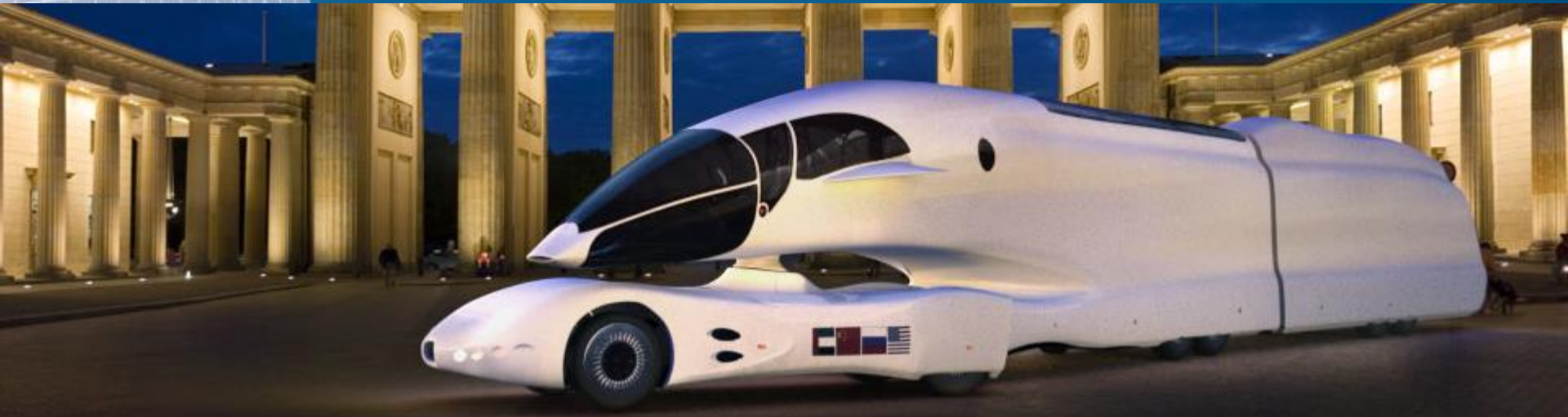
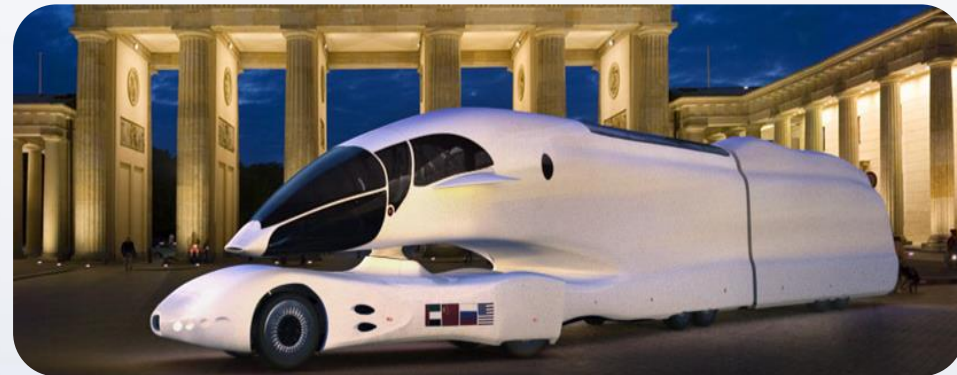
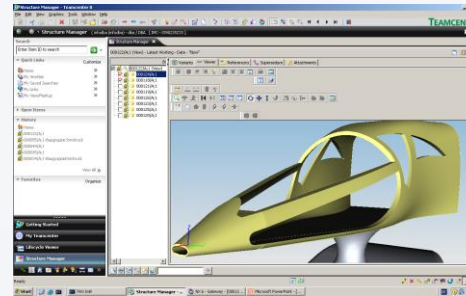


Project Diesel Reloaded



Diesel Reloaded – A Holistic Approach to Electric Mobility

- Motivation:
 - Manage complexity of functions
 - Optimal interconnection
- Project aims:
 - Holistic approach to electric mobility
 - Build demonstrator InnoTruck for evaluation and presentation of results

