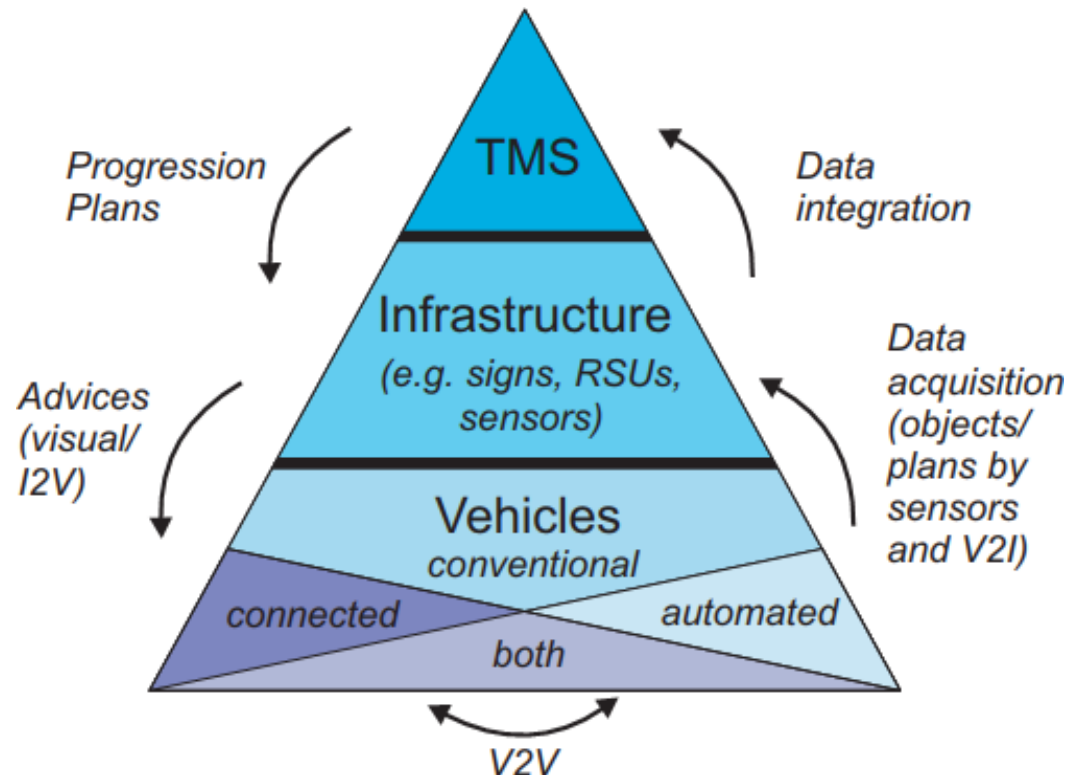
- Collective perception includes:

Sensor Setup
Architecture

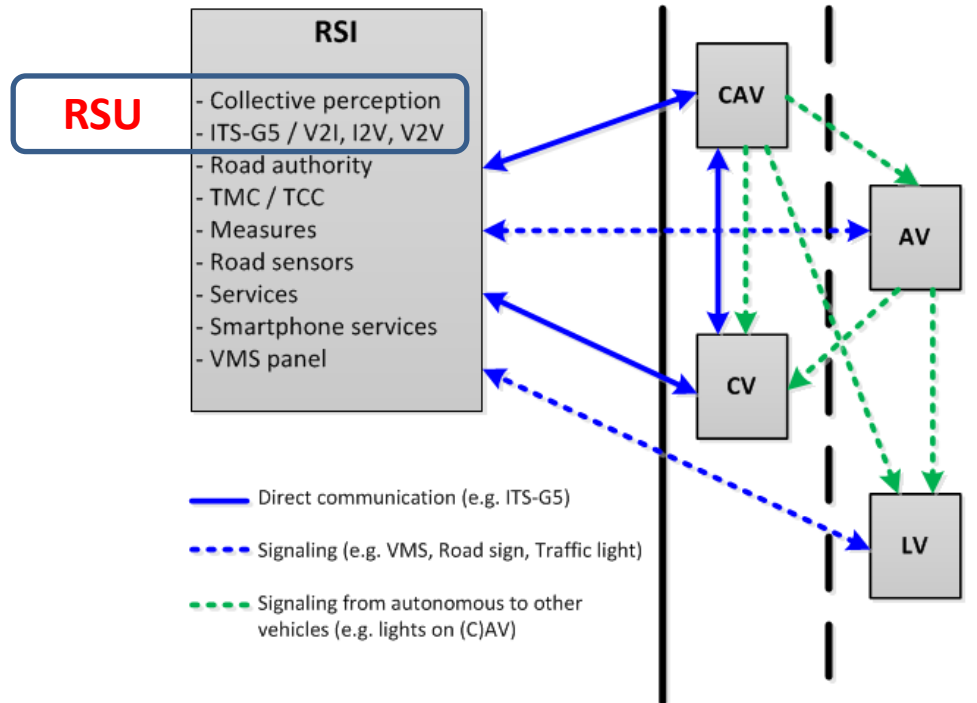
- CVs/CAVs (Cooperative Vehicles)/Cooperative Automated Vehicles
- RSUs (Road Side Units)

