Week 5: Smart cars

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# Smart Cars

The most powerful artificial intelligence applications use machines to enhance human capabilities rather than replace them (Heer, 2019; Boire, 2017). For instance, a person can write a more profound business case than a machine; however, the same machine will have fewer misspellings and grammatical errors. This dichotomy exists because humans specialize in contextualizing thought versus automation use patterns to make predictions (Schleer et al. 2019). Smart vehicles are an area of research that seeks to fuse this symbiotic relationship. As this partnership flourishing, it will continue creating advancements across safety, optimization, and convenience systems.

# Practical Applications of Intelligence

Machine learning can enhance every aspect of the drive, from extending the physical parts’ lifespan to increasing the driver’s overall satisfaction. Figure 1 contains a non-exhaustive taxonomy subset of these situations, such as reducing wear and tear and object detection. While building the taxonomy, the critical placement consideration was focusing on that aspect’s core use cases. Many items, such as Voice Assistance (VA), could arguably live under the Safety pillar. However, safety systems could exist in the same capacity even though more traditional input interfaces.

Figure 1: Taxonomy of Use-Cases

## Safety Control Systems

Annually, 32,000 Americans die from automotive accidents, and another 2 million are injured (CDC, 2016). These statistics are unacceptably high and require innovations that increase all participants’ safety on the road (see Figure 2). Artificial intelligence can assist these scenarios by collecting sensor data and then predicting risks and opportunities. For example, several manufactures, like Suburu and Lexus, support audible risk alerts during lane changes or backing up. While these capabilities exist today, they are often incomplete models due to the high volume of edge cases across in the real-world.

It can be challenging to model the interactions between drivers and passengers, road design, and pedestrians because they are not always rational actors. For instance, adaptive cruise controls can use sensors to determine the car ahead is slowing down and that a similar reaction is necessary. However, if a child runs into the street, this deviates from the standard workflow. Other issues arise

Figure 2: Taxonomy of Participants and Example Challenges

## Convenience Systems

## Optimization Systems