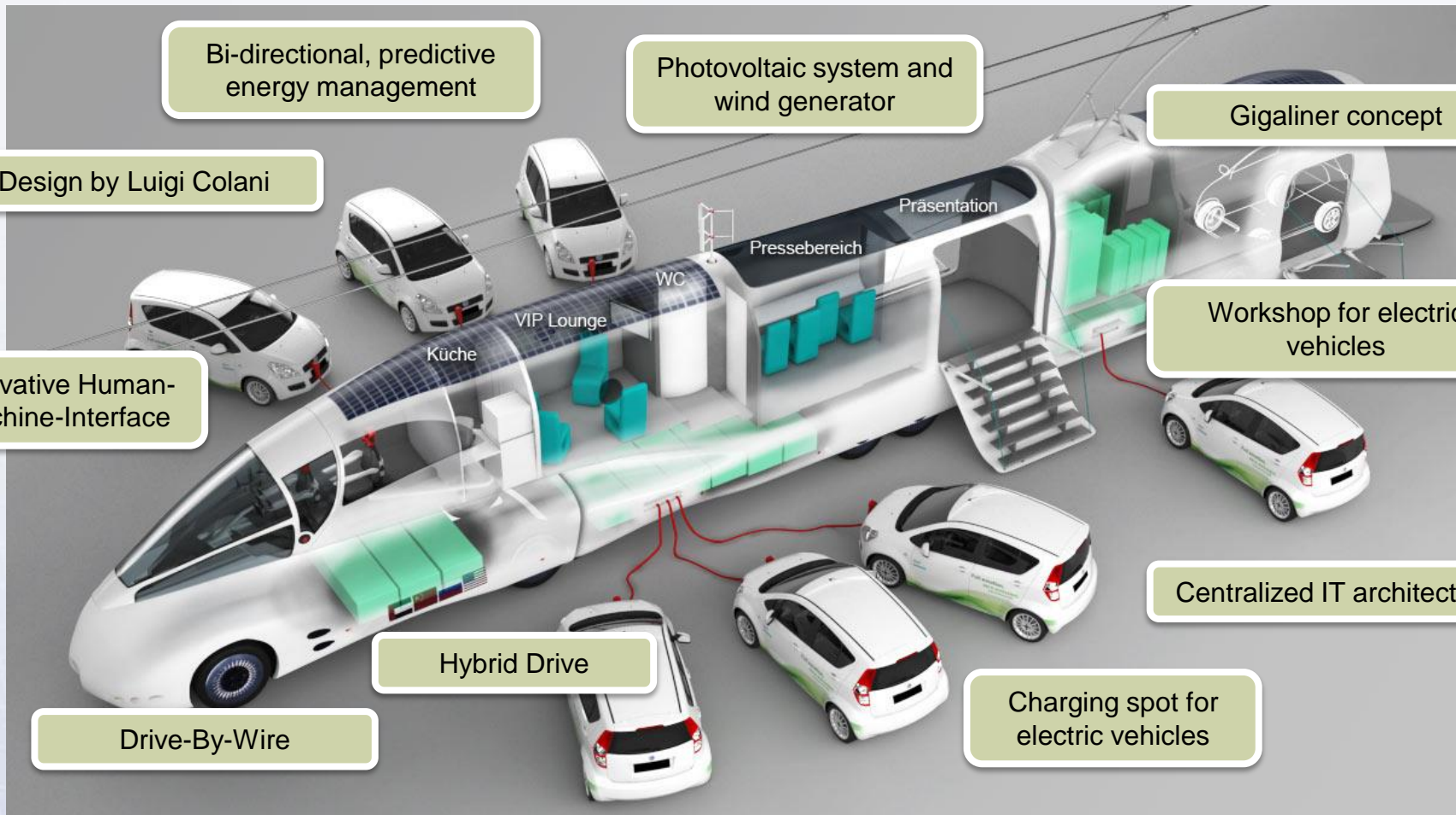


Supported by **SIEMENS**

<http://www.innotruck.de>

Prof. Alois Knoll, Prof. Markus Lienkamp, Prof. Gernot Spiegelberg
Dipl.-Ing. Claudia Buitkamp, Ljubo Merčep M.Sc., Dipl.-Ing. Hauke Stähle

Demonstrator InnoTruck - Highlights



Bi-directional, predictive energy management

Photovoltaic system and wind generator

Gigaliner concept

Design by Luigi Colani

Workshop for electric vehicles

Innovative Human-Machine-Interface

Centralized IT architecture

Hybrid Drive

Charging spot for electric vehicles

Drive-By-Wire

Diesel Reloaded – Project Team

Principal Investigators

Siemens / IAS
Prof. Spiegelberg



Rudolf Diesel Senior Fellow
Institute for Advanced Studies

TUM
Prof. Knoll



Robotic and Embedded Systems
TUM

TUM
Prof. Lienkamp



Automotive Technology
TUM

Doctroal Candidates



Hauke Stähle,
System
Architecture



Ljubo Mercep,
Human-
Machine-
Interface



Claudia Buitkamp,
Energy Management

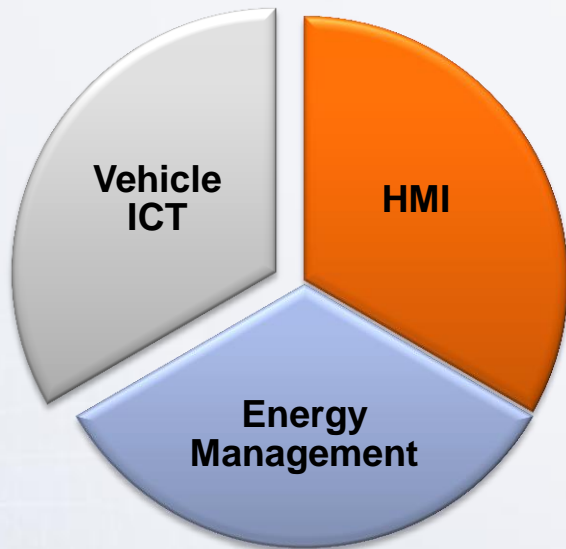
Students



Project Roadmap



Research topic #1: System Architecture



New concepts for the system architecture of vehicles, evaluated on the example of advanced driver assistance systems.