- Inside the collective perception service loop to enhance the detection capabilities.
- Due to limitations on sensing environmental information
 - Sensor range
 - Sensor mounting positions
 - Other physical limitations

Hierarchical Traffic Management

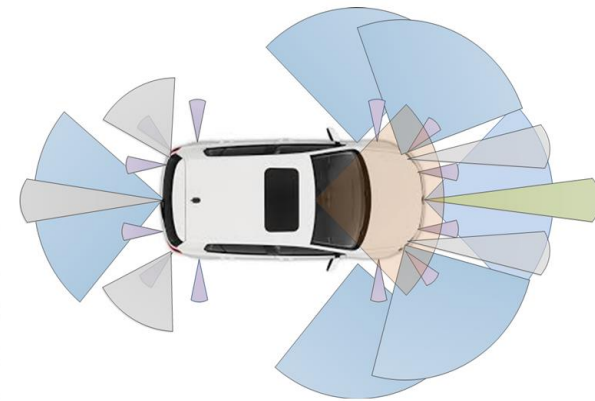
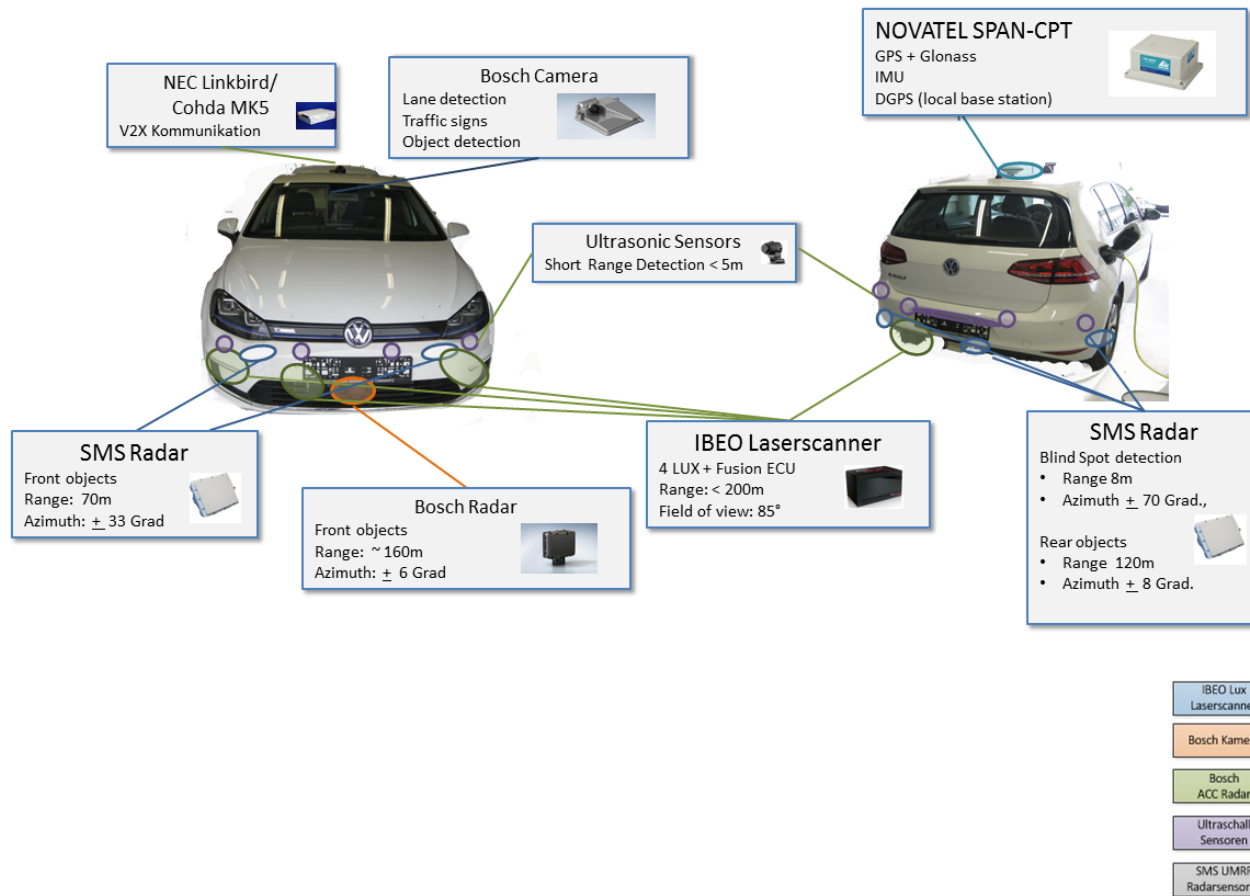


