AUTONOMOUS VEHICLE INTERACTIONS WITH VULNERABLE ROAD USERS

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HOW DO AUTONOMOUS VEHICLES DETECT BICYCLISTS?
“Bicycles are probably the most difficult detection problem that autonomous vehicle systems face,” says UC Berkeley research engineer Steven Shladover.
Driving Assistance Systems

- Forward collision warning (FCW)
- Automatic emergency braking (AEB)
- Lane departure warning (LDW)
- Lane keeping assistance (LKA)
- Blind spot warning (BSW)

FCW & AEB could potentially prevent 1.99 million crashes 884,000 injuries, 4,738 deaths (85% rear end crashes and 74% of preventable fatalities were pedestrians and bicyclists)*

LDW & LKA systems could have potentially prevented 519,000 crashes (187,000 injuries, 4,654 deaths, mainly road departure crashes)*

BSW could have potentially prevented 318,000 crashes (89,000 injuries and 274 deaths, mainly sideswipe and rear-end)*

Overall: combined potential to prevent 40% of all passenger-vehicle crashes, 37% of injuries, and 29% of deaths* *(Benson et al., 2018)*
Backup camera

→ 1:4 owners with Rear Cross-Traffic alert (RCTA) sometimes backup without looking over shoulder

→ 1:3 owners with blind spot monitoring (BSM) sometimes change lanes without checking blind spot (McDonald et al., 2018)
CRASH: Tempe, Arizona, testing of a self-driving Uber resulted in a pedestrian fatality. Safety driver was using phone and failed to brake.

CRASH: Williston, FL, Tesla in autopilot mode, driver over-reliance on automation (Poland, NTSB, 2019)

(Williston, FL, Photo by Florida Highway Patrol investigators)
HOW WILL PEDESTRIANS AND BICYCLISTS ADAPT TO AUTONOMOUS VEHICLES?

→ AVs will affect our road environment
→ Drivers will adapt their behavior
→ How will other road users will modify their behavior

Cautious

Fearless
HOW TO ADDRESS UNCERTAINTY OF FUTURE ENVIRONMENTS
BICYCLISTS AND PERCEIVED SAFETY

- Preliminary studies assessing what impacts bicycle use
- Concerns about safety → decreased bicycle use
- Perceived safety impacted by: motor vehicle speed, lane widths, motor vehicle volumes, presence of bicycle infrastructure, etc.

Autonomous vehicles?
REFERENCES

- https://www.youtube.com/watch?time_continue=17&v=NG_O4RyQqGE
Questions?
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