

# **Autonomous Vehicles: Society's Most Anxiety Inducing Potential Life Saver**

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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## **Introduction**

According to *The Global Burden Of Disease Study 2019*, published in *The Lancet*, road injuries were ranked as the leading cause of global disability-adjusted life years lost and the leading cause of death amongst young people worldwide (Vos, 2019, p. 1204). A large majority of these accidents are a result of human error. This includes, but is not limited to, drivers texting, eating, speeding, or driving under the influence. Many attempts have been made to limit traffic deaths and distracted driving, but none of these efforts compare in potential efficacy to autonomous vehicles. Early autonomous vehicle data suggests that they have the potential to eliminate accidents as a result of human error and drastically decrease traffic accidents and deaths. The problem with implementing autonomous vehicles has been societal anxiety and apprehension about these vehicles, primarily citing concerns regarding loss of autonomy and safety. Most technologies are met with a degree of anxiety and concern that is eventually overcome, but the first step is garnering enough trust to get the ball rolling. In the case of autonomous vehicles, which have been in production for nearly 20 years, this process is moving slower than others. The public's concerns are understood, but they are concerns that prior technology such as social media and trains have experienced in the past and overcame. So the question remains, why have these concerns persisted with autonomous vehicles? This research aims to answer this question by comparing concerns faced by trains and social media with those of autonomous vehicles to help identify potential aids to alleviate societal anxiety regarding autonomous vehicles. While autonomous vehicles are not claimed to be perfect, early data suggests that they have the potential to significantly decrease accidents compared to current methods of personal transportation. Therefore, the longer their implementation is delayed, the more the problem of vehicle deaths will worsen. A 2023 article in *Forbes* magazine detailing car accident statistics for 2023 indicated that between 2019 and 2020 there was a 7% increase in

fatal car accidents(Beiber, 2023, How Many Fatal...). This is further highlighted in a 2017 report from the Rand Corporation by Nidhi Kalra and David G. Groves summarizing the effects of their delayed implementation when it says “From a utilitarian standpoint, it seems sensible that HAVs should be allowed on U.S. roads once they are judged safer than the average human driver so that the number of lives lost to road fatalities can begin to be reduced as soon as possible...Yet waiting for HAVs that are many times safer than human drivers misses opportunities to save lives. It is the very definition of allowing perfect to be the enemy of good” (Kalra and Groves, 2017, p. ix). In this paper, I argue that the key reason that autonomous vehicle skepticism has persisted longer than that of social media and trains is not because of autonomy or safety concerns alone, but rather the loss of autonomy over one's safety.

### **Not All Technological Concerns are Created Equal**

#### *The Consequences of Current Personal Transportation*

The current transportation systems in the United States, and worldwide, have several glaring flaws that policymakers and innovators have been attempting to address for years. The primary issue that needs to be addressed is the growing number of car accidents and deaths each year. According to the Centers for Disease Control and Prevention, traffic accidents are among the leading causes of non-natural death in U.S. citizens and account for 1.35 million deaths on average worldwide(CDC, Global Road Traffic..., 2023). While the loss of human life is far and away the main concern, many other consequences are imposed on the public as a result of these accidents as well. In the National Highway Traffic Safety Administration’s(NHTSA) budget estimates submitted to Congress in 2020, it was estimated that the motor vehicle crashes imposed \$836 billion in U.S. economic costs and societal harm in 2010 alone(Parker, 2020, p.2). The problem is that since 2010 not only has the situation not improved, but it has worsened. As these

numbers continue to grow they raise questions as to why these accidents are happening so frequently in the first place and the answer is quite clear: human error.