Communication System Design

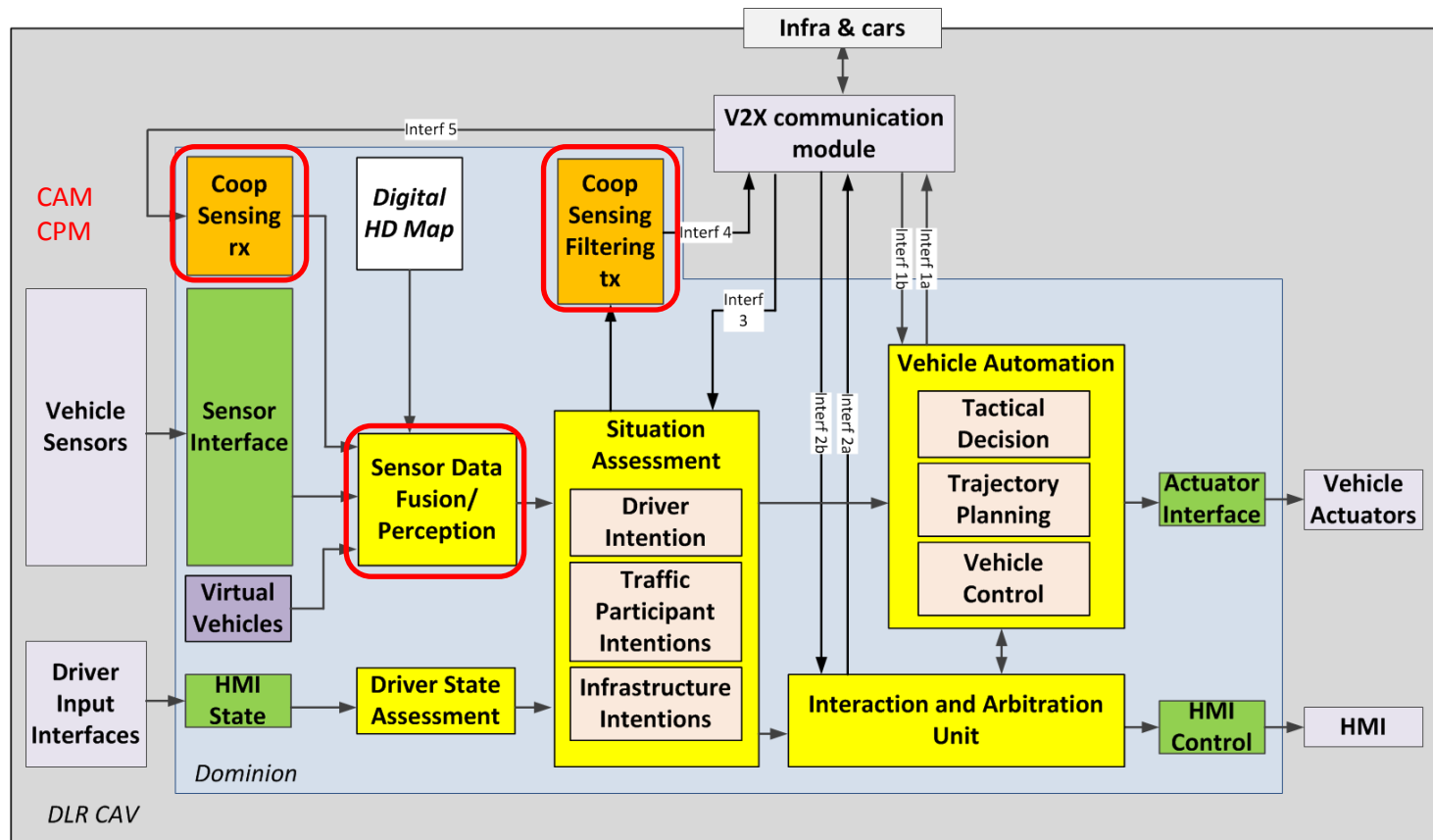


TransAID communication system design

Sensor Distribution

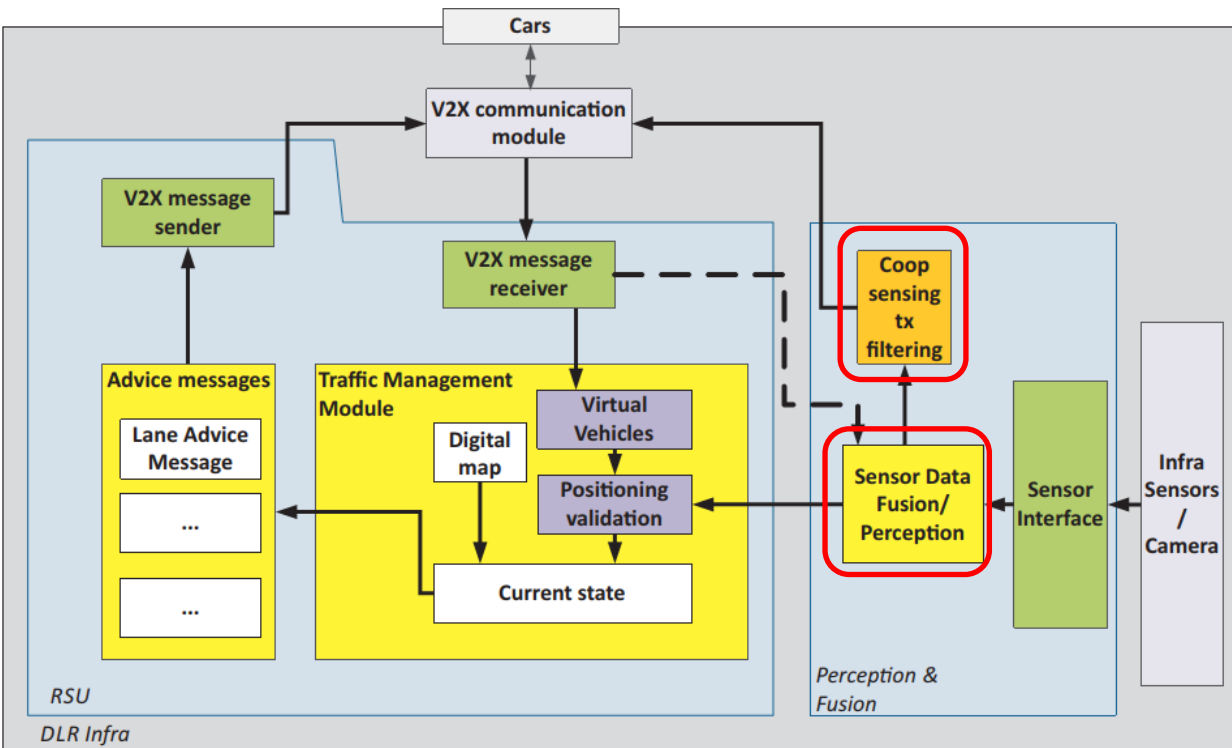


Vehicle-based Sensor Processing Architecture