→ Optimal information flow between all functions

- Delivering data with quality-of-service guarantees
- Structuring functions according to information flow



Dipl.-Ing. Hauke Stähle
Chair for Robotics and
Embedded Systems
Department for Informatics
Technische Universität München



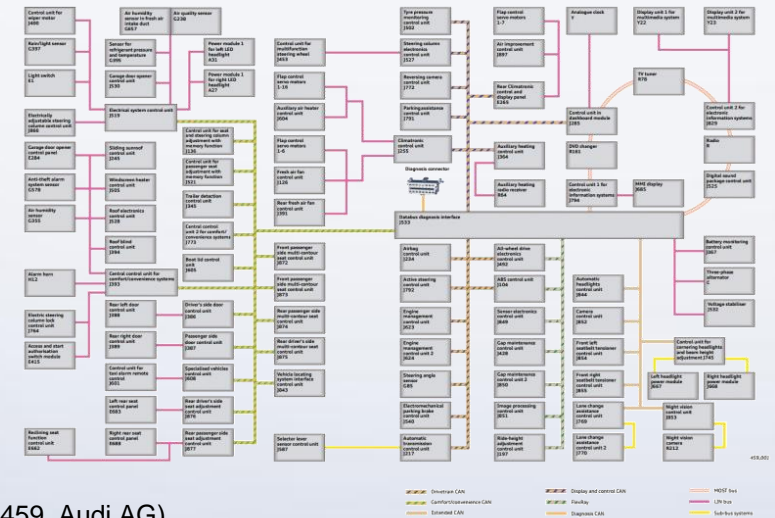
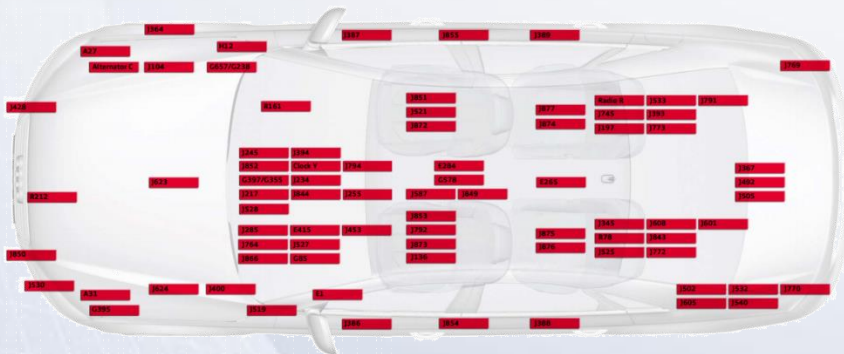
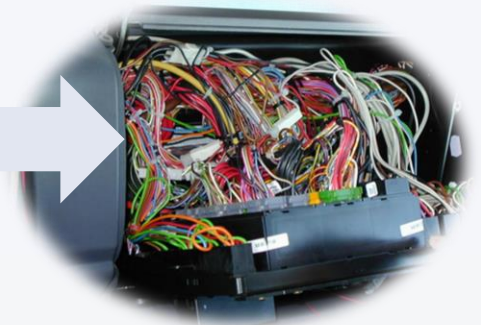
Inform. and Comm. Technology in Today's Vehicles

New technologies

Increased data exchange

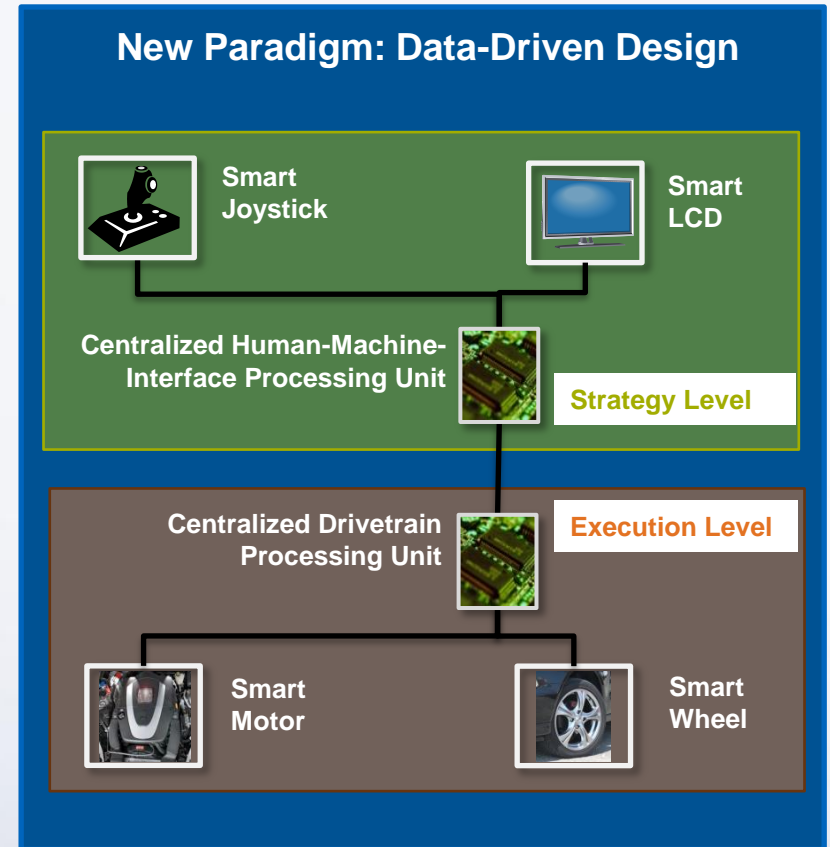
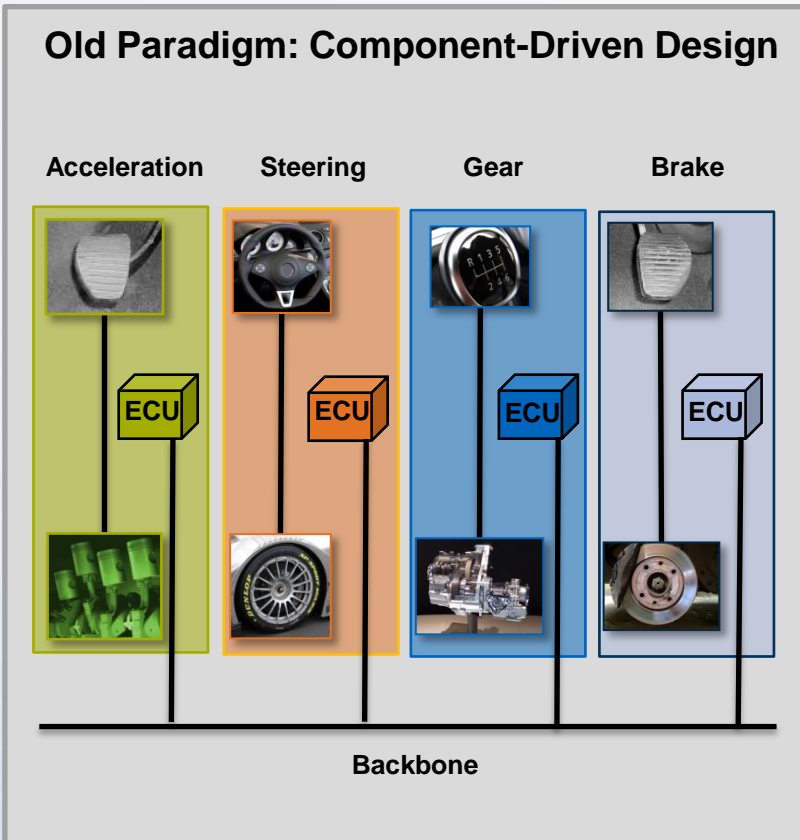
New functions