### *Human Flaws Behind the Wheel*

Human error is a given factor in any realm of human endeavor. It becomes a serious cause of concern and requires significant attention when safety is at risk due to human error, which is often the case when a human is behind the wheel of a motor vehicle. Human cognitive biases such as overconfidence and limited attention span can lead to multitasking and distraction while behind the wheel which in turn leads to serious road injury. According to the USDOT, 94% of vehicle accidents come at the hands of human error(Chao, 2017, p.i). This includes, but is not limited to, speeding, texting, eating, and driving while under the influence. So even without the introduction of substances human error is already a major concern, but add alcohol to the equation and safety concerns skyrocket. 35% of all fatal motor vehicle accidents occur as a result of driving while impaired and 29% of all fatal car accidents occur as a result of speeding(Beiber, 2023, How Many Accidents Involve...). Attempts have of course been made to bottleneck these concerns by implementing stricter penalties for distracted and impaired drivers, but human error can never be completely eradicated so these problems will always exist while humans are behind the wheel. However, in the last decade, autonomous vehicle development has shown a great deal of promise as a potential solution to this problem.

### *Autonomous Vehicle's Potential Upside*

Since the beginning of the development of autonomous vehicles, the topic has drawn massive interest for a multitude of reasons. Two topics of discussion have become most prominent surrounding their development, the first being the potential public health benefits they

bring. According to Janet Fleetwood's journal article *Public Health, Ethics, and Autonomous Vehicles*, autonomous vehicles have the potential to save nearly 30,000 lives per year in the United States, shifting the focus from the minimization of post-crash injury to collision prevention entirely (Fleetwood, 2017, Abstract). She also points out that these vehicles have the potential to save up to 10 million lives per decade, potentially making them one of the greatest health advances of the 21st century (Fleetwood, 2017, Abstract). This potential was realized back in 2009 when then-President Barack Obama proposed spending \$4 billion to "accelerate the acceptance" of autonomous vehicles in the United States (Fleetwood, 2017, Abstract). Since then, development has made massive leaps forward in making that potential a reality. A 2020 article in the *Journal of Advanced Transportation* titled "Safety of Autonomous Vehicles" by Jun Wang explores the safety benefits and concerns surrounding autonomous vehicles. Zhao found that from 2014 to 2018 over 3.7 million miles have been tested by autonomous vehicles from various manufacturers and in that time 128 accidents were recorded (Wang, 2020, p. 1). Out of the 128 recorded accidents, 94% (the same number caused by human error to date) were attributed to actions by external parties, such as pedestrians, motorcyclists, or conventional vehicles (Wang, 2020, p. 1). The reality of this continued development and the promise it shows is that autonomous vehicles are coming sooner rather than later. However, skepticism from a majority of the population remains an obstacle that needs to be addressed before it can make a significant impact.

### *Fear of Autonomous Vehicles Juxtaposed with Those of Social Media and Trains*

Historically, society has maintained a healthy amount of skepticism when faced with massive technological innovations. Joel Mokyr states in his journal article, *The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different?*,

“Technology is widely considered the main source of economic progress, but it has also generated cultural anxiety throughout history. From generation to generation, literature has often portrayed technology as alien, incomprehensible, increasingly powerful and threatening, and possibly uncontrollable.” (Mokyr, 2015, p.31). Autonomous vehicles have induced anxiety as well, but it has lasted much longer in comparison with prior technologies. Autonomous vehicle development has been in progress for nearly two decades, even being partially implemented in active vehicles such as Teslas, and skepticism is still very high. According to a 2022 article from the Pew Research Center titled “AI and Human Enhancement: Americans’ Openness is Tempered by a Range of Human Concerns”, 44% of Americans still believe that the widespread usage of autonomous vehicles would be a bad thing for society (Rainie, 2022, Americans Cautious About...). Additionally, in a 2017 study conducted by the Pew Research Center titled “Automation in Everyday Life” 56% of Americans stated they would not ride in autonomous vehicles if given the chance (Smith, 2017, Americans Attitudes Towards...). This skepticism has largely stemmed from two primary concerns: loss of autonomy and safety. However, social media has faced significant concerns regarding its encroachment on personal autonomy, and trains induced significant anxiety regarding their safety, yet both are used by billions worldwide today. This suggests that these two concerns alone cannot be the sole reason for autonomous vehicles' continued skepticism.

