Automation and Roadway Electrification

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National Advanced Driving Simulator

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The National Advanced Driving Simulator

The University of Iowa

USU's EVR will be a great facility, and I've been lucky to have a great facility too...

- The National Advanced Driving Simulator (NADS) was established in 2001 with funding from USDOT
- We are the nation's premier driving simulator and are available for use by anyone

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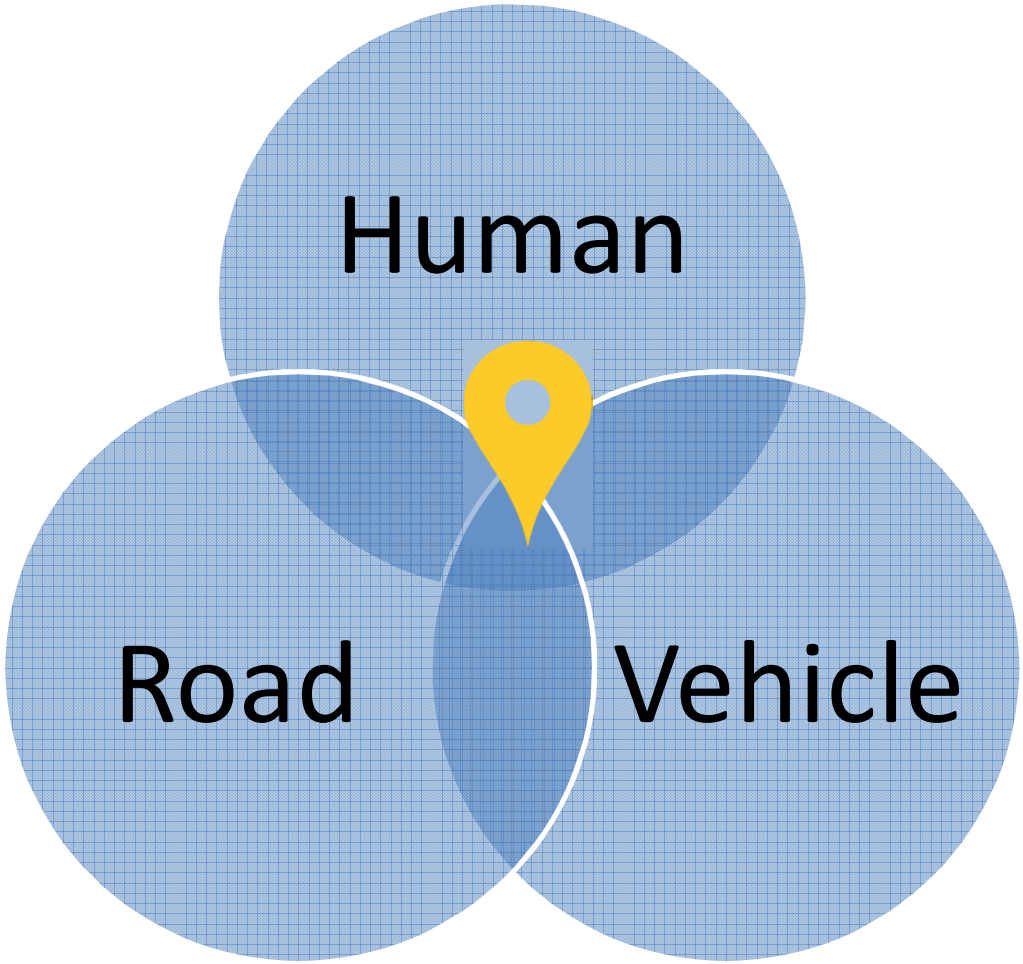
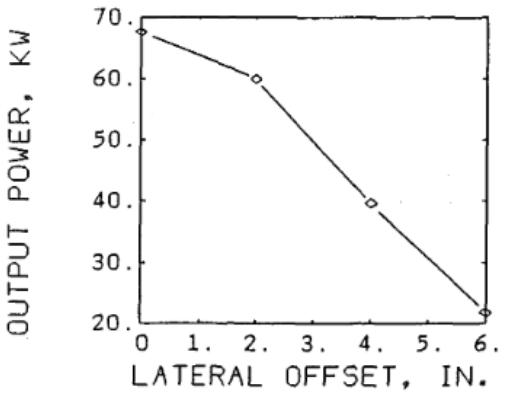
We focus on the human factors of driving safety



Automated vehicles should be good for electrified roadways

Lateral Control



- Automatic alignment
  - Stationary and dynamic

Longitudinal Control

- Automation may increase the potential density of traffic by 3X or more
- Normalize inter-vehicle gaps to provide more consistent traffic flow

