EVS30 Symposium
Stuttgart, Germany, October 9 - 11, 2017

Digitizing parking spots in front of charging stations with sustainable sensor technology, to increase occupancy and profitability of the charging infrastructure and enable additional business models for charging point operators

Neven Heuberger

Head of Business Development and Sales, ParkHere GmbH; neven.heuberger@park-here.eu, +49 176 31 263 206

Summary

The annoyance over blocked parking spaces in front of charging stations belongs to the everyday life of many owners of electric cars. As a result, it is still not possible for the charging infrastructure operators to generate profits through just selling electricity at the charging stations, which is slowing down the development of the entire e-mobility market.

Sustainable Parking Sensor Technology like ParkHere' self-powered and maintenance free parking sensors for EV-charging stations solve this problem, increases the occupancy and profitability of charging stations and opens up possibilities for additional business models for the charging infrastructure.

city traffic, digitalization, infrastructure, mobility concepts, smart charging

1 The Issue of today's Charging Infrastructure and its Business Case

The development of an accessible charging infrastructure is essential for the transition to a sustainable e-mobility. Unfortunately, high investment costs and an unsatisfying business case for charging infrastructure have stagnated the expansion of not subsidized charging stations in Germany.

Nevertheless, charging point operators (CPOs) keep arguing that the main reason from keeping them investing into charging infrastructure is the low number of EV-drivers. Drivers on the other hand are not switching to EVs due to an unsatisfactory charging network and car manufactures complain about a low demand for EVs. Unfortunately, this discussion ends up in a classical and usually unsolvable chicken-egg-situation, while missing the true issues:

The business case of the charging infrastructure currently depends highly on the occupancy of the charging points, as the business model consists of selling electricity to the EV-drivers. However, charging point operators are facing serious issues finding the right billing method for electricity to get a decent return on investment and are suffering from a very low occupancy.

One reason for the unsatisfying business case might be, that the willingness to pay for electricity at a charging station is usually very low among the most EV-drivers, which forces the CPOs to either charge very low rates or even give the electricity for free in the hope to attract household electricity customers.

Low occupancy is also caused by further emerging problems, which make e-mobility seem unattractive to the everyday driver:

Especially in urban areas there are already enough EV-drivers in the need of an accessible charging station. The annoyance over blocked parking spaces in front of charging stations belongs already to the everyday life of many owners of electric cars. Several e-mobility blogs and other influencers (e.g. famous e-mobility vlogger Bjørn Nyland[1] and German e-mobility vlogger Alexander Bangula[2]) are already discussing the tiresome search for accessible charging stations, which are very often blocked by either combustion engine cars or electric cars which are not charging, but misusing the charging station as a parking spot for EVs.

This doesn't just make e-mobility unattractive to the everyday driver thinking about buying an EV, but also effects the current business case of the CPOs severely, who cannot detect non charging vehicles in front of the charging station: Firstly, the CPO cannot generate any revenue while a charging station is blocked and furthermore they are upsetting current EV-charging customers, who would like to charge at the “believed” free charging station, but encounter it being blocked.

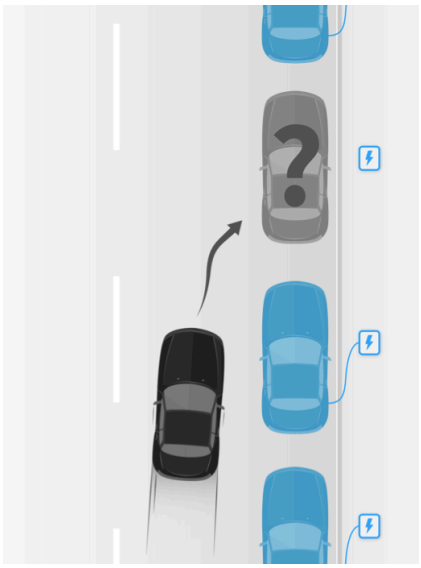

Figure 1: The issue with blocked charging stations by non charging vehicles leads to frustration among EV-drivers

Even if CPOs offer to reserve a charging station, there is no guarantee for the EV-driver to be able to charge, nor any information before the arrival, that the charging station is blocked, which is going to frustrate EV-drivers very soon.

Due to this problems charging infrastructure operators can hardly return their investment with their current business model. To make matters worse, they are upsetting their current customers, ultimately losing them and contributing to the unfortunate business case of charging infrastructure.

Consequently, this is slowing down the development of the entire e-mobility market, while the solution might be as easy as the monitoring of the parking spaces in front of charging stations.