Loss of autonomy is the primary voiced concern by the United States public regarding autonomous vehicles. Of the 56% of Americans who said they would not ride in an autonomous vehicle in the Pew Research Center study previously noted, 51% expressed that their top concern was the loss of control (Smith, 2017, Americans Attitudes Towards...). This is not the first time an emerging technology has experienced skepticism as a result of its invasion of individual

autonomy, the most prevalent example being social media. A 2018 study by the Pew Research Center titled “Americans’ Complicated Feelings About Social Media in an Era of Privacy Concerns” indicates that 91% of Americans believe that people have lost control over how personal information is collected and used, and 80% of social media users were concerned about advertisers and businesses having access to their data(Rainie, 2018, People Worry About...). Additionally, social media platforms steal their users' autonomy by controlling their attention, their behavior, and the use of their data(Sahebi, 2022, p.5). Despite this, social media usage grew by 3.2% year-over-year in 2023 and people are more rapidly joining new social media platforms each year(Nyst, 2023, Social Media Statistics...). The time to reach 1 million users for different social media platforms is illustrated in Figure I, and the time decrease has been exponential over the last 30 years(Cox, 2023).



**Figure I.** Time to 1 Million Users. This graphic was used by the Daily Mail in an article detailing the diminishing time required for media platforms to hit 1 million users(Cox, 2023)

Considering this data, it becomes apparent that the loss of autonomy alone cannot be the sole reason for societal apprehension toward autonomous vehicles.

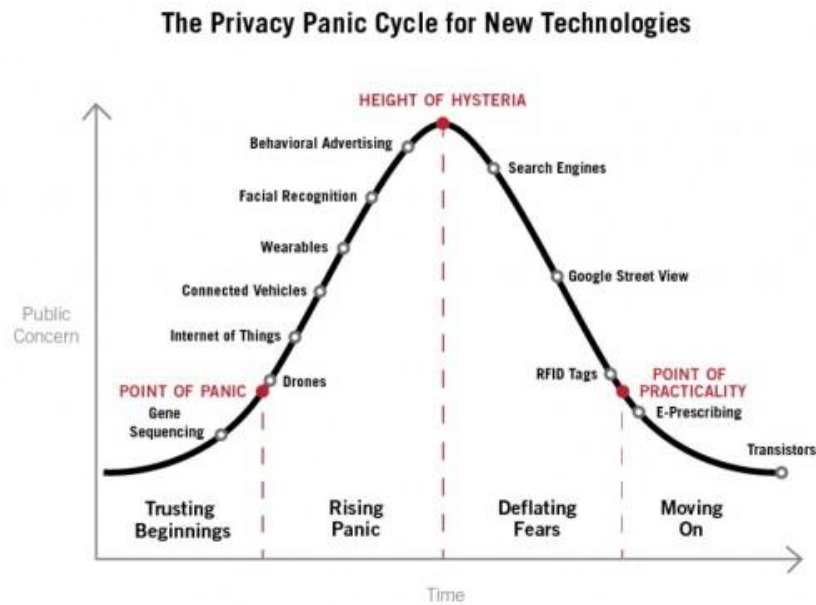
The second leading concern expressed by Americans who would not ride in an autonomous vehicle was safety at 30% of those surveyed by the Pew Research Center (Smith, 2017, Americans Attitudes Towards...). A technology that experienced a similar fear in regards to safety early on was the train. The primary concern of trains regarding their safety was their speed. The primary methods of long-distance transportation at the time were horse-drawn carriages and canal boats reaching speeds of 4-6 mph. Conversely, early steam trains were able to travel at upwards of 60 mph (Stacey, 2003, Terror of Trains). While trains killed far fewer people than accidents of the time such as shipwrecks and overturned carriages, train wrecks struck people as more deadly and horrific. This was conveyed through the media as well as with newspaper publications such as the New York Times and the New York Herald describing the grotesque nature of the injuries and burns suffered by accident victims. The impact on everyday life was also highlighted in a British magazine following a local accident, with the magazine citing the "nearness to us all" (Stacey, 2003, Terror of Trains). Despite the propaganda and initial fear, the public eventually overcame its apprehension of trains, and today, the annual user base of trains is nearly 1 billion people (Key, 2023, Number of Users...). Considering this data, trains are evidence that the public can overcome early safety concerns when presented with evidence to the contrary that they do not exist. Additionally, early autonomous vehicle data indicates that safety is not a point of concern, but a strength, and yet societal apprehension is still very high. Given that the two largest concerns the public has met autonomous vehicles with have been overcome by other technologies with the same concern, why are people still unwilling to adopt autonomous vehicles? What assurances and information are they lacking? How are these situations different? The reality is that anxiety surrounding autonomous vehicles exists not as a result of loss of autonomy or safety concerns, but rather both in unison.



