

The Munich Test Bed for Connected and Automated Mobility

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The Test Bed

Consisting of:

- Intersection area (football field size)
- Park & Charge Lane
- Drive & Charge Lane
- Future Parking Deck
- 5G Connectivity
- Simulation Center

Partner:

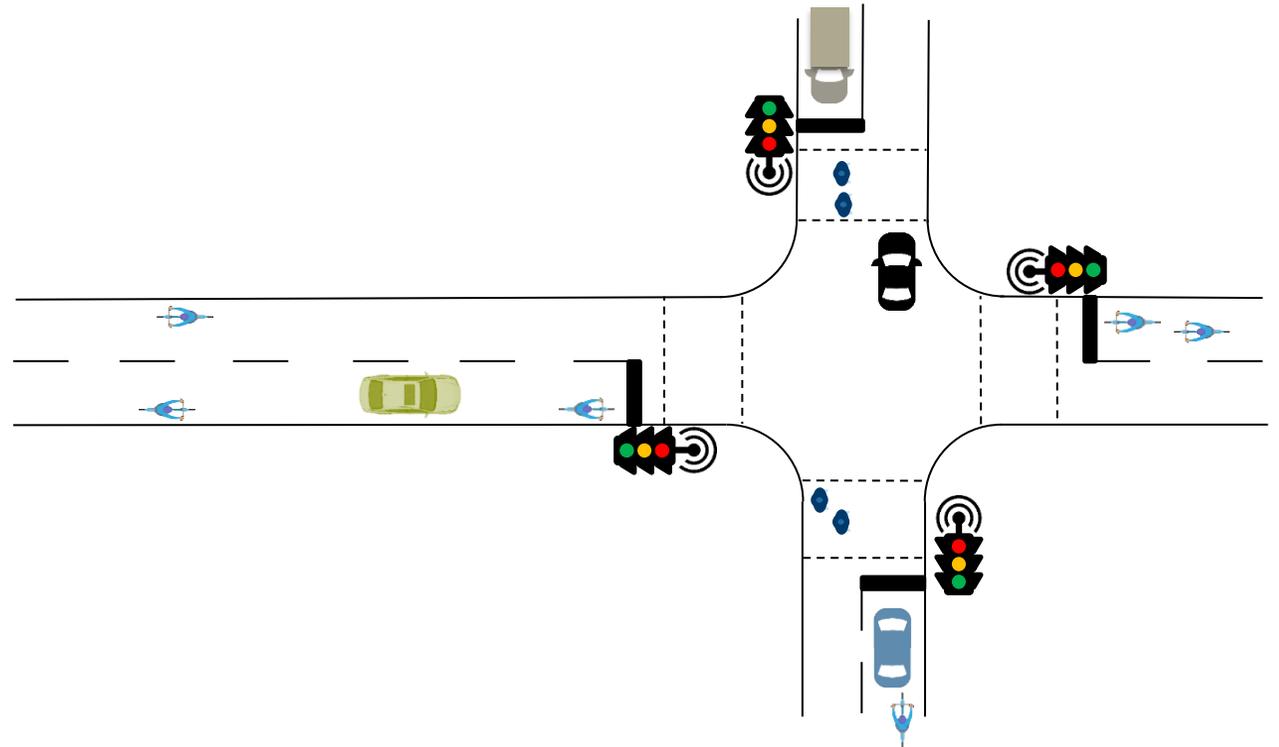


Bayerisches Staatsministerium für
Wohnen, Bau und Verkehr



Highly Dynamic and Flexible Test Bed

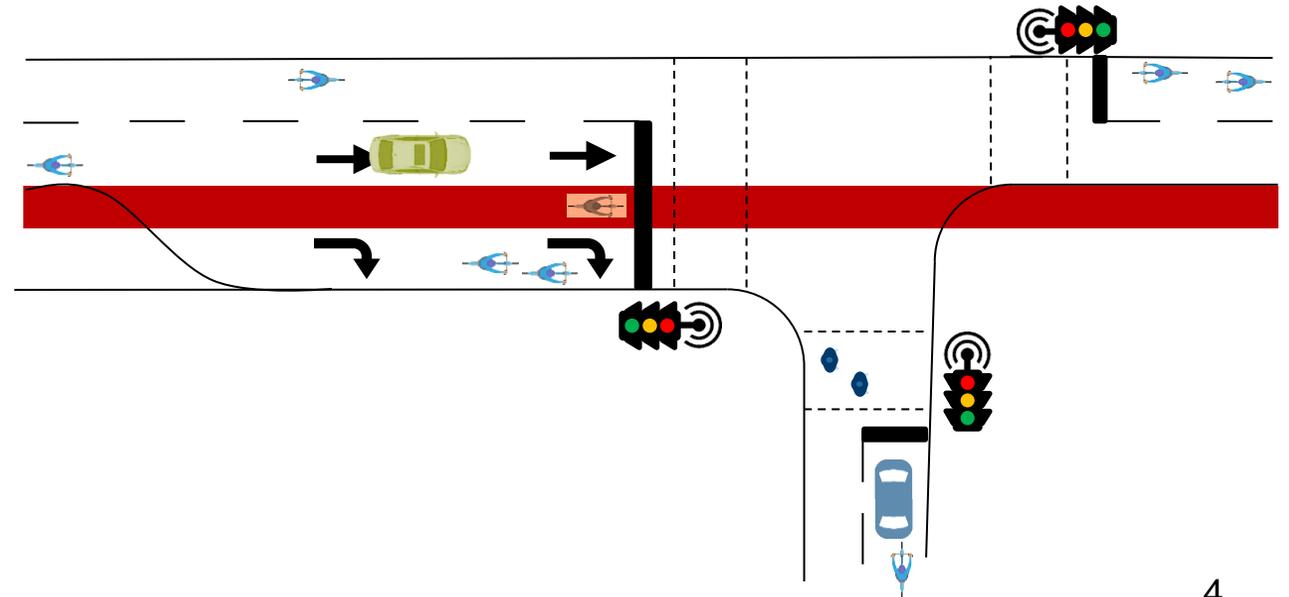
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Highly Dynamic and Flexible Test Bed

