Vehicle Automation: An Enabling Technology for Wireless Power Transfer

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What are the benefits of driver automation?

- Increased Safety
- Increased Capacity
- Increased Speed
- Increased Freedom

Challenge: Quantifying Benefits
Where we are today!

- Stationary charging is being rolled out
- Limited testing of in-motion charging
Automation’s Role in Stationary Charging

- Better alignment with the transmitting coil
- Auto Valet Service
Automation’s Role in In-Motion Power Transfer

- Driver automation is an enabling technology for in-motion IPT, especially at high speeds.

- Power transfer rate are dependent on the amount of time transmitter and receiver are aligned.
Driver Automation Levels

- **Level 0**: No vehicle autonomy. Driver has control.
- **Level 1**: Vehicle provides driver info/warnings. Driver has informed control.
- **Level 2**: Vehicle integrates detection/response. Driver ready to take control.
- **Level 3**: Vehicle fully autonomous. Driver takes control in emergency.
- **Level 4a**: Vehicle fully autonomous. Occupants do not need ability to drive.
- **Level 4b**: Vehicle connected, cooperating. Optimized system operation & passive driver experience.

Full Driver Responsibility

Full Vehicle Responsibility

Via Department of Civil & Environmental Engineering
Vehicle Communication

- Vehicle to Infrastructure Communication
- Vehicle to Vehicle Communication
Interconnected Infrastructure
Vehicle Test Track

- Conceived by Womack, Muhs, Heaslip in 2009.
- Currently being built at USU
Conclusions

- Stationary IPT will be a disruptive technology for vehicles
- Automation will be a disruptive technology for driving
- Combined there is great opportunities for success
- Many challenges still exist for in-motion charging
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