Autonomous vehicles are the first technological innovation in which human beings would have to surrender direct control of their physical safety to the decision-making processes of a computer. Despite this, there is no definitive published decision-making process or regulations regarding autonomous vehicle algorithms when faced with ethical dilemmas regarding passenger and civilian safety. The significance of this issue is expressed in the journal article *The Social Dilemma of Autonomous Vehicles* by Jean Bonnefon when he says “For the time being, there seems to be no easy way to design algorithms that would reconcile moral values and personal self-interest, let alone across different cultures with differential attitudes to life-life tradeoffs”(Bonnefon, 2016, p.8). Bonnefon goes on to highlight the struggle between whether autonomous vehicles should prioritize utilitarianism or self-interest when faced with ethically challenging situations. This is further highlighted by the National Highway Traffic Safety Administration in a 2020 report in which they stated “Ethical considerations are essential to automated driving technology development. However, currently, there is no consensus around acceptable ethical decision-making given the depth of the element is not yet understood nor are there metrics to evaluate against”(NHTSA, 2020, What is NHTSA’s Approach...). To come to this realization I had to first understand the base-level challenges that autonomous vehicles would have to overcome in comparison with prior technologies that experienced the same challenges. Understanding what challenges had been overcome previously made it significantly clearer to identify the true gap in research and knowledge that autonomous vehicle research and policymaking would have to address for their implementation to be more readily embraced.

## **Use of Historical Comparison to Identify Existing Solutions to Autonomous Vehicle Fears and Identify Undeveloped Areas of Research**

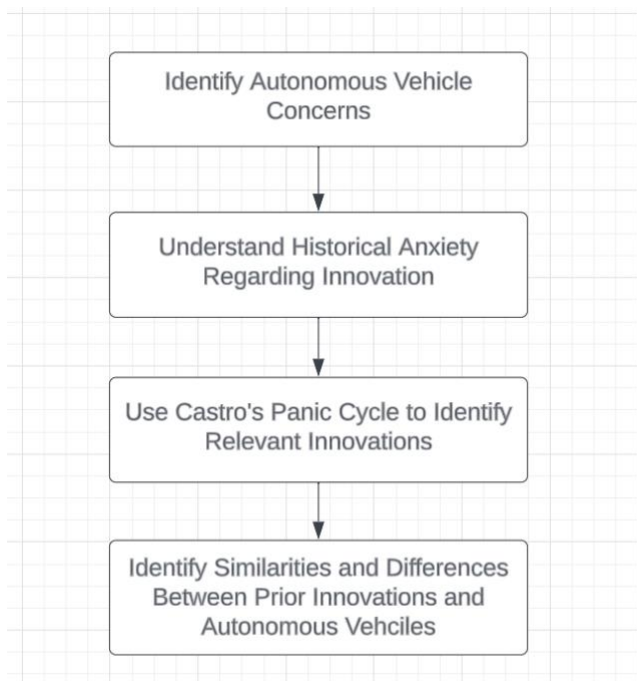
The research approach applied in developing this paper was a historical comparison of autonomous vehicles' primary public concerns with those experienced by large technological innovations in the past, specifically trains and social media. This was a multi-step process that first involved identifying the most prominent spoken concerns of autonomous vehicles. This was accomplished by analyzing the relevant emerging data regarding people's most spoken concerns about autonomous vehicles. This included released research and data from developers of autonomous vehicles, data collected from independent research studies and surveys, and research articles and journals discussing the benefits and drawbacks of autonomous vehicle implementation. Once these were identified, the next step of my research approach was examining the history of technological anxiety in hopes of identifying technologies that experienced similar concerns to that of autonomous vehicles. This mainly consisted of researching content regarding the history of technological anxiety. In the process of gathering prevalent data, a research article titled "The Privacy Panic Cycle: A Guide to Public Fears About New Technologies" by Daniel Castro was discovered. This article demonstrated the general rise and fall of public anxiety in response to innovations, resulting in eventual acceptance. The cycle of fears experienced in response to new technology is illustrated in the graph from Castro's article in Figure 2.