2 The Missed Opportunities for Charging Point Operators and why monitoring of the parking lot makes sense

To increase the occupancy of their charging networks CPOs should focus more on delivering the best charging experience to their existing customers, on which they are missing out today.

While EV-drivers already know if a charging station is in use, they still do not have the information if the parking sport in front of it is free. If they drive to a charging station, which is blocked by a non-charging vehicle they have to switch to another charging station. This is not just frustrating for the EV Drivers, but also wastes time they could have spent charging, if they have had targeted the actually free charging station from the beginning on.

To charge an EV it is always necessary to park first. Thus the status of the parking spot in front of the charging station is essential for a convenient charging experience and eliminates the fear of a blocked charging station and potential time-loss while searching for a free charging opportunity.

Furthermore, additional business models e.g. a reservation model just make sense, if the status of the parking space in front of the charging station is actually known in real time.

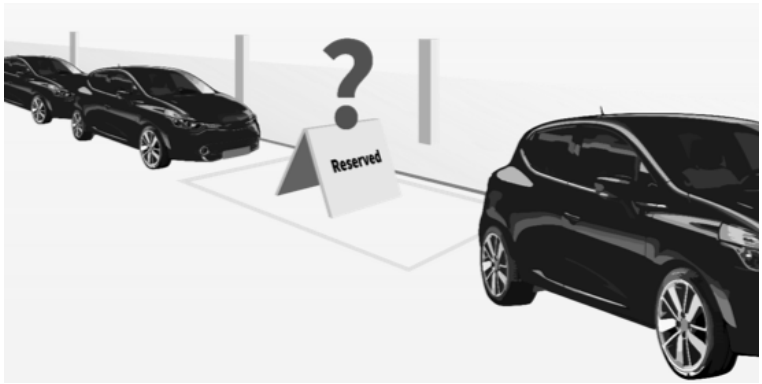

Figure 2: Reservation as a potential new business model needs parking sensor technology

This makes charging and e-mobility more appealing to existing and potential EV-drivers and is going to increase the occupancy of the charging infrastructure, while enabling charging without time loss.

To overcome the low willingness to pay for electricity while charging, CPOs should focus more on including the parking space into their business case. Usually the willingness to pay for parking is very high in urban areas. Thus, it would also make sense to charge for parking and charging either separately or with a mixed rate. For this additional business model parking spot sensors are necessary, which recognize the parking time and can not be tricked. Together with the information from the charging station CPOs would recognize if an EV driver disconnects from the charging station and keeps blocking it and of course combustion engine cars blocking the station. With bonus or malus models they could still keep generating revenue for the parking even though the charging station is blocked. This additional revenue is essential to enhancing the business case and thus the further expansion of charging infrastructure.

Consequently, a parking status detection through sensor technology is essential and the monitoring of parking spaces in front of charging stations is going to improve the current state for all stakeholders and enable a compelling business model for EV infrastructure.

3 Monitoring of parking spaces in front of charging stations as the solution to the issues with ParkHere's self-powered parking sensor technology

ParkHere stands for the self-powered occupancy control and optimization of urban parking areas. Smart and self-powered sensors on the parking spot in front of a charging station register a car parking and leaving and distribute the data over ParkHere Servers directly to the car drivers.

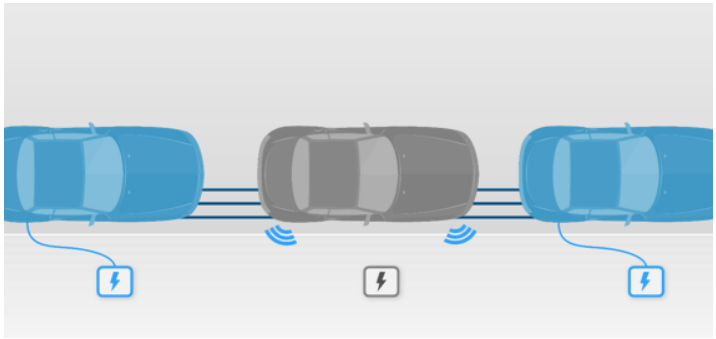

Figure 3: Charging station equipped with ParkHere's parking sensor stripes detecting a non-charging car

ParkHere offers the first self-powered parking sensor, which monitors parking spots 24/7 for more than 25 years at all weather, without the need of any energy source (no battery or external power supply) or maintenance. The ParkHere sensor uses "Energy Harvesting" technology to generate the electricity necessary by the cars driving over the sensor stripes. A neural algorithm then recognizes the patterns of the vehicle driving over the sensor stripes, and changes the status of the parking spot, sharing the information over the web to all stakeholders. ParkHere's self-powered and maintenance free sensor technology has huge benefits over competitor's parking sensors, which usually work with batteries and thus need regular and expensive maintenance/replacement every 2-3 years. This maintenance free aspect makes ParkHere parking sensors the only sustainable solution on the market to monitor parking spaces.