Heavily interconnected architecture

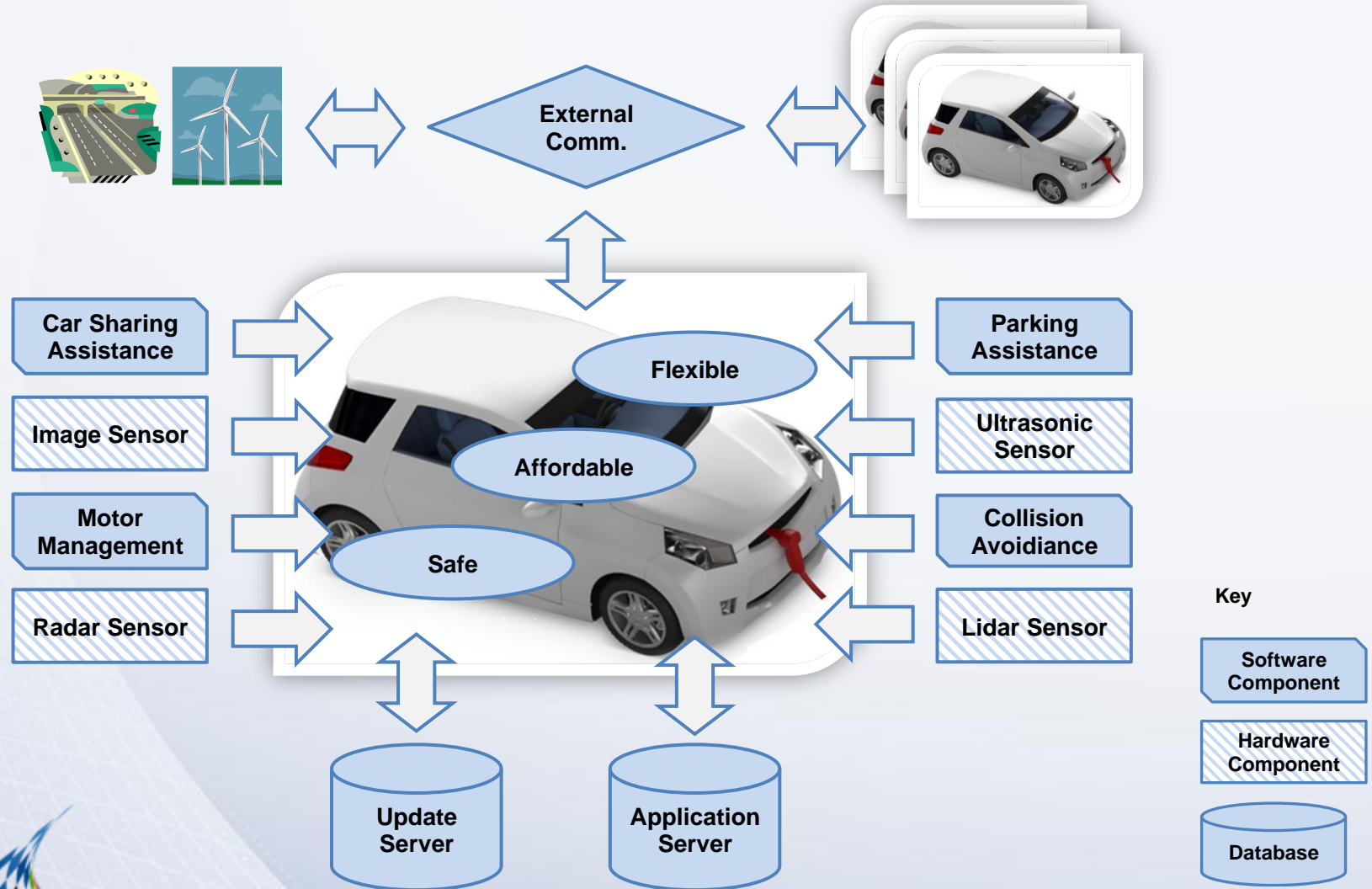


(Audi A8, Self-study Programme 459, Audi AG)

