**Debate Notes - Week 6 - Driverless vehicles should be banned for safety and ethical concerns (For)**

**Opening Statement:**

Driverless vehicles have been around since the 1970’s in certain private settings, for example in the military. They are only now beginning to appear in the general public automobile industry as many players have jumped into the area, including Google, Tesla, General Motors and many others trying to be the leader in the field. While I do believe that one day in the future driverless cars could become mainstream, I do not think that time is now or even in the near future. As stated in an article written by Fagnant and Kockelman,

“Although this may potentially provide safety and efficiency benefits, there are major concerns around the public’s willingness to adopt the technology. These concerns relate to security, trust, privacy, reliability and liability”. Until these concerns are satisfied to the general public widespread use of driverless automobiles will not occur.

The points I will be touching on in this debate are the concern regarding computer systems and software in driverless cars being subject to malfunctions and hacks, liability concerns related to autonomous vehicles and infrastructure obstacles as well as choosing between 2 bad options.

**Source:** [Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars - ScienceDirect (syr.edu)](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub) Trust in driverless cars: Investigating key factors influencing the adoption of driverless cars, [Kanwaldeep Kaur](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub" \l "!) & [Giselle Rampersad](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub#!)

**Point 1:** **Driverless cars’ computer systems are subject to malfunctions and hacks.**

There are many different sensors and technological devices implemented into driverless cars. If only one of these devices malfunctions it could potentially lead to catastrophic accidents, injuries or death. It’s been discovered that bad weather has been able to cause sensors and devices within the car to perform inaccurately, which could lead to dangerous situations. This can obviously have devastating consequences to those utilizing driverless cars and those that could potentially be on the other side of the road. Another concern is hacking from bad parties. Just like any device that utilizes internet, software, etc. hacks are a concern that cannot be overlooked. As Tim Ring states in his paper,

*“A self-driving car may be vulnerable to traffic mishaps and disruptions, car-jacking, broken equipment, as well as software related security flaws as in car hacking, remote access, remote control of the vehicle, computer virus’s malwares, spoofing, excessive targeted marketing and in car product endorsements” (**[Ring, 2015](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub" \l "bib0185)).*

In addition, any personal information stored within the car’s computer system could be subject to hackers, which is another concern.

An example of how easy it is to manipulate and compromise an autonomous vehicle is explained in this Forbes.com article,

*Quote: “Remarkably, by extending the central bar of the number three on a 35 miles per hour speed limit sign, just with the 2-inch piece of tape, it was determined that a repeatable misclassification from the Tesla Model X and Model S test vehicles. Both of these 2016 models were enabled with Speed Assist (SA) and Tesla Automatic Cruise Control (TACC), and both were susceptible to the model hacking exploit.”*

So basically a piece of tape was able to fool an autonomous vehicle.

Furthermore, if you didn’t think this or other instances made Elon Musk and Tesla nervous,

*Quote: “The company has even*[*put up a half-million-dollar bounty*](https://www.forbes.com/sites/daveywinder/2020/01/09/can-you-hack-a-tesla-model-3-500000-says-that-you-cant/)*if elite hackers at the forthcoming Pwn2Own initiative can evade the multiple layers of security in a Tesla Model 3 and execute a full vehicle compromise.”*

So, although this happened in 2016 and improvements have most likely been made regarding this, the actions taken by nefarious parties was way to simple in order to trick an autonomous vehicle. There are inevitably much more sophisticated ways to do so that should be of much concern.

**Source:** [Connected cars – the next targe tfor hackers - ScienceDirect](https://www.sciencedirect.com/science/article/abs/pii/S1353485815301008?via%3Dihub), Connected cars – the next target for hackers, Tim Ring

**Source:** [Hackers Made Tesla Cars Autonomously Accelerate Up To 85 In A 35 Zone (forbes.com)](https://www.forbes.com/sites/daveywinder/2020/02/19/hackers-made-tesla-cars-autonomously-accelerate-up-to-85-in-a-35-zone/?sh=5e5e0a147245), Hackers Made Tesla Cars Autonomously Accelerate Up To 85 In A 35 Zone, Davey Winder

**Point 2: Who’s liable for** **Driverless cars when accidents occur? Is auto insurance necessary anymore?**

When autonomous vehicles take on the responsibilities that have previously been the driver’s responsibilities, liability when an accident occurs is shifted away from the driver.