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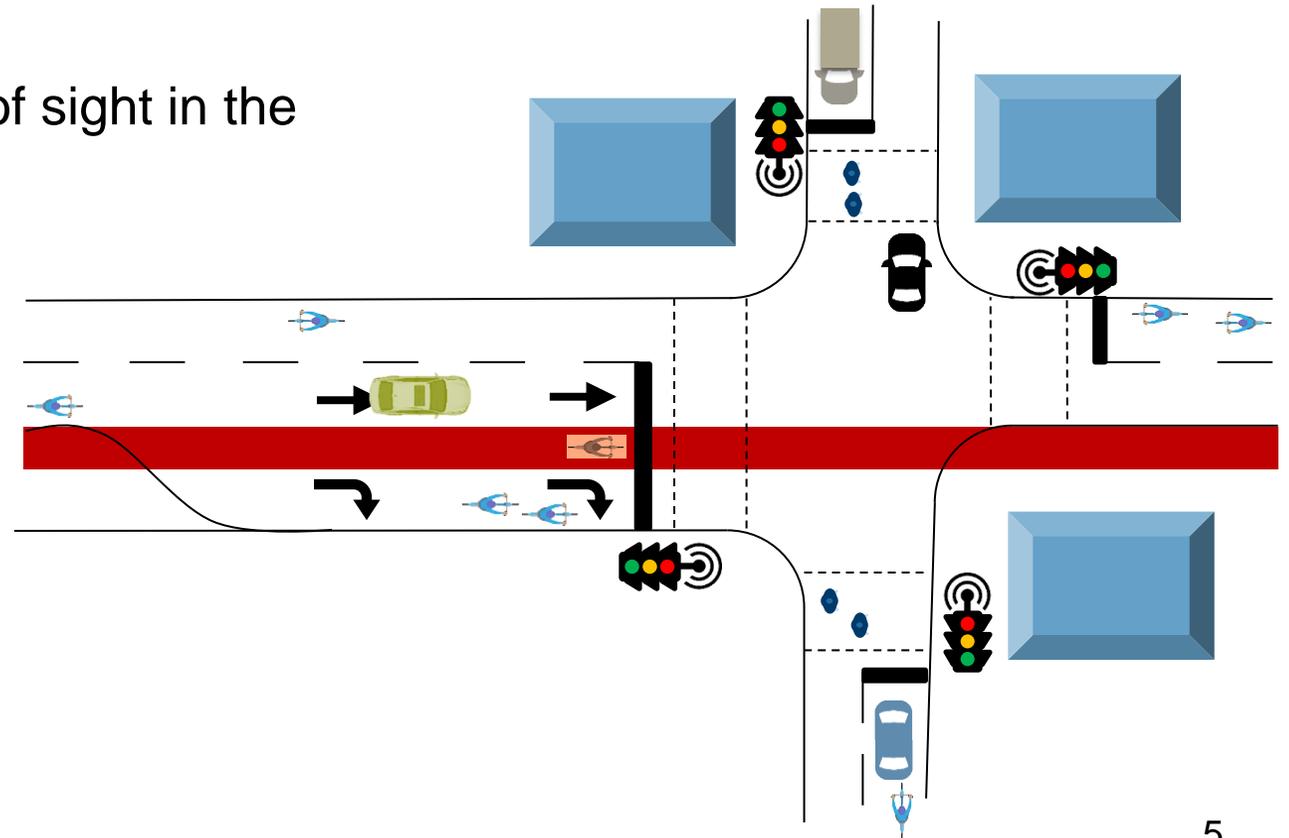
- Changeable lane markings.
- Moveable traffic signal poles.
- Moveable sensors.



Highly Dynamic and Flexible Test Bed

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- Inflatable elements for interrupting the lines of sight in the intersection area.