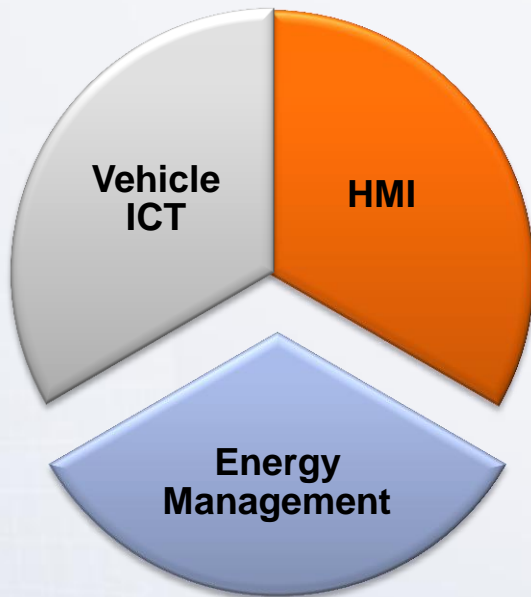
System Architecture – A new Paradigm



System Architecture - Outlook



Research Topic #2: Drivetrain and Energy Management



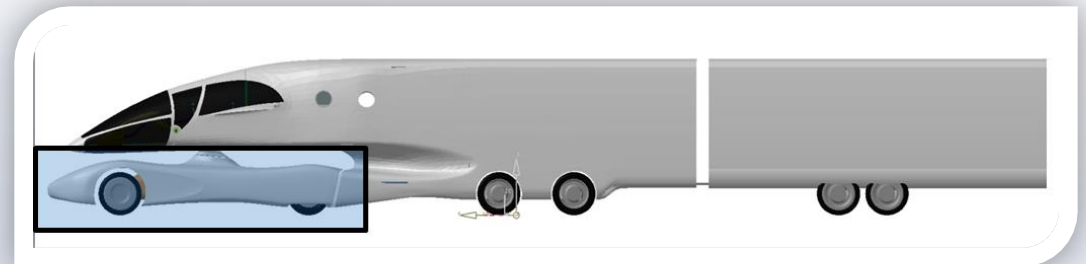
Electrical energy management for hybrid commercial trucks.

→ Benefits for the vehicle manufacturer and the operator

- flexible energy management
- holistically minimizing operating costs



Dipl.-Ing. Claudia Buitkamp
Institute of Automotive Technology
Department of
Mechanical Engineering
Technische Universität München



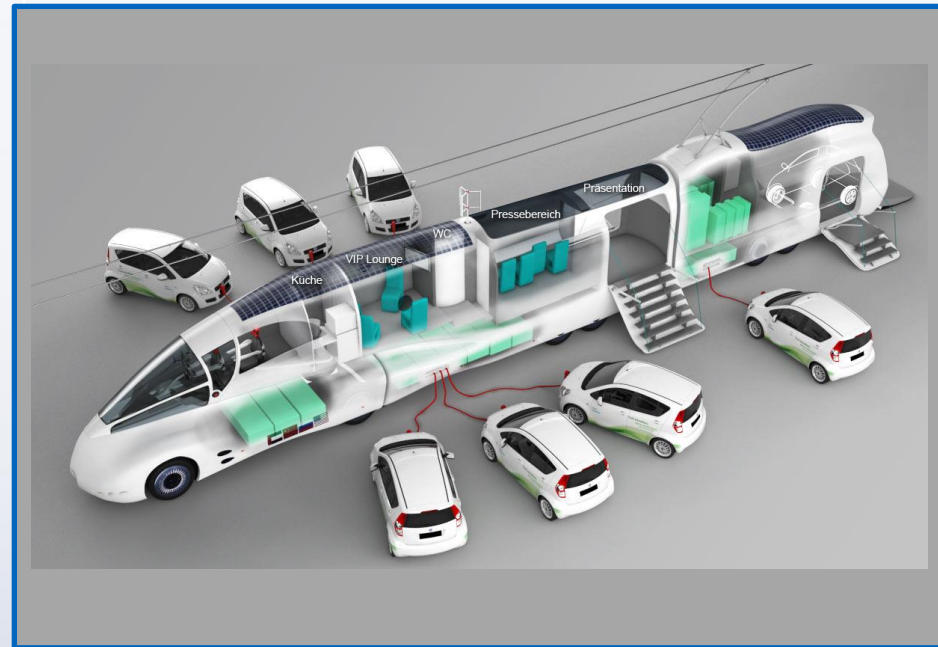
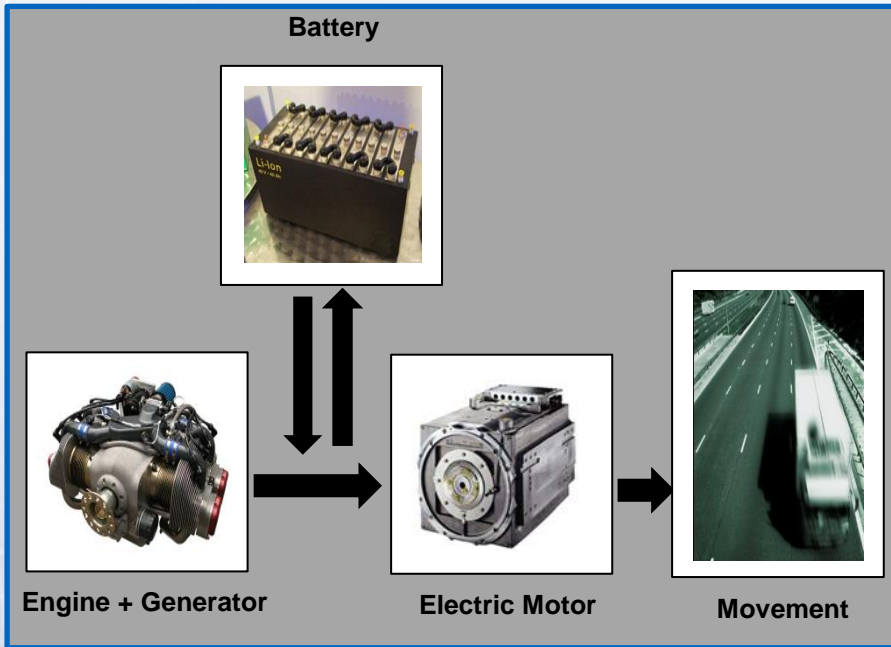
InnoTruck with Two Modes