**Figure 2.** The Privacy Panic Cycle(Castro, 2015). This graph demonstrates the path of rising panic and subsequent calming and acceptance experienced by new technologies

Castro describes the rise of fear, and eventual acceptance, in response to technological development when he says “Fears continue to climb until public understanding about the technology and its benefits reaches a tipping point. Various external factors, such as changes in the level of adoption and use of the technology, or disillusionment when fears never materialize, can affect when this tipping point occurs... Eventually the public dismisses the concerns associated with the technology. This occurs as the technology becomes increasingly commonplace and interwoven into society”(Castro, 2015, p.4-5). Castro highlights the impact of the media and policymakers on generating early hysteria by exaggerating and promoting the concerns surrounding innovations to garner recognition, leading to rising panic and anxiety within their spheres of influence. Considering that the goal of this paper is to identify prior technological advancements that faced similar concerns to those of autonomous vehicles and have since gained acceptance, this article offers a framework for categorizing such technologies'

stages of development and concerns at each stage. Understanding this cycle helped to focus the scope of my research in the next step, which was to identify a form of transportation that had experienced physical safety concerns and a modern computational technology that took autonomy away from its user. This involved evaluating prior technologies that followed Castro's cycle and shared similar concerns to those of autonomous vehicles in the early stages of their cycle. Once these technologies were identified, the final stage of my research approach consisted of identifying how these prior technologies overcame their concerns, as well as comparing and contrasting their concerns with those of autonomous vehicles. This primarily involved evaluating evidence about trains and social media's early development and concerns in search of similarities and differences to autonomous vehicle development. This process, highlighted in Figure 3, was highly effective because it provided a framework that allowed for the relevant evidence to be focused on, resulting in a much greater deal of clarity regarding the differences between autonomous vehicle development with prior technologies.



**Figure 3.** Analytical Research Approach (Created by Author)

## **What the Differences Between Trains, Social Media, and Autonomous Vehicles Highlight For the Future**

Upon analyzing the relevant evidence, social media and trains emerged as the most relevant technologies to provide insight into society's ability to overcome the loss of autonomy and safety concerns. Social media's concerns surrounding autonomy are persistent to this day, and trains' early concerns about physical safety were as prevalent as those for autonomous vehicles in their early stages, but both of these technologies overcame these concerns and are now spread worldwide with billions of users. This highlights that autonomy and safety alone cannot be what is causing lasting skepticism of autonomous vehicles, and the answer lies in the variations between the concerns of autonomous vehicles, social media, and trains.

