

Consortium



ETH Zürich Autonomous Systems Lab

Project coordination, planning in dynamic street scenes, and online localization and mapping

ETH Zürich Computer Vision and Geometry Lab

Offline 3D mapping and online dense 3D scene reconstruction

Volkswagen AG

Preparation of the vehicle platform, mission planning, and 3D scene perception

Robert Bosch GmbH

Preparation of the vehicle platform, online 3D scene perception, planning, and automated parking

Università degli Studi di Parma

Online object detection, classification, and tracking

Technische Universität Braunschweig

Server infrastructure, security, resource management, and vehicle-infrastructure communication

University of Oxford

Semantic mapping, scene understanding, and tagging maps to aid path planning

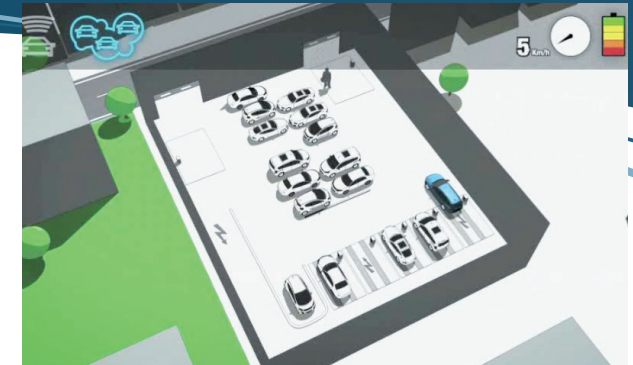
Project Information

V-Charge

Automated Valet Parking and Charging for e-Mobility

Collaborative Project no FP7-269916

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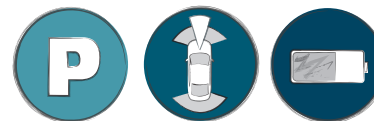
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V-CHARGE

<http://www.v-charge.eu>



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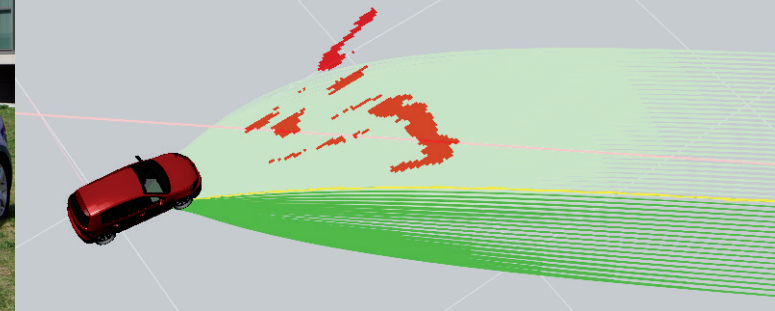
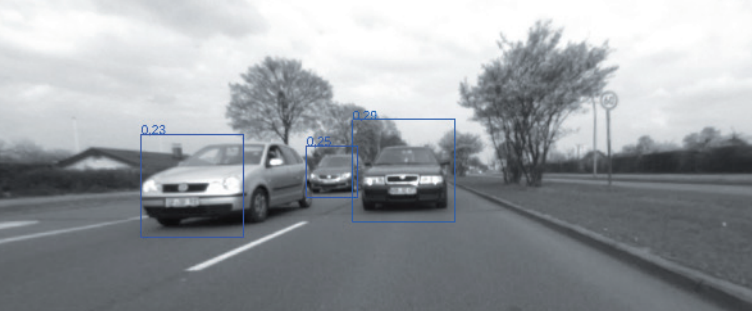
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Introduction

The project V-Charge is based on the vision that, due to required drastic decrease of CO₂ production and energy consumption, mobility will undergo important changes in the years to come. This includes new concepts for the optimal combination of public and individual transportation as well as the introduction of electrical cars that need coordinated recharging. A typical scenario of such a concept might be automatic drop-off and recovery of a car in front of a train station without taking care of parking or recharging. Such new mobility concepts require among other technologies automated driving in designated areas.

The objective of this project is to develop a smart car system that allows for automated driving in designated areas (e.g. valet parking, park and ride) and can offer advanced driver support in urban environments. The final goal in four years is the demonstration and implementation of a fully operational future car system including automated local transportation, valet parking and battery charging.

Concept and Objectives

Under the umbrella of V-Charge, e-mobility is combined with automated valet parking to spark customer's interest in electric vehicles (EV). This involves the development and implementation of a concept to maneuver and charge electric vehicles in designated areas (e.g. University Campus), to compensate for longer charging cycles of today's battery packages and to advance car safety in dense traffic. This implies three major fields of research:

1. Vehicle functionality

- Perception: Detection of objects and dynamic obstacles of any kind.
- On-board localization: Pose estimation using low-cost sensors.
- Path planning: Global path planning (mission planning) and local path planning (obstacle avoidance).
- Dynamic Maps: Representation of environment containing infrastructure and mission information downloaded from server that are fused with the locally established map to leverage localization and global path planning
- Power: Includes optimizing and monitoring power consumption of system hardware (PCs, ECUs, sensors) as well as the development of a standby concept

2. Logistics concept

- Management: Efficient management and assignment of charging stations and parking spots to connected EVs. Evaluation of scheduling algorithms based on real-world parking statistics to learn their suitability for different usage scenarios.
- Central back-end server: Parking/charging management, storing, updating, and distributing map data.
- Communication framework: Sophisticated vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communications, enabling distribution of mission information to connected vehicles, system monitoring and remote debugging, including security and trust concepts. Communication with mobile user devices (smartphones) for customer interaction.
- Coverage: Installation of signal repeaters that provide area-wide coverage to communicate with server, allowing the vehicle to receive and share information about their environment.

