

# **Implementing a Government Enforced Ethics Setting for Self-Driving Cars**

## **I. Abstract**

The regulation of programming ethics into autonomous vehicles (AVs) is just one of the many issues in the car industry. As autonomous vehicles are programmed to respond to situations before they even occur, law makers and manufacturers must take responsibility for the technology's actions. A self-driving car could potentially be programmed to always save its passenger and sacrifice all other lives, or vice versa. At this time, there is no official regulation for how ethics should be programmed into this technology. Creating a mandatory ethics setting for all autonomous vehicles will be the most effective solution to the dilemma of programming ethics. If all governments, both national and international, enforce this ethics setting, the many complex issues that come with programming morality into self-driving cars can be avoided, and most importantly, our roads will be safer. Programming ethics into self-driving cars is a complex task, but with government enforced guidelines, self-driving car companies will be able to have a clear path to build safe, fair, and efficient autonomous vehicles.

## **II. Background**

The computerization of driving can be traced as far back as the 1970s with the introduction of electronic antilock brakes. In recent years, the development of self-driving technology has advanced rapidly. Autonomous driving has gone from science fiction to reality in a matter of just a few years. For instance, Waymo, the company that emerged from Google's self-driving car project, has been working on their AV technology since 2009. Waymo's self-driving cars have driven over four million miles on its own and are now undergoing a public trial phase in Phoenix, Arizona [10]. Moreover, every significant automaker in the car industry is conducting research and development for self-driving technology.

There is no doubt that self-driving cars will provide us with many benefits. By removing human error such as texting while driving from the equation, autonomous technology will save many lives each year. AVs will also be much more efficient than cars driven by humans. With advanced sensors and cameras, they can travel at much higher speeds with closer proximity to other cars without having to worry about colliding [3]. Reducing traffic congestion and decreasing the amount of travel time is be a major win for

productivity, and people will no longer have to worry about wasting time while finding parking or stuck in traffic [3].

However, despite the many benefits to convenience, safety, and efficiency, self-driving cars also present several drawbacks. We cannot expect artificial intelligence to have the same instincts and common sense as human drivers. Generally, we can be reasonably confident that human drivers will act ethically and wisely behind the wheel, but this is not the case for AVs. This raises some difficult questions. How should the car be programmed to act in the event of an unavoidable accident? Should it minimize the loss of life, even if it means sacrificing the occupants, or should it protect the occupants at all costs? Should it choose between these extremes at random? Programming ethics into cars is unprecedented. Given that it is such a new concept, the government has not yet put forth any official legislation regarding the regulation of this specific issue. It is vital that the NHTSA and other law-making organizations create mandatory guidelines for programming ethics setting before AVs become a widespread technology.

### **III. Current Regulation**

As of today, regulation of autonomous vehicles is scarce. Automated cars are probably only legal in the United States because of the legal principle that “everything is permitted unless prohibited.” That is, because there are currently no official laws concerning AVs, there is no way to justify that selling or driving self-driving cars is illegal [9]. This gives autonomous car manufacturers such as Google to have free reign over what kinds of AVs they sell and how they sell them.

The 15-point checklist released in 2016 by the NHTSA was a set of guidelines, not laws. These guidelines attempted to provide best practices for companies developing self-driving cars, including a range of goals for manufacturers regarding how AVs should be built and programmed. However, the pitfall here was that the NHTSA only *recommended* this checklist. The guidelines are still completely voluntary, and do not come with a compliance requirement or enforcement mechanism [7]. This leaves dangerous room for manufacturers to potentially cut corners or only meet several of the safety guidelines that the NHTSA has outlined. Not only does this pose a threat to all passengers of those AVs, but also to the other vehicles and passengers on the road.

In September 2017, the House of Representatives passed the SELF DRIVE Act which laid out a basic federal framework for autonomous vehicle regulation. The bill ranges from

preempting states from regulating AV design, construction, or performance, to requiring manufacturers to file safety assessment letters and issue regulations for future automation features. Self-driving cars have been in testing on public roads since at least 2010, and in the absence of federal regulation, individual states have stepped in to create order. They have in turn created a muddled patchwork of state legislations with different purposes, definitions, and priorities [3]. Currently, only twenty-one states out of fifty have passed legislation related to AVs. Additionally, eleven states have issued executive orders or announced initiatives related to autonomous vehicles [3]. Obviously, these inconsistencies are not ideal for both AV manufacturers or the federal government. The biggest setback of the SELF DRIVE Act is that it will not official become law until the Senate passes its own bill on the matter [6]. With AVs poised to disrupt the car industry, the federal government must act quickly to implement a comprehensive federal framework to create regulations for AVs, especially regarding programming ethics.