Social media's autonomy concerns are largely regarding control of attention and data, while autonomous vehicles' autonomy concerns are regarding control over one's physical safety. Additionally, autonomy concerns surrounding social media were not widely known during its early development. By the time these concerns became common knowledge, social media had already established itself as an integral part of society, making it difficult for these concerns to dissuade people from its usage. Trains followed a trajectory similar to that outlined by Castro, wherein initial irrational fears were fueled by media outlets. However, as the smoke cleared and the benefits and true safety of trains became apparent through gradually increased use, they gained widespread acceptance. Additionally, trains operate on a set of tracks, so their direction and decision-making process when faced with an ethically difficult decision regarding safety is set in stone. This highlights that the primary reason that autonomous vehicles cause autonomy concerns is not the loss of autonomy itself, but the loss of autonomy over one's safety. Conversely, this highlights that the primary reason autonomous vehicles cause safety concerns is

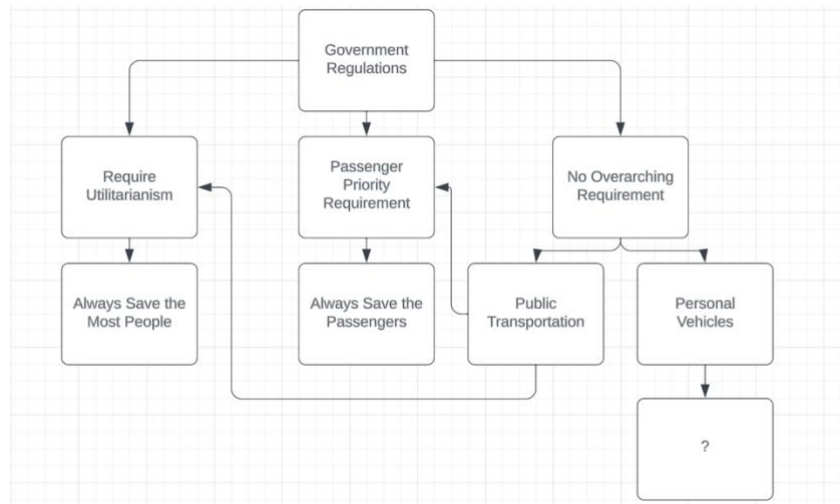
not because they are unsafe, but because they will have to make decisions about their passengers' physical safety, unlike that of a train. So the true concern that needs to be alleviated does not lie in the loss of autonomy, or safety improvement, but rather in the two in unison

### *Getting the Ball Rolling*

Castro suggests that as technology becomes more integrated into society, people become more willing to accept its benefits and forget about the concerns that were previously limiting its implementations. Trains and social media both followed this cycle and as they gained an initial user base they gradually began to spread as people were exposed to their benefits, and recognized that their concerns were not practical. This highlights that the first step with autonomous vehicles is providing enough resources and information to prospective users to acquire the first generation of users so that people may become further exposed to their benefits. Given that the primary concern that needs to be alleviated is about autonomy over one's safety, a good place to start would be to address the lack of information regarding their decision-making algorithms when faced with ethically tricky situations, highlighted by Bonnefon and the NHTSA.

Developing an ethical autonomous algorithm will require a great deal of infrastructure and planning. The primary ethical dilemma autonomous vehicle developers will face is one of utilitarianism vs self-interest according to Bonnefon. This scenario will be raised when an autonomous vehicle is faced with the decision of saving the most lives possible or saving its passengers. To take ethical action, developers will have to consider two sets of factors for each judicial region they intend their cars to operate: government regulations and public opinion. In doing so, it allows them to create a decision-making process that is ethical for whichever environment in which it is operating. For the vehicles to legally be allowed to operate, they need to first adhere to government regulations in the region of operation. Where there is a sticking

point is when there is not a concrete set of regulations mandating utilitarian action or action of self-interest. Figure 4 shows the basic conditions that developers will be operating under, and where their focus needs to be applied, which is regarding when ethically difficult situations for personal transportation are left under their purview. In these situations, developers will need to