While Driving

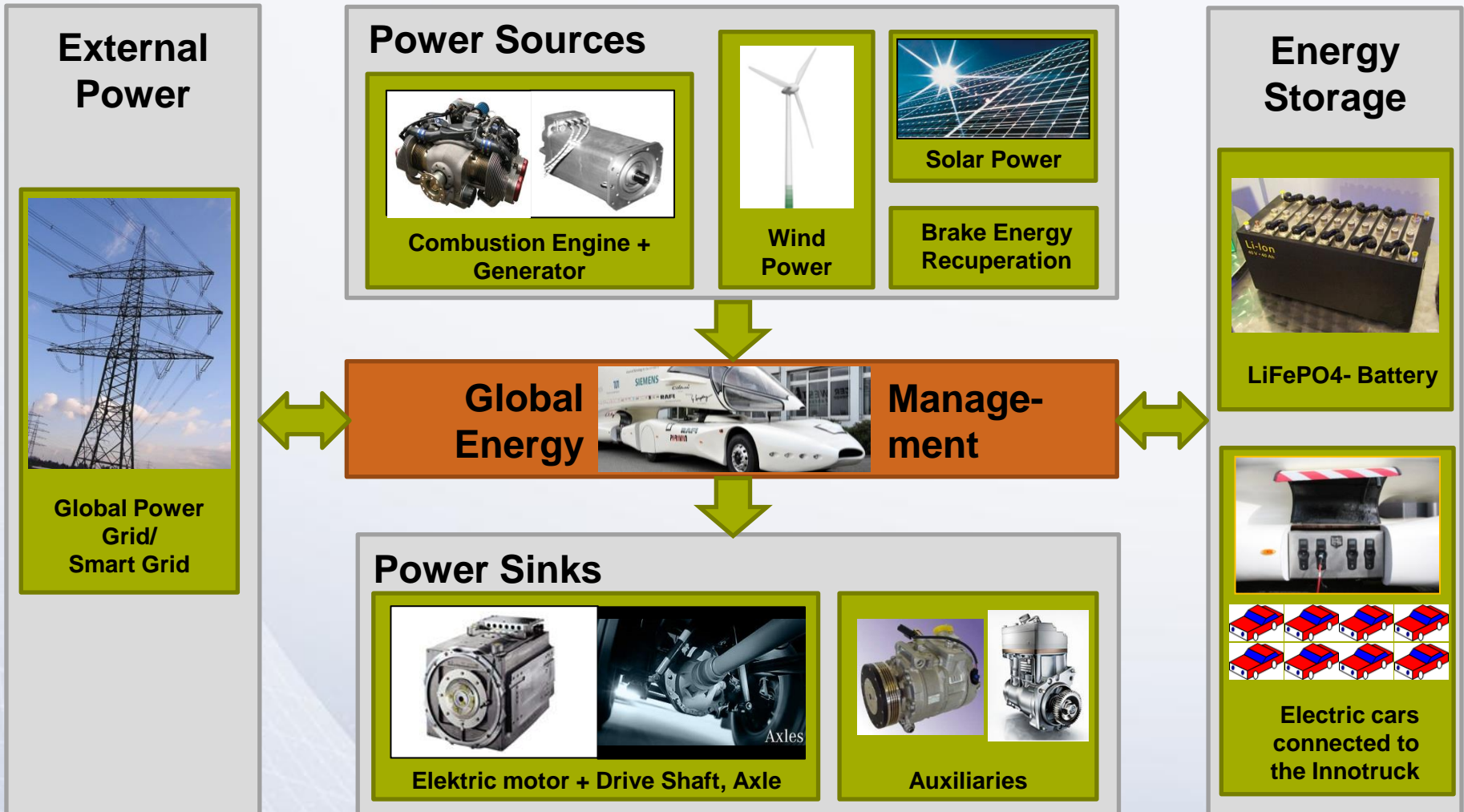
Innotruck is a serial hybrid truck

While Standing

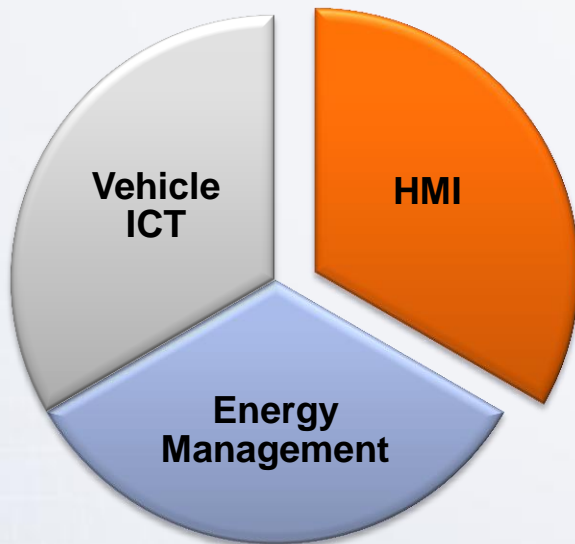
Innotruck can be seen as a smart home



Energy Management



Research topic #3: Human-Machine Interface

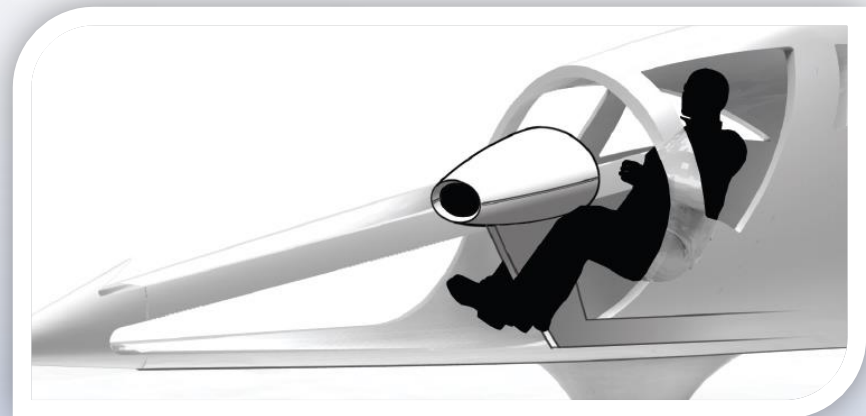


