



Press Release, July 2015

Driverless Parking And Charging for e-Mobility

Final presentation of the EU-funded V-Charge project

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



Can you imagine never having to search for a parking spot again? The V-Charge project offers the solution. This fully automated parking system relieves drivers of this tiresome and time-consuming task. With a simple push of a button in the V-Charge smartphone application, the vehicle finds its way to a vacant parking spot all on its own. If combined with an electric vehicle, this technology promotes novel environmentally-friendly mobility concepts with the use

of short-range private transportation to facilitate access to and from long-distance public transportation. This project envisions a world in which travellers complete most interurban journeys using a long-distance transportation network and then switch to comfortable electric vehicles for the last few miles from the railway station or airport to the destination. V-Charge enables the traveller to drop his or her vehicle off at the entrance of the parking lot, handing over the tedious search for a charging station and parking spot to the system. Picking up the vehicle at the end of the day is as easy as dropping it off - the vehicle awaits the traveller at the entrance, fully charged and ready for the onward journey.

Close-to-Market Sensors for Early Market Adoption

This new mobility concept requires nothing less than fully automated driving in designated parking lot areas. However, the V-Charge project sets itself apart from other automated parking concepts by enabling co-existence of manual and automated traffic while utilising a close-to-market sensor setup and placing only minimal infrastructure requirements on the parking lot. The cameras and ultrasonic sensors required for the vehicle to perceive and navigate in its environment are already available in many series cars. Localisation within the parking lot does not require any artificial markers nor any structural modifications due to the usage of solely natural visual landmarks. This increases the attractiveness for both managers and end-users of the parking lot due to substantial savings in both time and cost.

To make this vision a reality, the V-Charge project pools the knowledge of leading experts in the fields of automated driving, computer vision, and network communication. Researchers from ETH Zürich and the universities of Braunschweig, Oxford, and Parma, in collaboration with industrial

partners Robert Bosch GmbH and Volkswagen AG now present the result of four years of intensive research and development in the Excellence Parking Garage at Amsterdam airport.

A Highly Accurate System

Cameras and ultrasonic sensors are arranged for 360° coverage of the surroundings. After connecting to a remote parking lot server, the vehicle receives a specially designed map for localisation, and road-network information for the parking lot. The localisation map stores visual information of all the places in the parking lot, enabling the vehicle to determine its position with respect to the map using its camera images. This technology does not rely on a GPS sensor, thus allowing also navigation in indoor environments such as underground parking spaces where GPS is not available, and was perfected to provide centimeter-level accuracy. In the background, the parking lot server computes a time schedule for the vehicle based on the requested drop-off and pickup times, making the most efficient use of a potentially limited number of charging stations by prioritising imminent pickups. A year has passed since the previous demonstration of the system in the "Bosch parking garage" at Stuttgart airport, and parking accuracy was improved even further, enabling precise maneuvers to perfectly position the vehicle on inductive charging plates.

Navigation in Mixed Traffic

On its way to the designated parking spot or charging bay, the vehicle is constantly using its onboard sensors to monitor its local surroundings for static obstacles and other road users, and seamlessly integrates with them in traffic. The system automatically distinguishes between vehicles and pedestrians and accounts for their differing movement patterns.

With the final demonstration in Amsterdam, the V-Charge team shows that automated valet parking can be realized with a contemporary, close-to-market sensor setup. Work remains to be done to achieve higher levels of automation in the mapping processes and enable multiple automated vehicles to constantly contribute data to keep maps up to date. Allowing the system to learn behaviours of other road users and improve navigation over time will further promote smooth integration into everyday mixed-traffic operation.

Acknowledgement

V-Charge is a collaborative research project being coordinated by ETH Zürich with contributions from the universities of Braunschweig, Oxford, and Parma together with Robert Bosch GmbH and Volkswagen AG. The project is receiving funding from the EU's Seventh Framework Programme for Research (V-Charge, project number 269916) and has an overall budget of 5.63 million euros. It is set to run from June 1, 2011 to September 30, 2015.

Partners' contacts for press inquiries

ETH Zürich: Claudia Nägeli, claudia.naegeli@hk.ethz.ch, +41 (0)44 632 8961

TU Braunschweig: Elisabeth Hoffmann, e.hoffmann@tu-braunschweig.de, +49 (0)531 391 4122

University of Oxford: Pete Wilton, pete.wilton@admin.ox.ac.uk, +44 (0)1865 283877

University of Parma: Beatrice Lanfredi, office@vislab.it, +39 (0)521 905738

Robert Bosch GmbH: Joern Ebberg, joern.ebberg@bosch.com, +49 (0)711 811-26223

Volkswagen AG: Tim Fronzek, tim.fronzek@volkswagen.de, +49 (0)5361 977 639