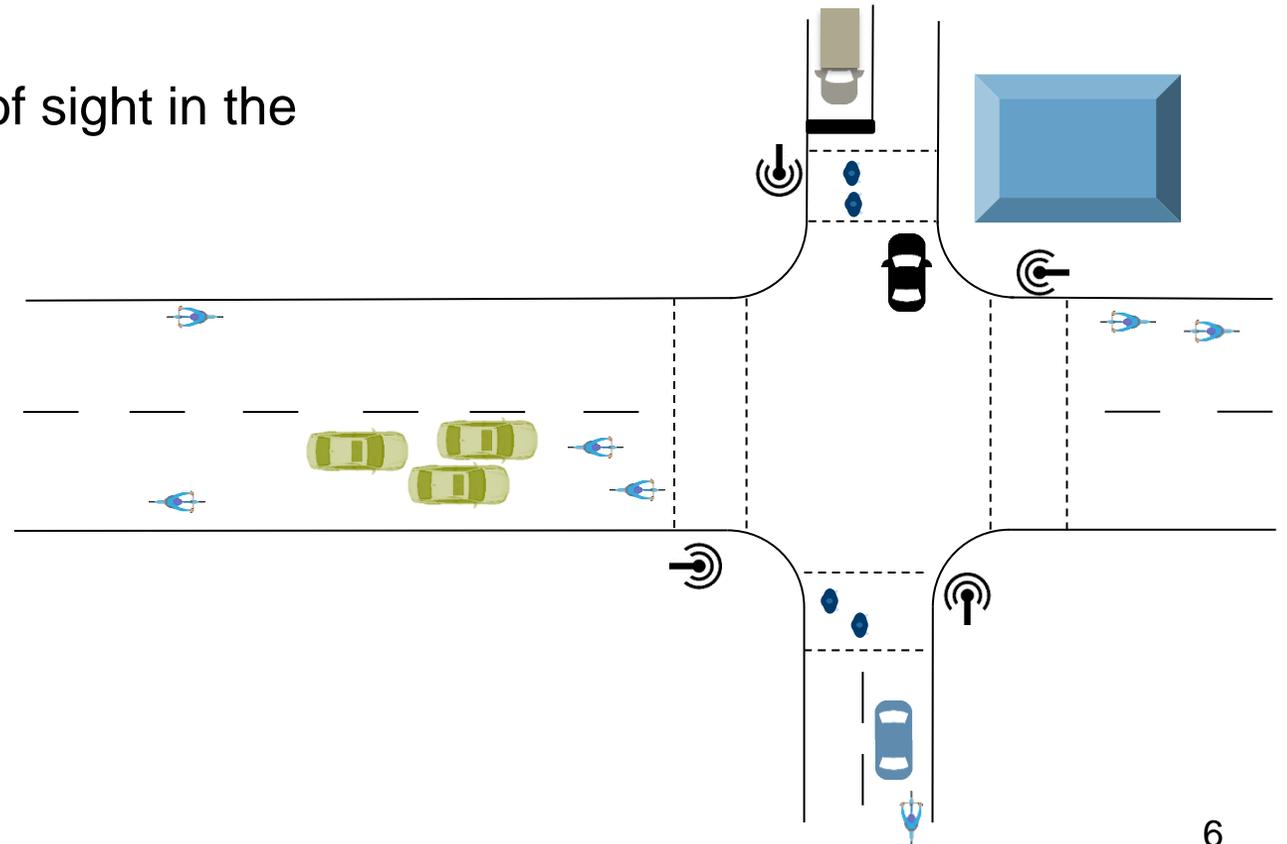


Highly Dynamic and Flexible Test Bed

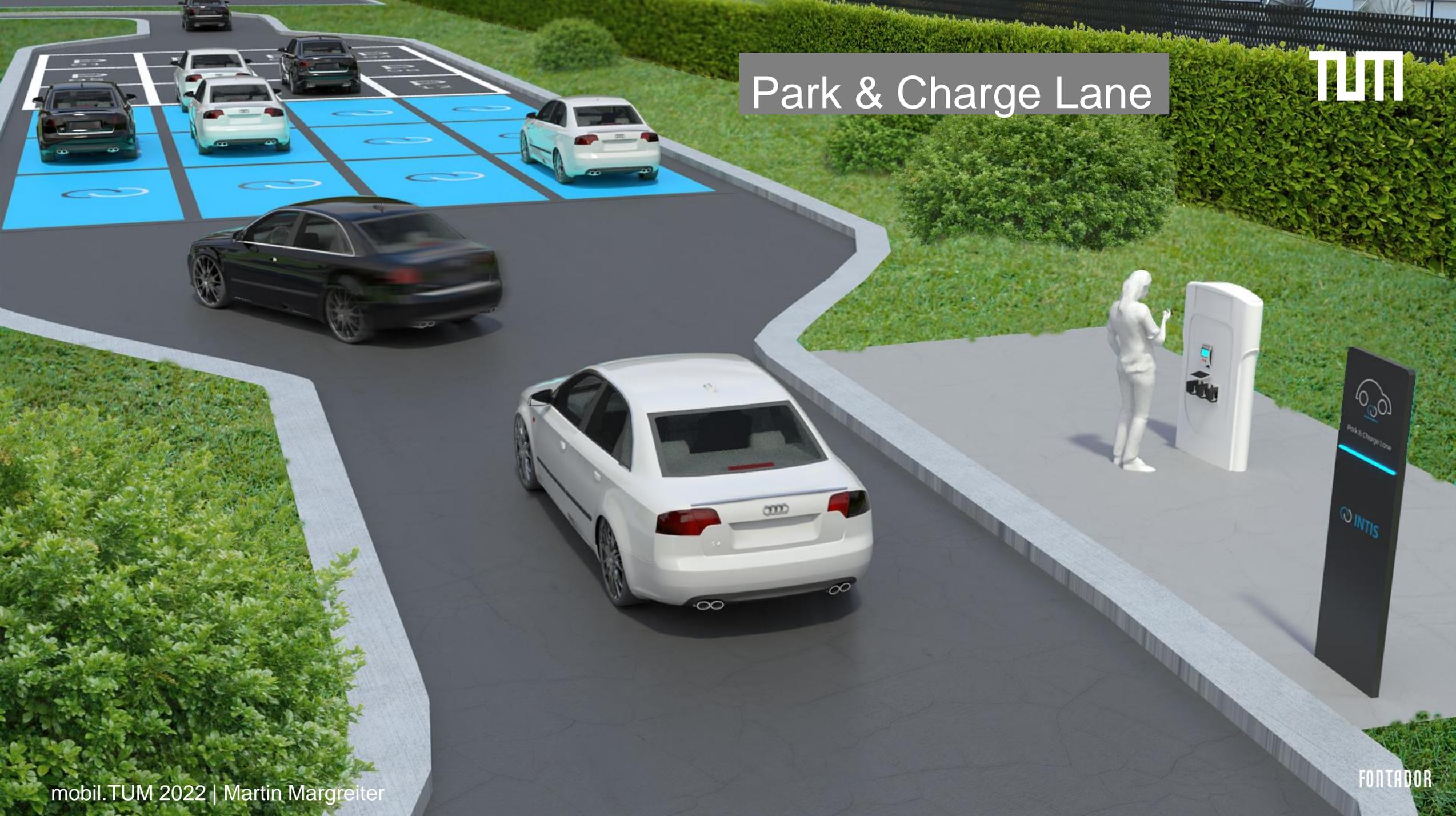