#### IV. **The Problem**

Despite the fact that autonomous vehicles promise to be safer than manually driven cars, they cannot always be one-hundred percent safe. They will sometimes encounter lose-lose situations where collisions are unavoidable, simply because of the unpredictable nature of driving. In the midst of other human drivers, pedestrians, bicyclists, and other moving variables, AVs must be responsive and adaptable.

The unfortunate scenarios that self-driving cars could possibly face are very similar to the dilemmas associated with the famous trolley problem. This problem refers to a popular thought experiment where one must decide whether or not to divert a trolley hurtling down a track. If the trolley is not diverted, several people on the main track will die. If the trolley is diverted, a man working on the side track will die. The question is, should you sacrifice one life to save many [5]? This problem is easily translated to situations with self-driving cars. Suppose a self-driving car was programmed to avoid pedestrians at all costs. If a pedestrian were to suddenly appear in a two-lane tunnel, and the vehicle couldn't stop in time, the vehicle would be forced to swerve, even into the path of an oncoming bus loaded with passengers. In this case, is it right to prioritize life of the pedestrian over the lives of the many people inside the bus?

The key difference between this example and the traditional trolley problem is that long before the scenario even occurs, the AV has already been programmed to react a

certain way. Unlike humans who make these decisions out of pure instinct and panic, an automated vehicle would do so as the result of a carefully planned strategy of risk management created by those in charge of manufacturing the vehicle [5]. This raises important ethical questions. For example, should autonomous vehicles be programmed to always minimize the number of deaths? Or should they perhaps be programmed to save their passengers at all costs? The government must decide what moral principles should serve as the basis for these “accident-algorithms”. With the inevitability of crashes and collisions, it is expected of us to want to find the person who can be held responsible. Especially if accidents involve fatalities or serious injuries, legal proceedings will often occur after the fact. These legal proceedings naturally lead to a debate about who is morally and legally responsible for what occurred. Thus, it is vital that manufacturers and law makers reach an agreement on what moral grounds to ensure the safety of all passengers of AVs [8].

## V. Reasoning for Mandatory Ethics Settings

There are several different ways to program AVs in situations where crashing is inevitable. An easy way out would be to not program the responses of AVs at all. This is an unacceptable solution. Being unprepared for situations such as the lose-lose scenarios outlined above, deems a self-driving car unfit to deal with the realities and contingencies of actual traffic [5]. Knowingly surrendering the important responsibility of controlling what happens in traffic is equivalent to ignoring the moral duty to try and make sure things happen in good and justifiable ways. Not programming automated vehicles to respond to ethically loaded dilemmas is unacceptable.

Some may argue that it might seem like a good idea to transfer control to the people in the car in any or all situations where accidents are likely or unavoidable. However, human reaction-times are much slower than computers. Natural human reaction can be panicky and erratic. Therefore, handing over control to human passengers is not the best option [8]. Even in situations of inevitable collisions, self-driving technology is much more adept at handling *how* to crash.

Based on sensor inputs and other prevalent information collected by self-driving technology, AVs are able to enable significant choices and control-levels regarding how the vehicle responds to certain situations. It can calculate the most likely consequences of different trajectories that involve combinations of braking and swerving [8]. There’s no doubt that it is much more reliable to have a computer react rather than a human,

but the question is, who decides how these algorithms are coded, or in simpler terms, how the computer responds? The answer is the manufacturers and engineers who build and engineer the vehicles.

However, if there are laws regulating the way these vehicles are engineered, those who create the legislation are indirectly yet completely responsible. As aforementioned, laws get incredibly muddled when individual states or manufacturers create their own rules. Variance between different accident algorithms could conflict with each other and even augment the problem instead of solving it. Allowing individual passengers to choose their own ethics setting is also very risky as well. It is very likely that adjustable ethics may lead to morally troubling situations. For instance, targeting black people over white people, poor people over rich ones, or gay people over straight [4]. Unfortunately, we cannot guarantee that people will always have good intentions. Thus, the responsibility should lie on the shoulders of those we have elected to represent us – the government.

## **VI. Implementing and Enforcing a Mandatory Ethics Setting**

Adopting a mandated ethics setting for all self-driving car technology is by far the best solution. This ethics setting will simply be a set of laws enforced by the governments. Under these laws, self-driving cars will be required to comply with predetermined and standardized ethical settings decided by a group of educated professionals in the field. Utilitarians may object that not giving passengers or autonomous vehicle owners the autonomy to choose the crash algorithms of their cars is wrong, but the more important thing to keep in mind is the safety of all passengers on the road. The goal is to minimize the harm for all people affected. To maximize traffic safety, the government must introduce a new industry standard for automated cars that binds manufacturers directly [4].