The goal is to develop and implement a strategy for intelligent user interfaces in road vehicles.

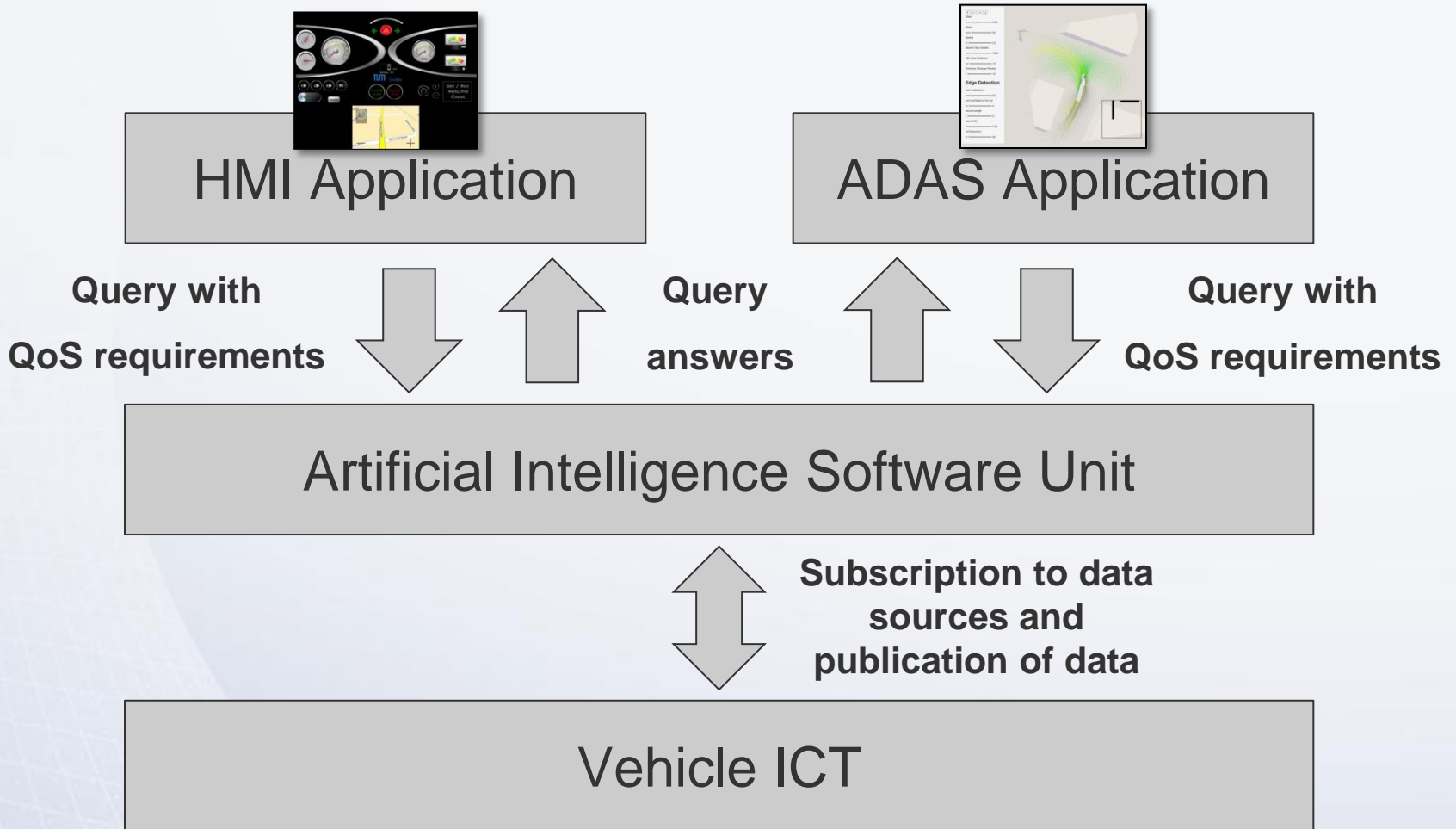
- Developing the necessary artificial intelligence
- Analyzing sidestick and touchscreen-based cockpit
- Analyzing brain-computer interfaces as the long-term HMI solution



