AUTONOMOUS VEHICLES

PLANNING FOR MADISON'S FUTURE

PRESENTED BY DAVID HOFFERT

DAVID HOFFERT

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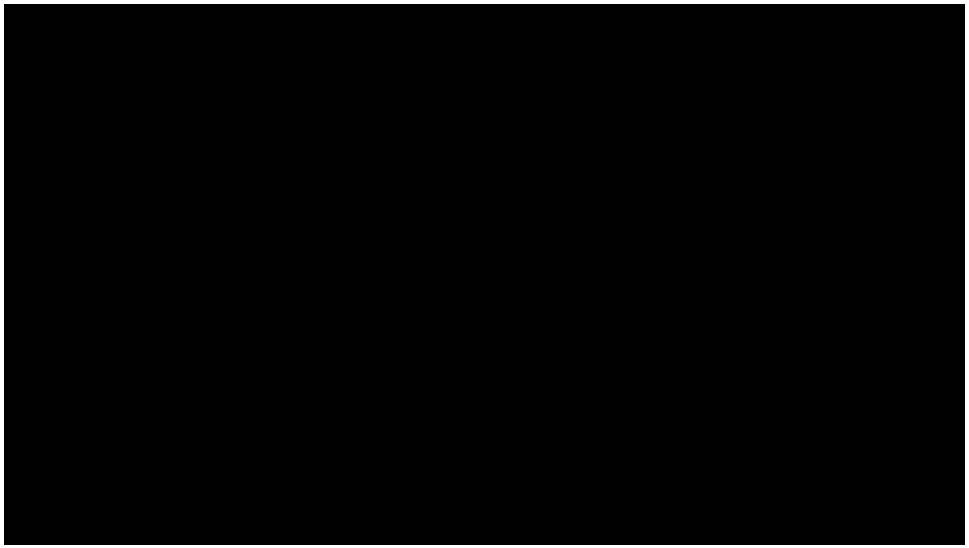
- Member of the Citizen Advisory Committee of the Madison Area Transportation Planning Board

STANFORD'S AUTONOMOUS TTS



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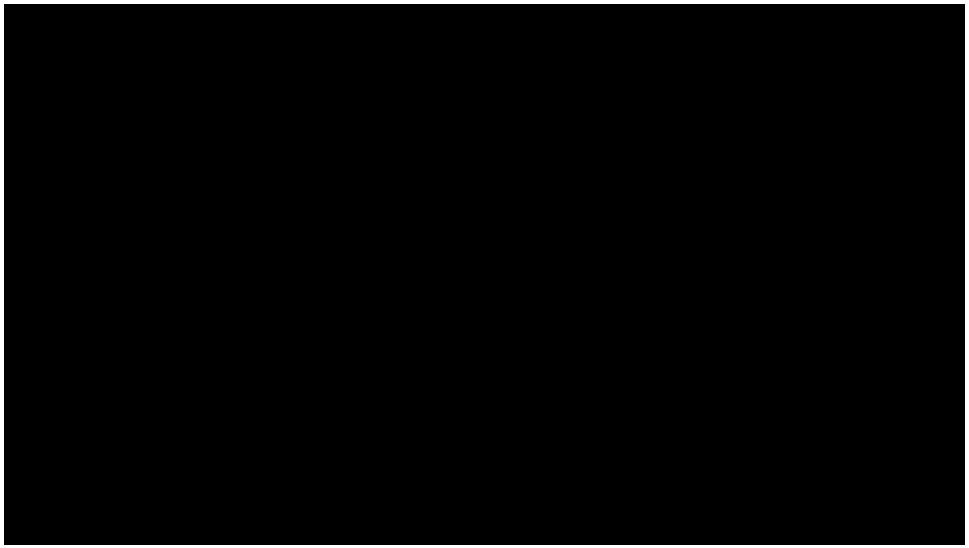
PARTIAL AUTONOMY IS LONG ESTABLISHED

- Anti-lock Braking System (ABS) pumps the breaks for us so that we can retain the ability to steer
- Electronic Stability Control (ESC) distributes power across the four wheels to avoid fishtailing and spinning
- Adaptive Cruise Control (ACC) slows up and speeds down to keep a constant distance from the next vehicle
- Recent: parking assist, lane departure warnings…
- Fully autonomous vehicles will just be the continuation of a trend that has already been happening for decades

FULL AUTONOMY IS APPROACHING RAPIDLY

- 2004: First DARPA Grand Challenge failed (no car went further than 7.32 miles)
- 2005: Second DARPA Grand Challenge completed by five vehicles (132 miles), Stanford beats CMU for first place
- 2007: DARPA Urban Challenge completed by several vehicles (first autonomous car crash between MIT and Cornell)
- 2010: Google reveals that it has continued Stanford's research and already has a fleet of autonomous vehicles driving California highways
- 2011: Nevada becomes first state to legalize autonomous cars
- 2012: Florida and California legalize autonomous vehicles
- 2013: Nissan announces plans to sell autonomous vehicles in 2020

GOOGLE'S AUTONOMOUS VEHICLE



https://www.youtube.com/watch?v=cdgQpa1pUUE

WHY AUTONOMOUS VEHICLES?

- **Every year, 32,000 people in the United States and 1.2 million people worldwide die in traffic crashes**
  - The United States number is only recently down from 40,000 due to the widespread adoption of an autonomous vehicle technology, Electronic Stability Control
- **90-95% of those crashes are due to human error**
- **Computers always follow traffic laws, don't drink and drive, etc., so could save most of these lives**

UPTAKE OF AUTONOMOUS VEHICLES

- Fully autonomous vehicles will be available commercially in the 2020s
- But at first they will be a true luxury item, and will take a long time to become available to the masses
- Eventually, they will be so much safer than human drivers, they will be mandated, but that's a long time off
- So, medium-term planning must account for the existence of human drivers and autonomous cars in tandem

A PHILOSOPHY FOR AUTONOMOUS CAR POLICY

- **Do not adapt infrastructure for self-driving cars, make them adapt to existing infrastructure**
  - This minimizes the disturbance to human drivers, who will remain the majority of cars on the road for a while
  - This also keeps Madison out of the business of playing favorites with commercial companies
  - It does mean Madison will have to develop a “driving test” for certification for a make/model of autonomous car
- **Autonomous vehicles must be able to act unilaterally; a network approach to cars is too vulnerable to attack**

INITIAL AREAS THAT WILL BE IMPACTED

- **Short-Term: Parking**
  - An autonomous car will want to self-valet—which requires a communications API for available parking spots
  - Cars may be willing to find parking further away, but not always → still need some downtown parking
- **Medium-Term: Transit**
  - Transit currently preferable to driving because of convenience, cost, and environment
  - Self-driving cars will reduce those incentives to environment only, though not right away