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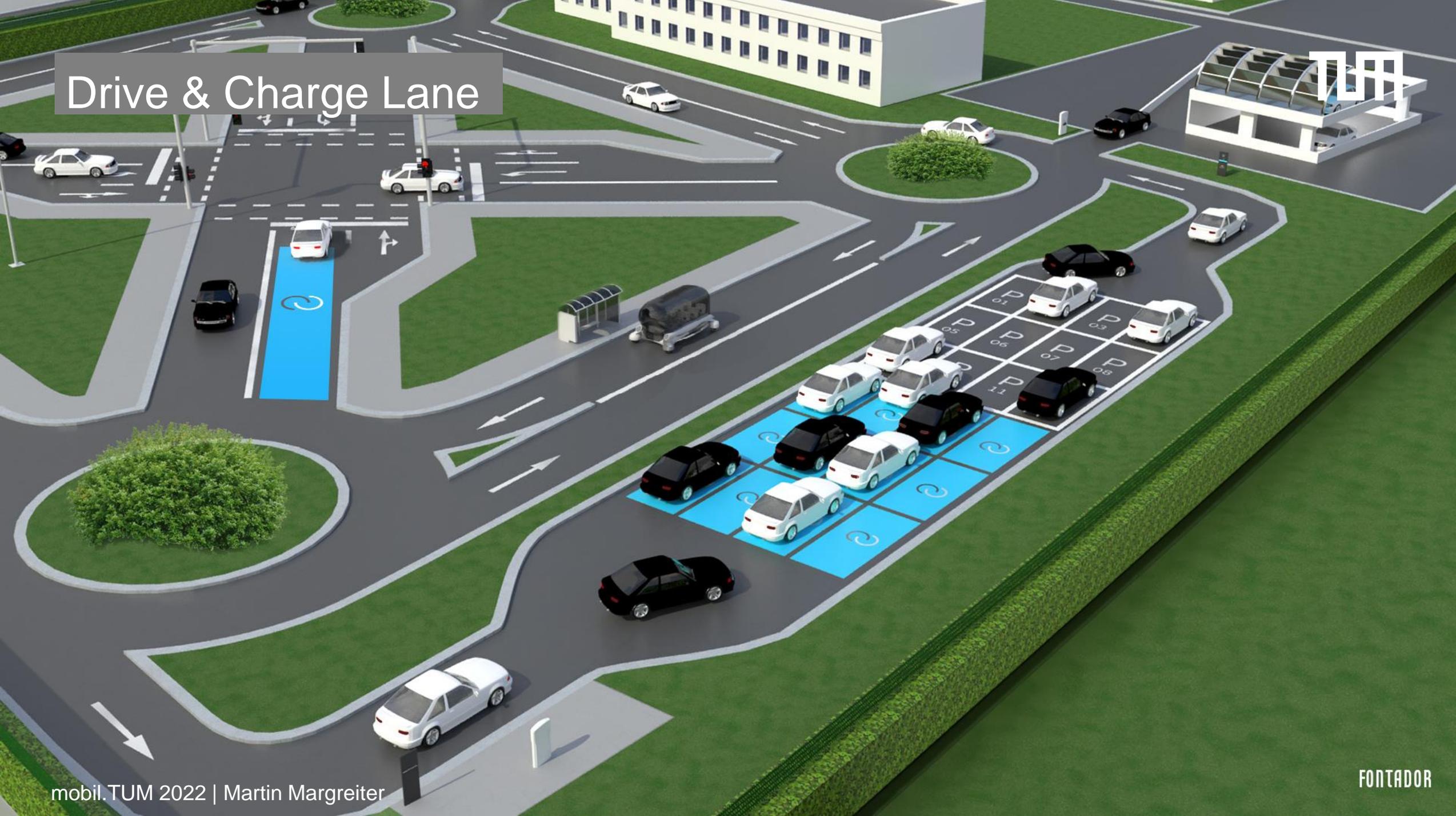
→ Allows for various different scenarios.