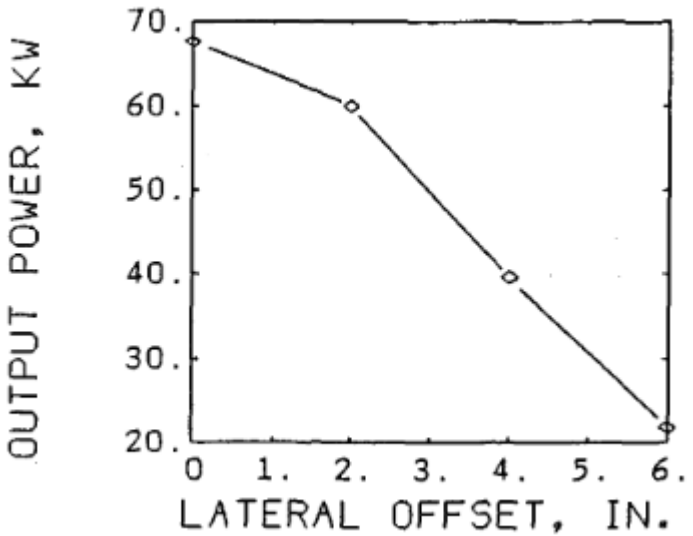
Shladover, S. (1990). Roadway Electrification and Automation Technologies. *Journal of Transportation Engineering*, *116*(4), 417–425.

Ask not what automated vehicles can do for you ...

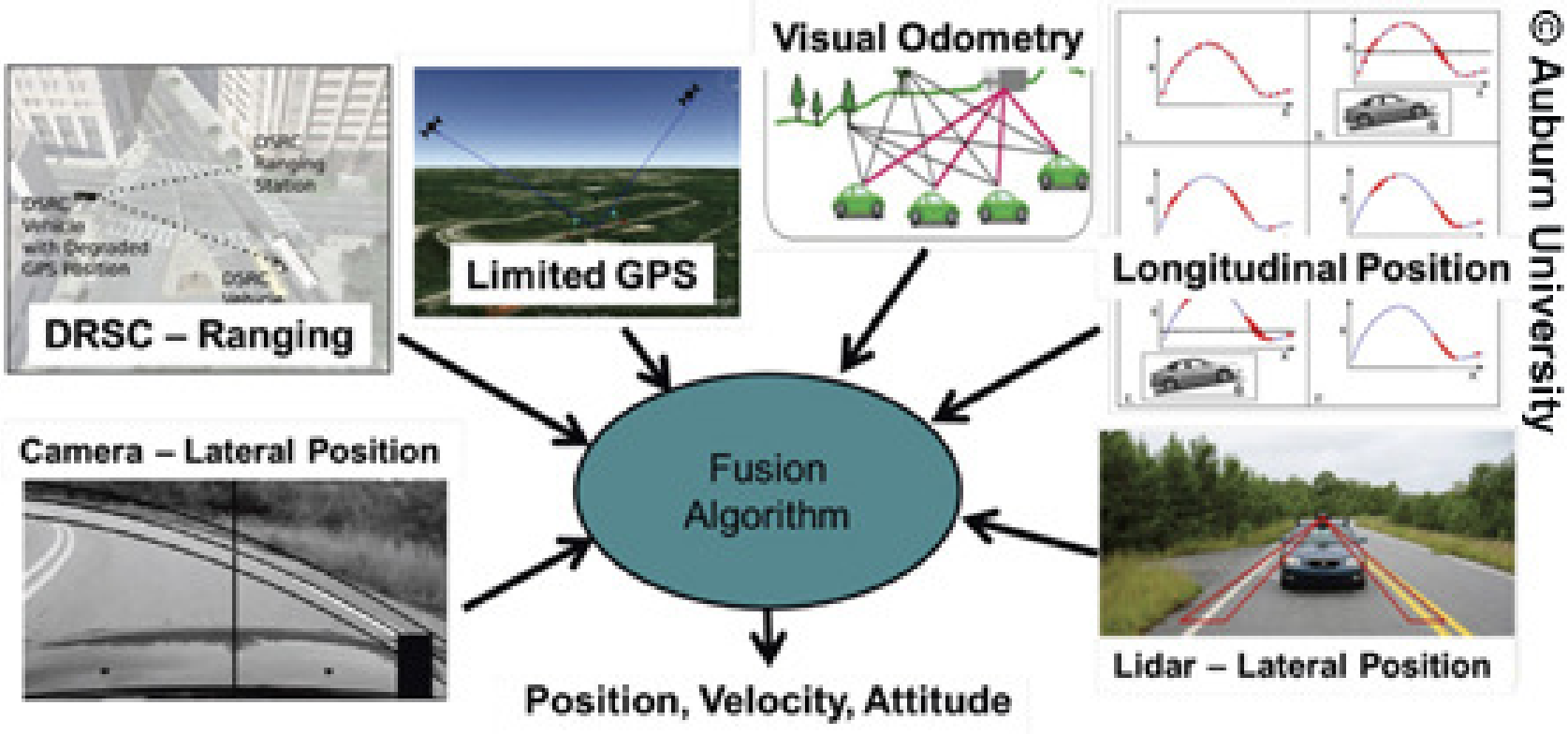
...but what you can do for automated vehicles