This standardized ethics setting must be enforced on a federal level at the very least. As previously stated, having individual states create their own laws regarding self-driving technology quickly becomes disorganized and confusing. Having only a fraction of all fifty states enforcing rules and regulations results in many dangerous inconsistencies that may cause fatal conflicts. This is why the NHTSA is the perfect organization to create and enforce laws regarding automated cars. Similar to how there are Federal Motor Vehicle Safety Standards, there should be federal self-driving car ethics standards in place to keep manufacturers in check. To minimize harm for all lives, creating a standardized ethics setting is the most efficient and effective course of action.

There should not only be a solid legal framework in place for AVs on a federal level, but also an international level. The United States is not the only country developing and test self-driving technology, and the law should reflect this. A good way to initiate this kind of diplomacy would be to bring this issue into the spotlight at the International Transport Forum (ITF), which continually aims to advance the global transport policy agenda. Even though the ITF does not have any legal power, they still hold a great amount of influence in the way many countries around the world are regulating their traffic safety. By creating conversation and awareness around the issue of programming ethics into self-driving vehicles, an industry standard for ethics settings of all self-driving cars can in time be enforced. Once all self-driving cars are able to follow these laws, they can be deemed safe for the road.

## **VII. Conclusion**

Self-driving cars are on the verge of revolutionizing the transportation industry. As these technologies keep advancing and making their way into society, many concerns have arisen despite the many advantages AVs promise to provide. One aspect of self-driving cars that generally remains unregulated is programming ethics for collisions. There are several dilemmas that arise in situations where collisions are unavoidable, which is highlighted by the trolley problem. After considering possible solutions, it is obvious that most effective solution is to create a mandatory ethics setting for all autonomous vehicles. By having the government enforcing this ethics setting through the NHTSA, the many complex issues that come with programming morality in self-driving cars can be avoided, and thus, fewer lives lost.

## VIII. Works Cited

1. Belay, Nick. "Robot Ethics and Self-Driving Cars: How Ethical Determinations in Software Will Require a New Legal Framework." *Journal of the Legal Profession*, vol. 40, no. 1, 2015, pp. 119–130.
2. Bonnefon, Jean-François, et al. "The Social Dilemma of Autonomous Vehicles." *Science (New York, N.Y.)*, vol. 352, no. 6293, 2016, p. 1573., doi:10.1126/science.aaf2654.
3. Fagnant, Daniel J., and Kara Kockelman. "Preparing a Nation for Autonomous Vehicles: Opportunities, Barriers and Policy Recommendations." *Transportation Research Part A*, vol. 77, 2015, pp. 167–181., doi:10.1016/j.tra.2015.04.003.
4. Gogoll, Jan, and Julian F. Muller. "Autonomous Cars: In Favor of a Mandatory Ethics Setting.(Report)." *Science and Engineering Ethics*, vol. 23, no. 3, 2017, p. 681., doi:10.1007/s11948-016-9806-x.
5. Goodall, Noah J. "Can You Program Ethics into a Self-Driving Car?" *Spectrum, IEEE*, vol. 53, no. 6, 2016, pp. 28–58., doi:10.1109/MSPEC.2016.7473149.
6. Hanna, Mina J., and Shawn C. Kimmel. "Current US Federal Policy Framework for Self-Driving Vehicles: Opportunities and Challenges." *Computer*, vol. 50, no. 12, 2017, pp. 32–40., doi:10.1109/MC.2017.4451211.
7. Kornhauser, Al. "Transportation Engineering and SmartDrivingCars A Perspective on the New Federal Automated Vehicles Policy." *Ite Journal-Institute Of Transportation Engineers*, vol. 86, no. 11, 2016, pp. 11–13.
8. Nyholm, Sven, and Jilles Smids. "The Ethics of Accident-Algorithms for Self-Driving Cars: an Applied Trolley Problem?" *Ethical Theory and Moral Practice*, vol. 19, no. 5, 2016, pp. 1275–1289., doi:10.1007/s10677-016-9745-2.
9. Smith, Bryant Walker, Automated Vehicles Are Probably Legal in the United States (2014). 1 Tex. A&M L. Rev. 411 (2014). Available at SSRN: <https://ssrn.com/abstract=2303904> or <http://dx.doi.org/10.2139/ssrn.2303904>
10. "Waymo." Waymo, waymo.com/.