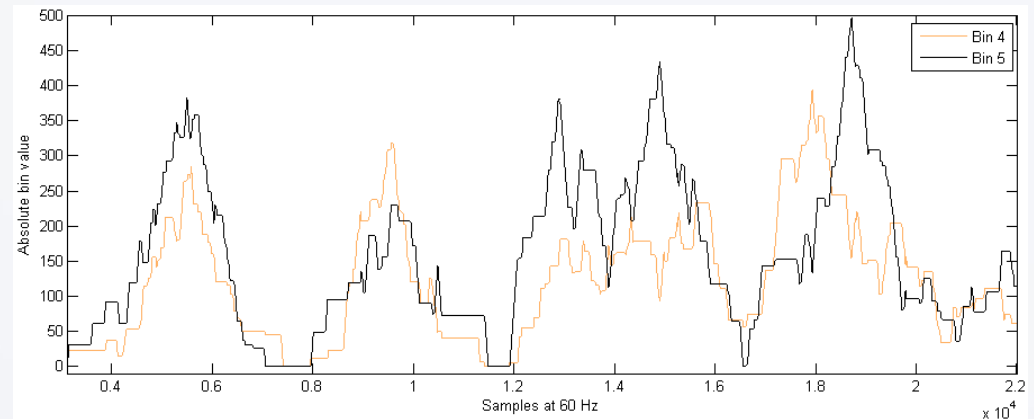
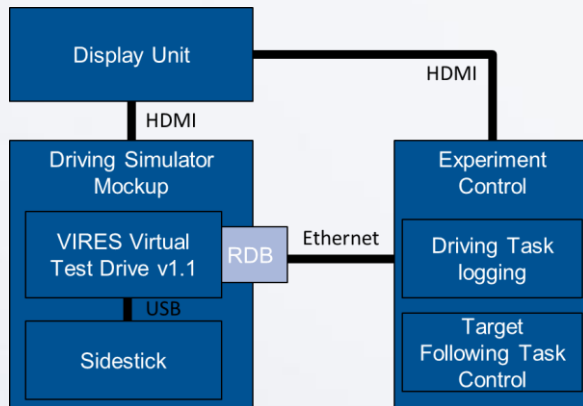
Ljubo Mercep, M.Sc.
Chair for Robotics and
Embedded Systems
Department for Informatics
Technische Universität München



Focus area 1: Artificial intelligence for the HMI



Focus area 2.1: Sidestick study

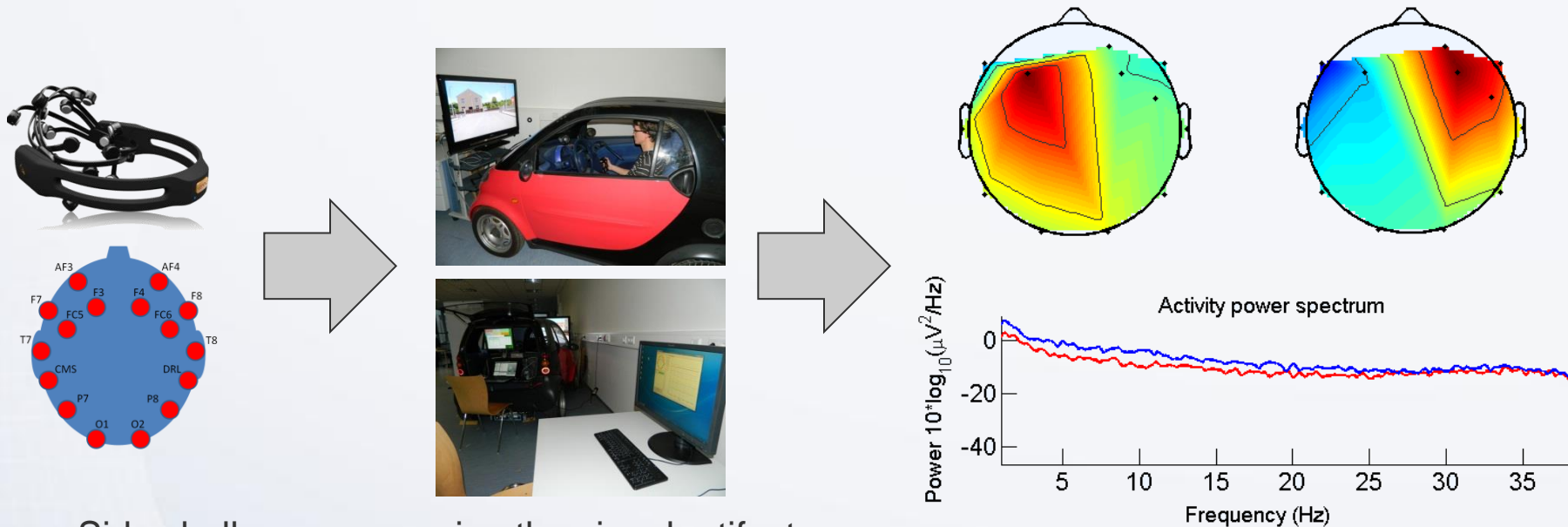


- Method: Learning driver-specific steering profiles for different types of environments
 - In-city
 - Off-road
- Detecting anomalies in a learned profile is a warning sign for driver assistance
- Driving task is reduced at the lane following task

Focus area 2.2: Touchscreen study



Focus area 3: Brain-computer interfaces



- Side challenge: managing the signal artifacts:
 - Vibration-caused artifacts – through Gyroscope data
 - Biological – through classical Independent Component Analysis
 - Technology-specific – through extended Independent Component Analysis