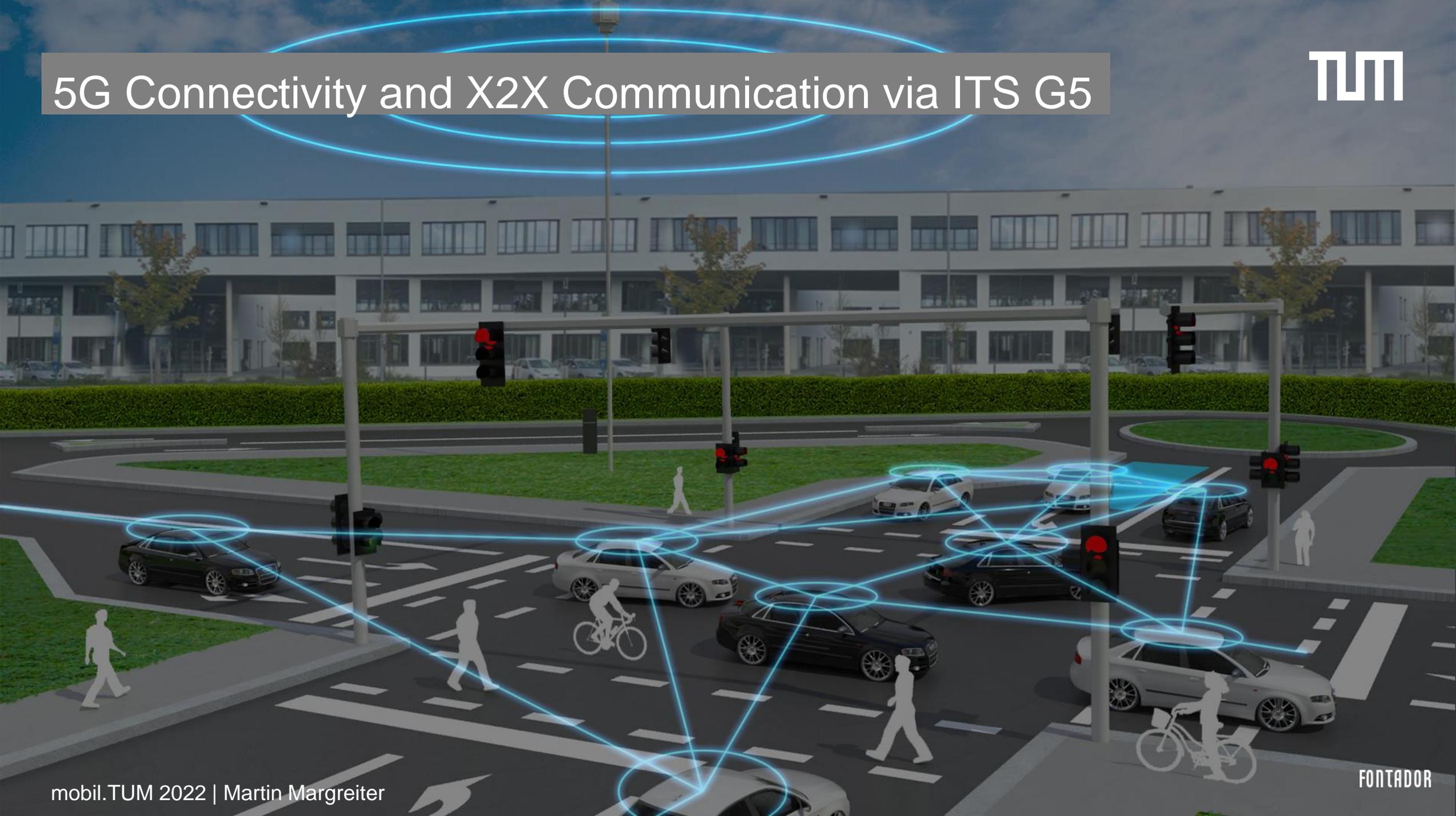
Park & Charge Lane



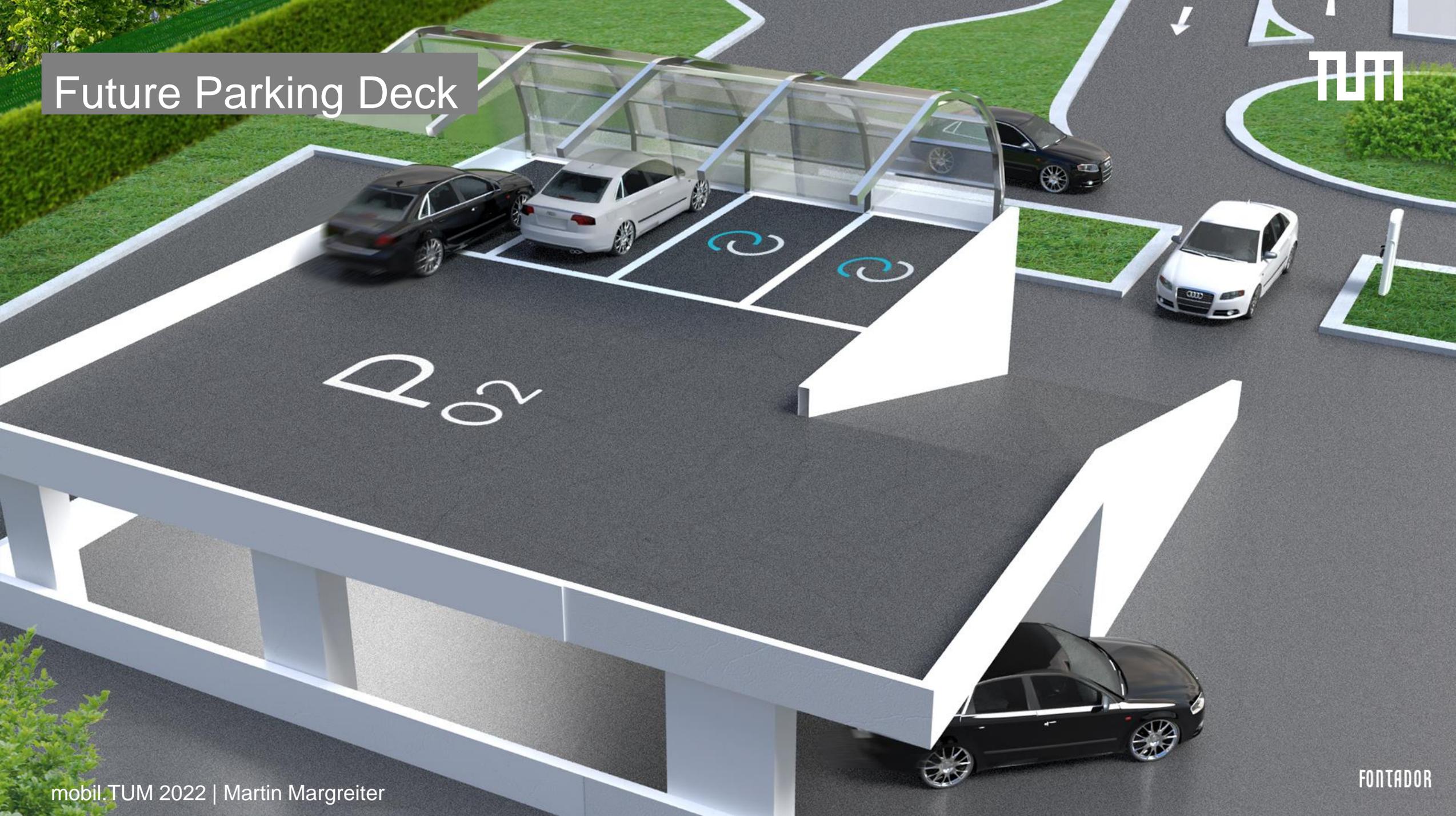
Drive & Charge Lane