CAV architecture implemented on the test vehicles

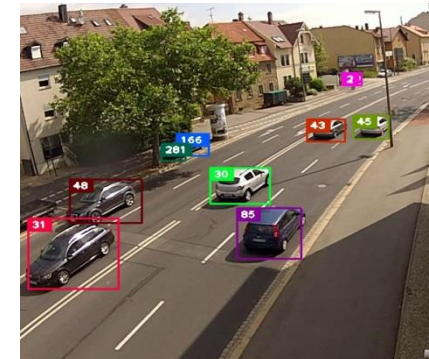
RSU with Sensor Processing Architecture



RSU infrastructure with sensors and communication modules



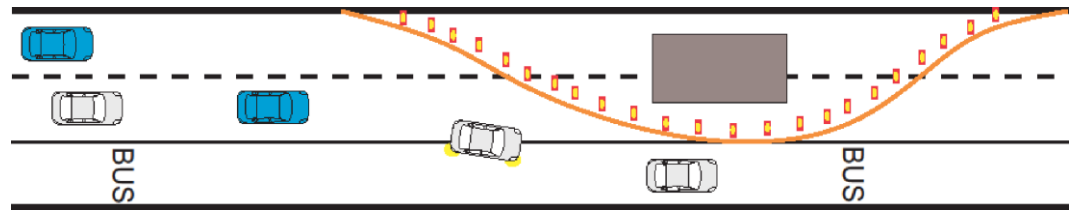
Road Side Unit



