Wireless Charging Systems for EVs – The answer to the consumers demand!

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Fortunately during the last few years we have seen many more Electrical Vehicles (EVs) and Plug In Hybrid Vehicles (PHEVs) on our roads due to various reasons. Driving an EV for being mobile, staying always connected and by being environmental friendly has become a clear statement for going with the spirit of the time. However, one subject has changed fundamentally: how to get the vehicle recharged, filled up or powered-up during or after a trip. This is somehow new to the drivers community and must be regarded also from a consumer perspective. Moreover, we have learned throughout the last few years, that making EV charging easy and user friendly is key to their mass adoption.

One option to charge an EV is to charge without a cable, just by resonant inductive power transfer. Wireless electric vehicle charging offers a safe, effective and convenient solution that makes charging effortless and -most important- automatic, specifically in respect to automated/assisted parking. Needless to mention, that wireless charging systems facilitates autonomous driverless vehicles. Whereas standard electric vehicles would require an attendant to physically plug in and initiate cabled charging. Alternatively to wireless charging, there are some prototypes of automated robot arms or uplifting connectors underneath of the vehicle on its way in some pilot projects.

But most likely only wireless charging systems will free up the valuable urban space required for conductive charging points. Wireless charging systems can be invisible, integrated into the roadside or into a parking lot. And this is what city planners are asking for! They are tired about “street furniture”, such as housings for street lamps, cabinets of DSL distributers and also ticket machines for public parking. It is clearly seen as a mandatory, that additional control cabinets on side walks or on places of historical inner cities must be avoided.

Still many drivers are afraid about the range of an electric vehicle. There are many doubts, questions and concerns with respect to “can I make my way from A to B without charging?” or “where are the charging stations on my way to my destination?” or “what kind of battery size fits best for my vehicle and my daily usage?”. All these are valid questions and sometimes will be answered automatically, latest once the driver has gained experience after driving a BEV.
for a couple of months. One question came up during the drivers “probation” period. Do we need larger and more heavier battery packages underneath the vehicle or is the answer a high density of opportunity charging facilities? And: what can be seen as acceptable if drivers are willing to plug-in a charging cable, identify and register 4 times a day, just to get enough energy for a mid-size trip?

The consumer may accept a premium to its total cost for an e-vehicle, a kind of surcharge for an accessory for convenient and hands-free charging. On the other hand, the driver can expect an infrastructure for wireless charging in public and semi-public (e.g. company owned employees parking house) situations. These are provided by charging infrastructure operators, energy providers and other operators, similar to those which offer wired charging infrastructure. The driver also expects a transparent cost per each charging event in addition to an affordable charging rate, at the same price level as an AC-wired charging event.

But it is pretty obvious, that the entire charging event must be automated and left without any control by the consumer. It is expected, that the driver of an e-car will be guided to the parking slot by the integrated navigation and charging infrastructure pilot system. But once arrived at the wireless charging spot, the vehicle must be positioned above the primary coil, also named Ground Pad Module (GPM), visible or even invisible on the street/parking spot surface. After the vehicle has been placed, the driver may leave the car without any other interaction. The handshake between the vehicle and the GPM will be performed while the vehicle will be made ready for a wireless power transfer event. The session can be interrupted at any time by simple open the door and thereafter starting the engine.

An finally the battery capacity and size can be reduced significantly by many charging events during the day, but then only with an automated, convenient charging system.

BRUSA Elektronik AG is one of a few pathfinders in electrical vehicle components technology and is currently supporting the car industry on their way to series production for such a sophisticated charging technology.

The presentation describes and analyzes the latest trends in automated charging systems with a clear focus on wireless charging. And it provides answers to all the questions above. It also highlights the technology trends for power transfer, detection of living and metallic objects as well as the precise positioning of the vehicle above the so-called ground pad module (primary coil).
The speech furthermore describes the actual status of the global effort to harmonize various standards and requirements for inductive charging systems, to be certified and operated in a large number of countries.

Last not least, the presentation outlines the broad wireless charging eco system that will develop further, including infrastructure companies, energy providers, parking house operators and city planners, just to name but a few.