5G Connectivity and X2X Communication via ITS G5

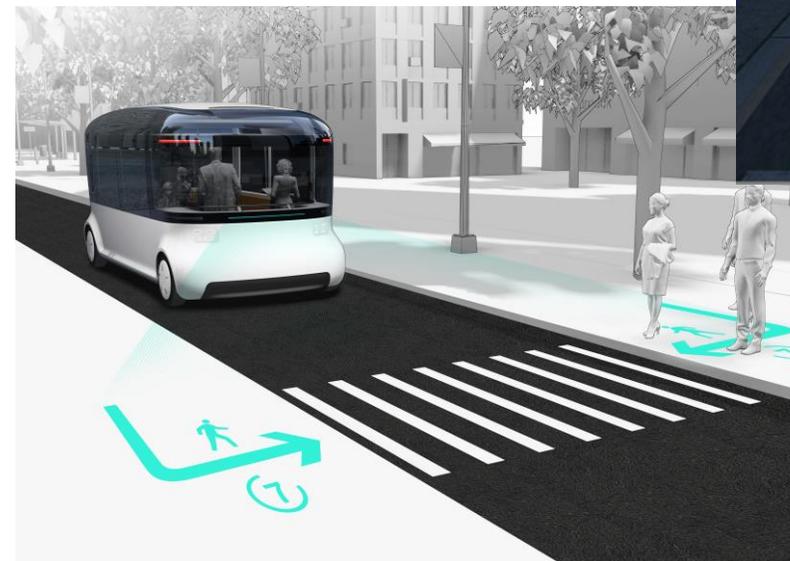
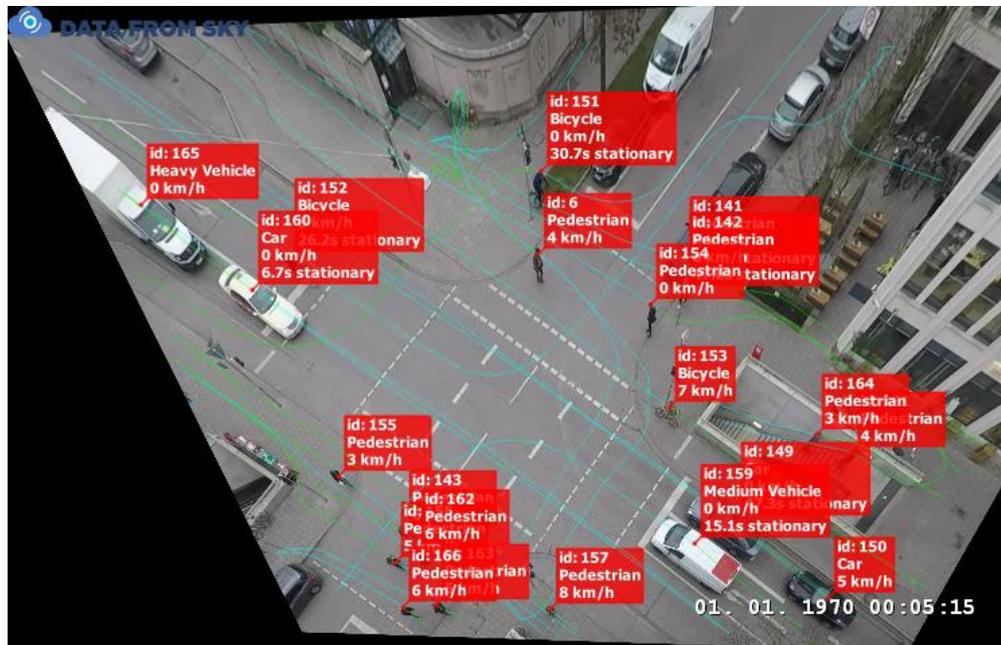