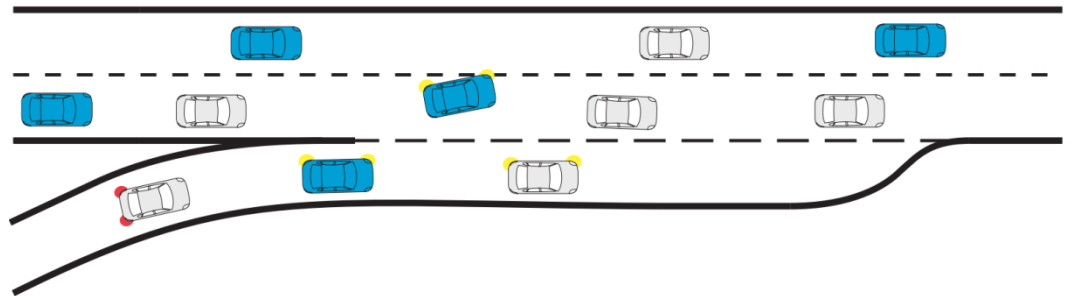
Data fusion output for a virtual perspective of the hemispheric camera

Selected Use Cases

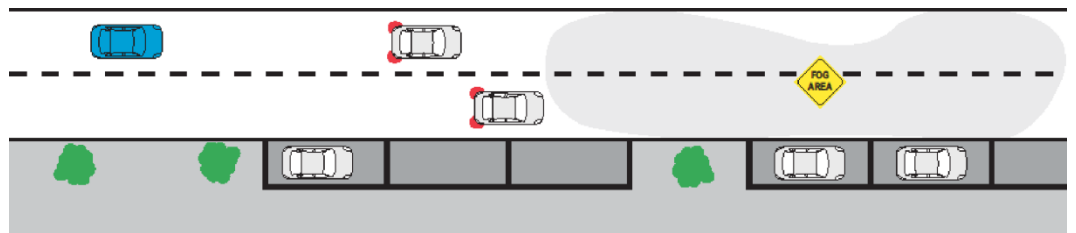
Blocked road where driving at bus lane which is usually not allowed