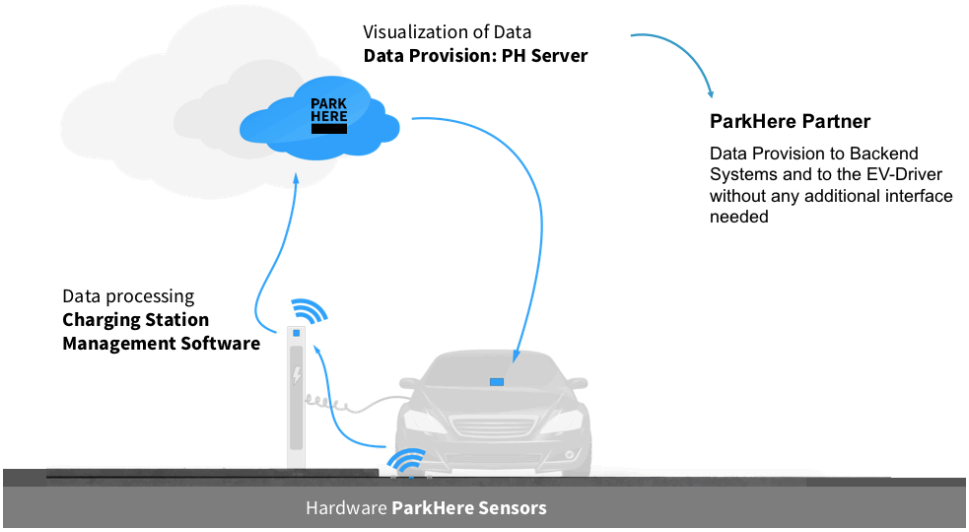

Figure 4: The ParkHere system of parking space monitoring consists of hardware and software

Especially the wire-less installation makes it the easiest solution to equip already existing charging stations with parking sensor technology without having to interfere into the usually closed housing of the charging

station. Furthermore, because the sensors are self-powered, there is both no need to supply electricity from the charging station, nor maintenance the sensors in any case for at least 25 years, which keeps the operating costs to a minimum with an unattainable sensor life time compared to other sensors.

As the sensor and the backend was developed by ParkHere, the real-time parking occupancy data can be distributed to everywhere necessary:

As ParkHere's backend is compatible to all major charging station management software, Charging Point operators have no further effort to analyse the data immediately in their known setting. ParkHere also partners with all major EV platforms and charging apps to bring the real time parking occupancy directly to the EV drivers and eliminate the tiresome search for actually free charging stations.

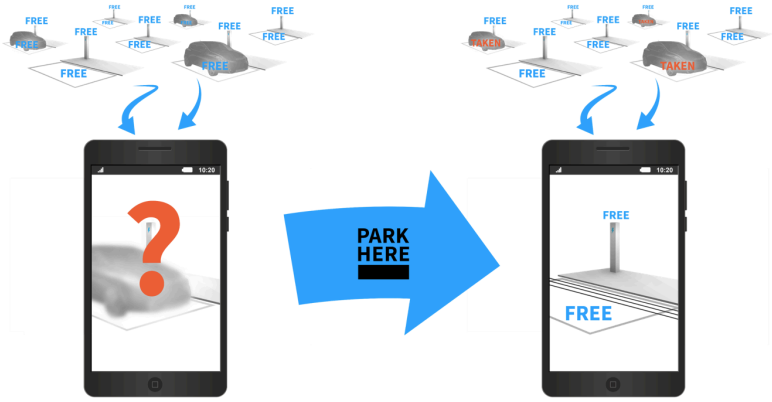

Figure 5: Perception of EV-Drivers; left side without parking sensors not knowing which charging point is accessible

Furthermore, additional business models can easily be implemented with the use of ParkHere sensors. EV-drivers are willing to pay from 1 to 5 Euros for a working reservation of a charging station, which was revealed by a survey conducted by Parkhere among EV-Drivers. Thus CPOs can implement a reservation model in combination with the ParkHere sensors to generate further revenue. While the CPOs blocks the charging station for a certain customer, the ParkHeres sensors monitor the parking spot in front of the charging station. If the charging station is blocked by another vehicle, the ParkHere sensors will detect it and immediately inform the charging station management software or the platform, that a reservation might not be possible. CPOs can immediately inform the EV-driver of the blocked charging station and offer him in advance a nearby charging station which isn't blocked, recognized by the ParkHere Sensors. This offers an easy to install and maintain reservation model, while keeping the EV-drivers in the specific charging network of the CPO.