Future Parking Deck



Use Case 1: Interaction of CAV with VRU

- Interaction of pedestrians & cyclists <> Connected and automated vehicles (CAV).
- Very vulnerable road users (e.g. kids, elderly, visually impaired etc. vs. high-tech).
- Communication of (planned) maneuvers between CAV and vulnerable road users (VRU).



Use Case 2: Certification of Automated Driving Functions

- "Closed Proving Ground" operated together with certification authorities.
- Provision of a large variety of certification scenarios due to the variable intersection layout.
- Dedicated private test bed without necessity to follow road traffic regulations.
- Scripted testing is possible → Reproducible scenarios.

Testing of the connected and automated vehicles (CAV) of TUM:

- Safely testing of TUM algorithms for maneuver planning.
- "Playground" before testing at the public *TEMPUS* test field in Munich.



TUM CAV



TUM automated ricksha



HSA CAV

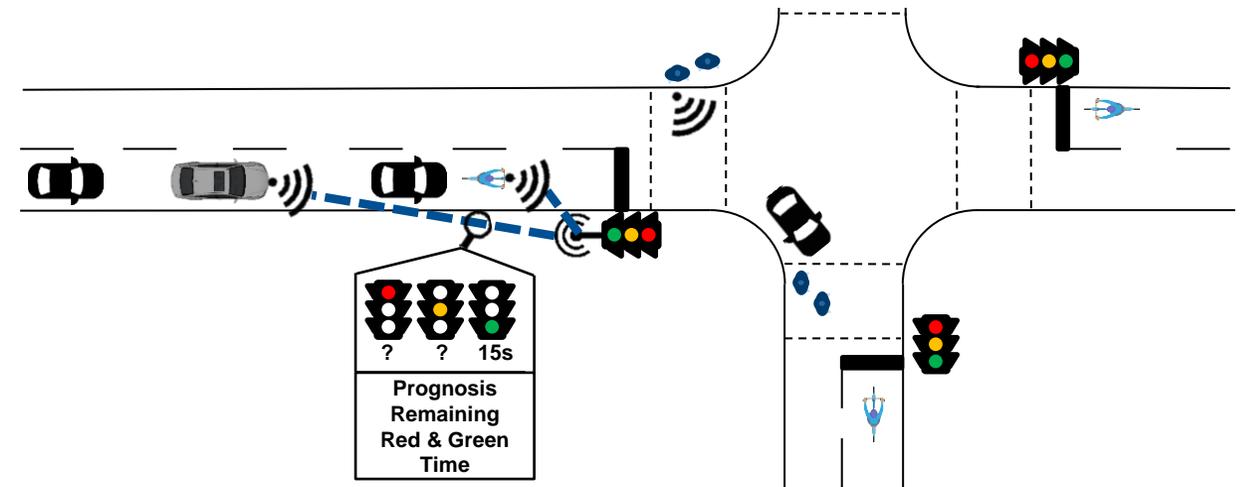
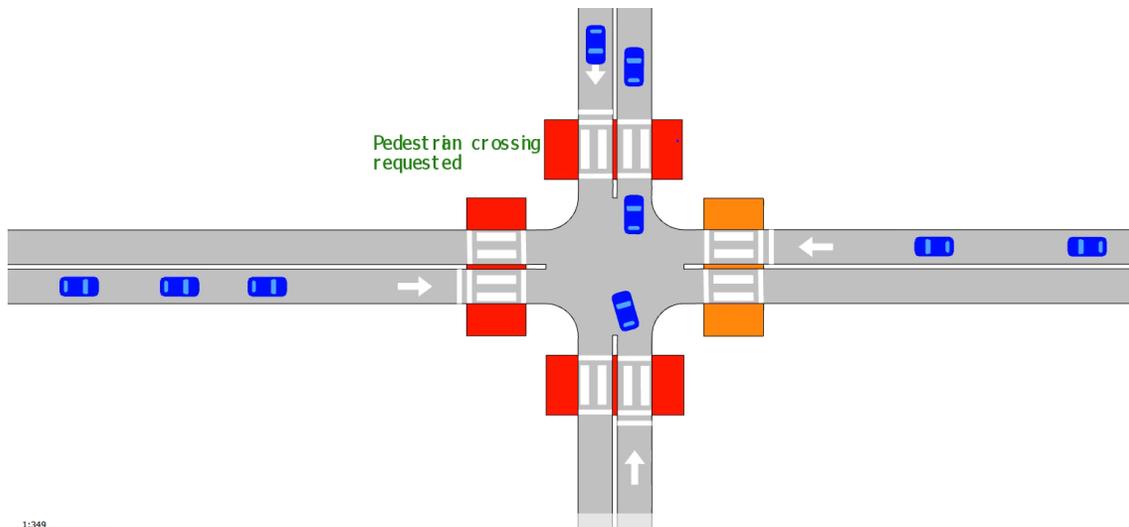
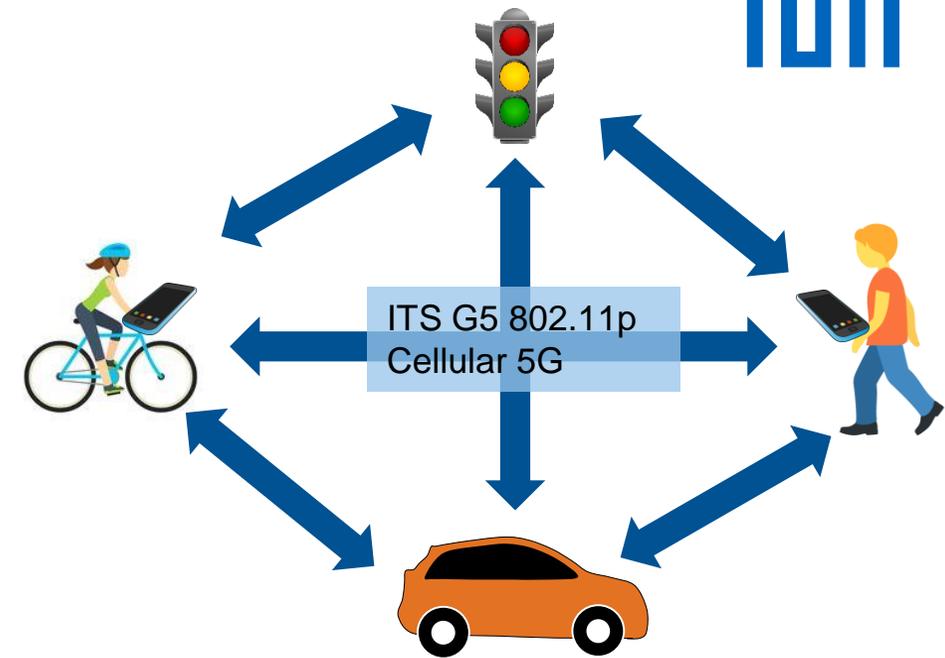


