

## DSRC Leads the way for Safety and New Stationary or In-Motion Wireless Charging

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DSRC (Dedicated Short Range Communications<sup>1</sup>) are wireless communication channels that will be mandated to be in cars in the future by the U.S. Department of Transportation. The primary use of DSRC is for vehicle safety, V2V and V2I. However, Joachim Taiber PhD, Research Professor and Institute Director Faculty of Automotive Engineering Clemson University International Center for Automotive Research (CU-ICAR) is testing a DSRC use that could substantially reduce emissions and extend the range of electric vehicles.

Funded by a grant from the U.S. Department of Energy (DOE) the team is testing inductive charging using DSRC for communications for wireless charging for when cars are parked at a base station and while cars are moving on a track. Electric Vehicles are important to the environment because they produce zero emissions.



Photo courtesy of Oak Ridge National Lab

The Department of Energy supports wireless charging because it can greatly increase the convenience and accessibility of electric vehicle charging for drivers. Inductive charging or wireless power transfer charging involves transferring power from the electric grid to EV batteries without the use of wires, cords or plugs. It requires a ground-based transmitting coil, or charging pad, and appropriate grid-side power electronics to transfer energy to a vehicle with a corresponding receiving coil installed.

Dr. Taiber is working with Toyota and Cisco to test wireless charging on the track at the Clemson University. Dr. Taiber chose DSRC for the vehicles to communicate with the coils in the base station because "DSRC has low latency and fast response time for communications with the base station."

The fact the DOT will be making DSRC mandatory also factored into the decision. If all vehicles will deploy DSRC using the radios for communication for conductive charging it makes it win/win situation without emissions, noted Dr. Taiber.

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According to the DOE Alternative of Data Center, electric vehicles when using electricity only produce [30 percent fewer lifecycle greenhouse gases](#) than the average conventional vehicle.

ADAS (Advanced Driver Safety Systems) that can use [DSRC](#) are Approaching Emergency Vehicle Warning, Forward Obstacle Detection and Avoidance, Cooperative Adaptive Cruise Control (auto-piloting). To get the best charge on the road, DSRC for charging can be combined with auto-piloting the vehicle to align the in-ground charging coils with the vehicle battery charging coils.

Currently, other forms of wireless charging for electric vehicles are from [WiTricity](#), (will work with 2016 Toyota Prius) [Plugless Power](#) and [Qualcomm Halo](#) that are stationary only. If charging can occur while the car is moving, it will be a major convenience for drivers who do not like to stop at charging stations or wish to driver outside the limited charge range of the vehicle.

One of the reasons drivers have been slow to adopt electric vehicles is the short driving range which can be as low as 40 miles per charge. If wireless charging could be built into parking space or into the road, the driving range could be extended greatly.

Although such technology is years away, Dr. Taiber imagines the first deployment of wireless charging would be in highly populated urban areas. A commuter could, through a payment box or in-car infotainment system, pay for charging while commuting to work in a charging HOV lane. A parking garage could provide charging while the commuter is at work. A retailer, say McDonald's, could provide free inductive driving while in the drive-through lane for purchases of \$10 or more. Such technology could also be used to charge city buses and public transportation.

Another use for mobile wireless charging could be a resort like Disneyland or a retirement community where service vehicles (LSVs (Low-Speed Vehicles also called golf carts by general public) could be charged while driving around the park. LSVs usually have a very short range. If wireless charging was built into the road the visitors, workers or community would not be experience the gas fumes from the gas-powered service vehicles.

Dr. Taiber noted that the car makers have to decide if the added benefits of wireless charging outweigh the costs of adding the feature to cars. Besides the added benefit of safer cars on the road DSRC could also link to payment systems for municipal infrastructure as well as retailers.

The DOT has not stated when it will require the deployment of DSRC in vehicles. According to the Office of [Energy Efficiency and Renewable Energy](#), widespread adoption of wireless charging for PEVs will require collaboration, cost reduction and technology improvement. The DOE recently awarded [\\$55 million](#) for 31 new projects.

1. DSRC communications take place over a dedicated 75 MHz spectrum band around 5.9 GHz, allocated by the US Federal Communications Commission (FCC) for vehicle safety applications. [DSRC](#) is preferred over Wi-Fi because the proliferation of Wi-Fi hand-held and hands-free devices that occupy the 2.4 GHz and 5 GHz bands, along with the projected increase in Wi-Fi hot spots and wireless mesh extensions, could cause intolerable and uncontrollable levels of interference that could hamper the reliability and effectiveness of active safety applications.



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