Merging lanes on motorway and dense traffic



Impassable road segment due to bad visual conditions



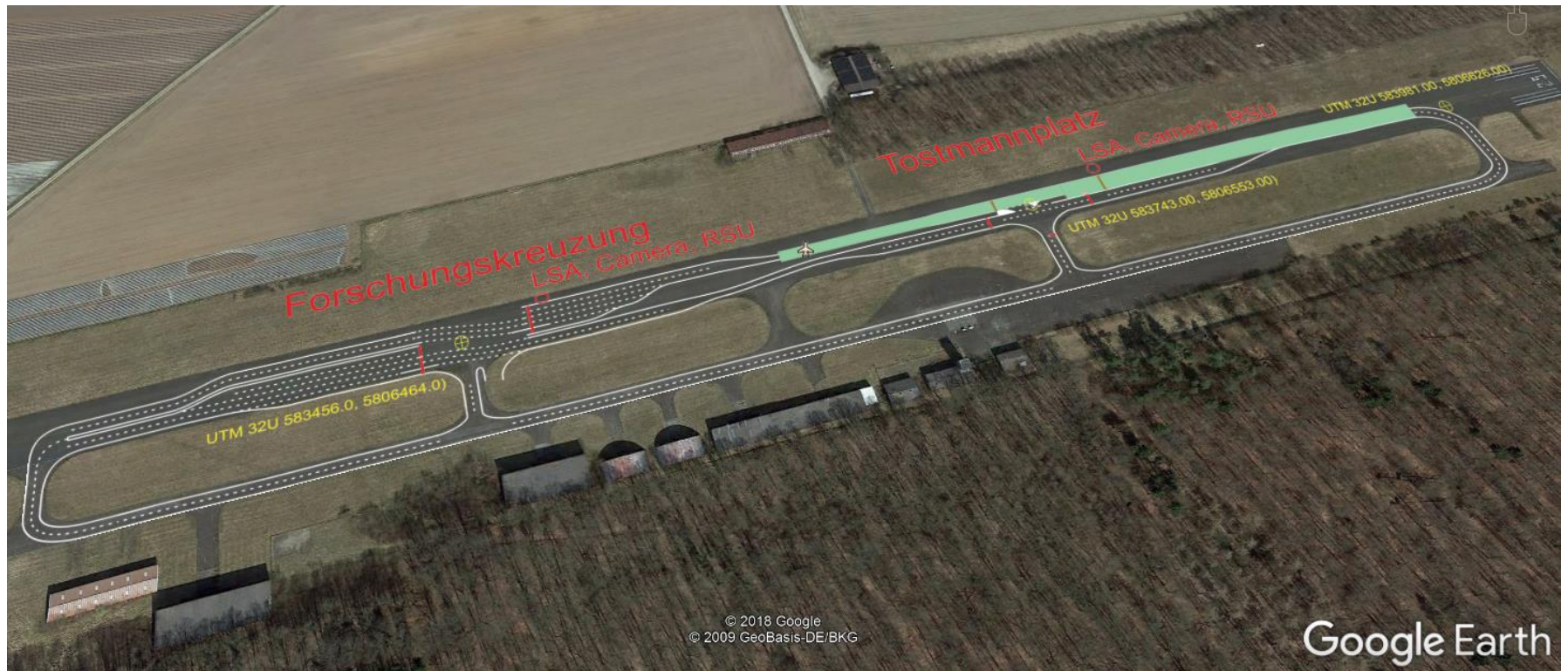
Feasibility Assessment & Prototypical Implementations

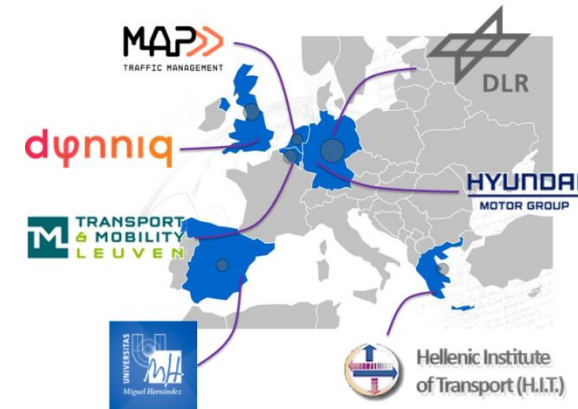


- Communication
- Variable Message Signs available
- Traffic Lights



Real World Setup at Edemissen Airport





Thanks for your attention!
Any questions?

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