EasyMile automated shuttle

Use Case 3: X2X-Communication

Development and testing of new traffic signal controls:

- Traffic signal free intersection.
- Green light optimized speed advisory (GLOSA).



Use Case 4: Augmented Reality Testing in Real Vehicles

- Real vehicle driving at the test bed.
- Driver with AR glasses.
- Partly virtual environment.
- Safe coupling with other simulators.
- Vehicle-in-the-loop.



Use Case 4: Augmented Reality Testing in Real Vehicles

Cycling simulator

- Live tracking of cyclist gestures.
- Virtual environment.



Driving simulator

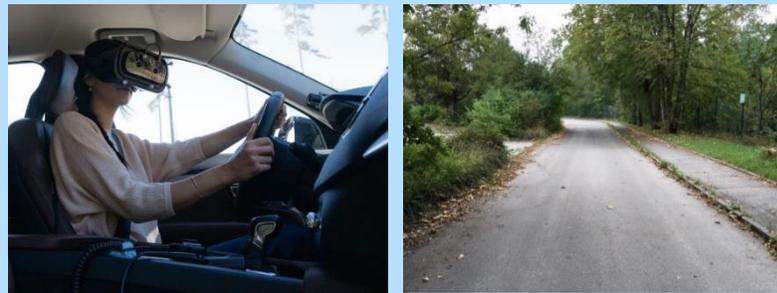
- Virtual environment.
- Also used as CAV simulator.



Various other simulators: E-scooter, pedestrian, cargo bike, wheelchair

Vehicle at the test bed

- Partly virtual environment.
- Real vehicle and vehicle dynamics.
- Driver with AR glasses



Visualization of real and simulated elements and traffic participants in Mixed-Reality



Microscopic traffic simulation

Thank you!

Cooperate with us!

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