As argued in the article “The Coming Collision Between Autonomous Vehicles and the Liability System” by Gary Marchant and Rachel Lindor,

“While the manufacturer will design the system to minimize risks of situations that it does anticipate, the collisions that are most damaging and costly will be those that the manufacturer fails to anticipate. This leaves the manufacturer highly vulnerable to design defects, in particular the cost-benefit test.”

This is not something manufacturers can take lightly as it could be of great cost to them if their products experience unforeseen scenarios.

There are different laws in various states defining who is liable when an accident occurs in an autonomous vehicle. Some states lay the blame on the individual who initiates the autonomous features to start and other states lay the blame on the manufacturer of the autonomous technology. In order for autonomous vehicles to be comfortably accepted by the public they need a concrete and uniform law that they are aware of.

Autonomous cars cannot be mainstream until there is uniformity in liability.

**Source:** <https://web.law.asu.edu/Portals/31/Marchant_autonomous_vehicles.pdf>, The Coming Collision Between Autonomous Vehicles and the Liability System, Gary Marchant & Rachel Lindor

**Point 3:** **Current infrastructure is so vast, unique and unknown. The unstructured nature of our roads create a big hurdle for driverless cars to tackle. Also, deciding between 2 bad situations.**

Roads and signs are vastly different throughout the country. Having an autonomous vehicle in Iowa is considerably different than having an autonomous car in Brooklyn. There may even be parts of the country that don’t have lines drawn on the road or don’t have speed limit signs as they should.

How will an autonomous vehicle react to this?

Also, a concern is unforeseen instances.

For example, what if a traffic light is out and car flow is relied upon taking turns going through the intersection? If a driver at the intersection waves you to go through, how can the autonomous car interpret this? Do humans need to take over in this situation? Another example of potential hiccups, is if there is construction and a worker directs you to cross over the double yellow line, how will the car react? Again, it seems a human would need to take control in order to act correctly.

A final point I would like to make involves the idea of technology making the best choice given 2 bad options. For example, if an autonomous vehicle encounters a deer in the road, will it swerve into the oncoming lane to avoid the deer and potentially crash head on into another car or will it continue to hit the deer, which may be the best decision a human would make.

**Things to be prepared for**:

Yes, there have been reports that autonomous vehicles are safer than human operated traditional vehicles but these studies have been performed under restricted conditions and human intervention when required. The real world has unrestricted conditions and a vehicle is not fully autonomous if human intervention is required in certain instances.

“Contemporary research predicts that autonomous vehicles will have improved performance over traditional non-autonomous vehicles ([Paden et al., 2016](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253" \l "bib0175)). Such research is backed by vehicle tests conducted by driving thousands of miles under restricted conditions and human intervention when required” ([Benenson et al., 2008](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253" \l "bib0035); [Godoy et al., 2015](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253#bib0095)).

* Restricted settings for testing don’t replicate real world situations. Roads are unique and different in each state.

**Closing statement**:

I believe driverless vehicles for the general public are inevitable sometime in the future. I do not think that time is now though. There are too many unknowns and issues that need to be addressed before the public feels comfortable. Stated back in 2015 by Jorge Godoy & Miralles-Guasch,

“It is widely accepted that driverless cars will not become mainstream on the majority of roads globally in the immediate future.” ([Godoy et al., 2015](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub" \l "bib0095)).

“The most likely adoption settings may be in closed environments such as university campuses, airports, golf courses, holiday parks and retirement villages.”([Miralles-Guasch](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0923474817304253?via%3Dihub" \l "bib0160)).

Though there may be autonomous vehicles utilized in some closed environments there hasn’t been the utilization rate of autonomous vehicles that many expected 5 years ago. As explained previously, autonomous vehicles show a lot of promise for the future but at the current time and in the near future they are not ready for public rollout.

**Source:** [A driverless vehicle demonstration on motorways and in urban environments | Transport (vgtu.lt)](https://journals.vgtu.lt/index.php/Transport/article/view/1564)

**Source:** [Sustainable transport challenges in a suburban university: The case of the Autonomous University of Barcelona - ScienceDirect (syr.edu)](https://www-sciencedirect-com.libezproxy2.syr.edu/science/article/pii/S0967070X10000612)