If the CPO is operating the parking spot too, there is also the possibility to physically block the charging station with ParkHere's individual parking spot barrier, which is integrated into ParkHere's backend. When the charging station is reserved by an EV-Driver the ParkHere parking barrier rises and blocks the access of the parking spot to other vehicles. The EV-Driver can lower the barrier over his handheld device (either smartphone or any other mobile phone) and use his/her reservation of the charging station. With the use of the parking barrier the EV-Driver knows, that he/she is going to be able to charge his/her car at the preferred and reserved time-slot. After charging the car, the EV-Driver just drives off the parking space. The ParkHere parking sensor recognizes the left car and rises the parking barrier for a future reservation.

The electric car drivers benefit and can always find a free parking space in front of the desired charging station and are going to be able to reserve preferred charging stations and parking spaces. Furthermore, CPOs benefit from the additional information about the parking spot for further analysis and will generate

further revenue of the additional business models e.g. reservation or charging for parking and charging to generate further revenue.

Consequently, the Park Here Sensors and the ParkHere parking barrier are the essential link between parking and charging, thus benefit all stakeholders and enable charging without time loss.

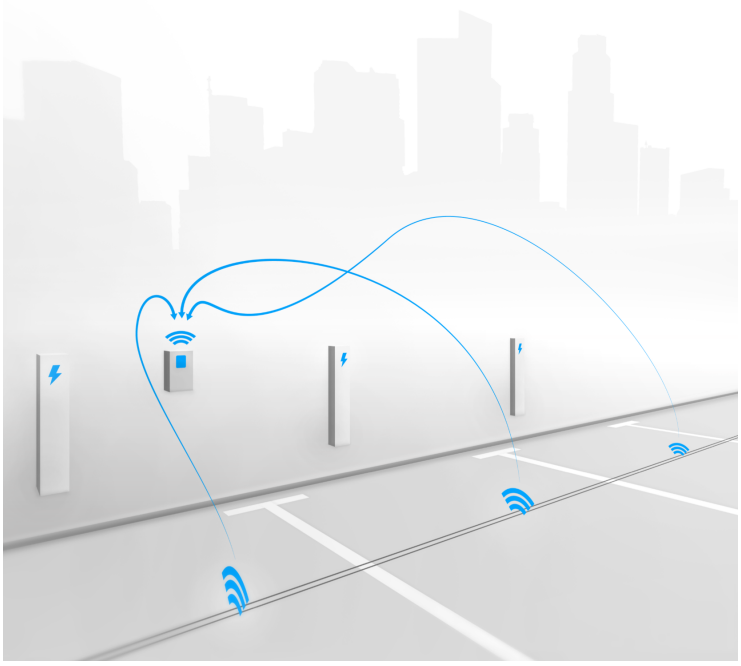

Figure 5: Charging Stations equipped with ParkHere sensor stripes, connecting parking and charging

References

[1] Bjørn Nyland, Charging spot is not a parking spot, https://youtu.be/SQDBpRsZ1vE, ,accessed on 2017-29-06

[2] Alexander Bangula, Tesla Fahrer Lässt Nachts Autos Abschleppen - Moralisch Richtig?, https://youtu.be/sCoHyyL1QmM, accessed on 2017-29-06

Author

Neven Heuberger, has received his Bachelor of Science degree in Business Administration with the major in Marketing and in 2018 his Master of Science degree in Business Administration with the major in market-oriented Corporate Leadership from the WFI – Ingolstadt School of Management of the Catholic University Eichstätt-Ingolstadt.

Since 2016 he is working for the ParkHere GmbH, which specializes in the field of smart parking with the development of the first self-powered parking sensor to digitize parking in smart-cities and end the tiresome search for parking spaces, which is causing high inner-city traffic and contributing to the CO_2 pollution. ParkHere also focuses on making the search for charging easier by digitizing the parking spot in front of a charging station. ParkHere is a spin-off company from the technical University of Munich and is located in Munich, Germany.

For further information visit, www.park-here.eu