Electrified roadways should also be good for automated vehicles

- The same misalignment issues that automation may help to minimize can be used to help automated vehicles keep the center of the lane very accurately

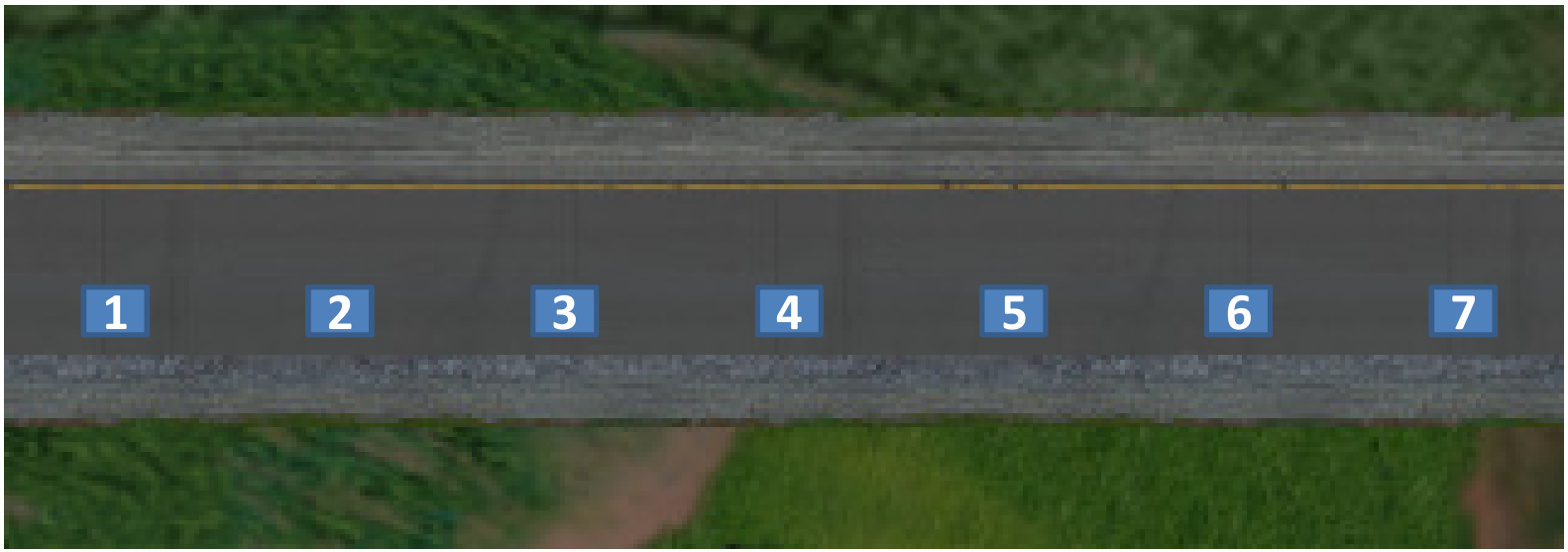


There are relatively few absolute fixed location markers available to AVs



Bevly D., Farrell J. (2013). Vehicle Positioning, Navigation, and Timing: Leveraging Results from EAR Program-Sponsored Research. *Final Report FHWA-HRT-13-052*, pg 5.

Induction charging pads provide good absolute location markers



- A localization scheme that include charging pads would effectively augment GPS / IMU
- The accuracy of the C.V. basic safety message is important for safety applications

The long range considerations could be even more significant

Automation Pros

- Robo-taxis could take advantage of public stationary charging during idle time
- Crashless vehicles can be smaller & lighter
  - The start of a ‘virtuous’ cycle of mass reduction

Automation Cons

- Car sharing aims to reduce idle time, potentially to the point that dynamic and semi-dynamic charging issues must be solved
- Platooning may provide capability for very small gap sizes

There are undeniable synergies between automation and WPT…

- But the two technologies may compete in some ways
- Induction charging proponents should make the case on how they can complement and benefit automated and connected vehicles