**Figure 4.** Autonomous Vehicle Developer’s Key Area of Focus(Created by author)

decide as to whether vehicles will take a universal utilitarian approach, a universal passenger-first approach, a nuanced approach dependent upon region, or leave the decision up to the consumer. I suggest that whatever approach they decide upon will be in the interest of alleviating the anxieties of the greatest number of potential consumers. Once these processes have been decided, I recommend that autonomous vehicle manufacturers publish and advertise their decision-making processes to consumers. While this may not eliminate skepticism entirely, greater clarity over how passenger safety will be managed may help to encourage the first generation of users to take the leap and buy an autonomous vehicle. Acquiring this first generation of users will be essential in following in the footsteps of trains and social media by gradually being introduced over time. Introducing them gradually, first in purely hybrid forms to increase consumer exposure, will lead to greater fully autonomous vehicle adoption over time,

but will at least aid to get the ball rolling. As the first set of hybrid models is purchased, more people will gain experience with autonomous vehicles, and the benefits will become increasingly clear. Consumer skepticism is likely to fade over time as a result, increasing the number of users, and compounding the trend toward widespread adoption. Assuming data regarding autonomous vehicle safety holds when implemented on a larger scale, the disparity between accidents and deaths as a result of human error and autonomous vehicles will grow until there is not much of a choice as to which form of transportation is truly safer.

## **Conclusion**

In this paper, I argue that the key distinction between autonomy and safety concerns related to autonomous vehicles and those experienced by trains and social media is that, in the latter two examples, these concerns were experienced independently, whereas, for autonomous vehicles, they overlap. This was determined by analyzing current concerns about autonomous vehicles, historical relations with technological anxiety, historical concerns about social media and trains, what led to these historical technologies' eventual acceptance, and comparing these factors. This literature review displayed that while loss of autonomy and safety were concerns for social media and trains respectively, they had been overcome in each of their cases by gradual exposure leading to dissipating concern and increased use. Autonomous vehicles are not at this stage of implementation at the moment because the autonomy concerns for autonomous vehicles are concerns about control of individual safety, and the safety concerns are in regards to how these vehicles will make safety decisions, hence the overlap of the two. To get to this stage, skepticism needs to be alleviated in enough consumers to get autonomous vehicles into circulation so that gradual exposure may begin. To get there, the public will need more assurances than prior technologies did because it is the first time that individuals will be giving



up direct autonomy over their physical safety to a computer-operated system on such a large scale. Given that there is currently no consensus on ethical autonomous decision-making algorithms, this is a good place for developers to focus on so that consumers may have a better understanding of how their safety is being handled in hopes of alleviating their anxieties. This process will require a great deal of funding, manpower, and time to collect relevant data from prospective consumers. However, if successful, the benefits on the back end will include a decrease in losses to the economy as a result of accidents and a decrease in road deaths. While this certainly is not the only course of action that needs to be taken to reduce anxiety caused by autonomous vehicles, it is a key step to increase consumer comfort and understanding of autonomous vehicles.

# References

- Anderson, A. S. and M. (2017, October 4). 3. Americans' attitudes toward driverless vehicles. *Pew Research Center: Internet, Science & Tech.*  
<https://www.pewresearch.org/internet/2017/10/04/americans-attitudes-toward-driverless-vehicles/>
- Automated Driving Systems* | Parker, Cynthia. (n.d.). [Text]. Retrieved December 2, 2023, from <https://www.nhtsa.gov/vehicle-manufacturers/automated-driving-systems>
- Bonnefon, J.-F., Shariff, A., & Rahwan, I. (2016). The social dilemma of autonomous vehicles. *Science*, 352(6293), 1573–1576. <https://doi.org/10.1126/science.aaf2654>
- Car Accident Statistics For 2023 – Forbes Advisor*. (n.d.). Retrieved November 3, 2023, from <https://www.forbes.com/advisor/legal/car-accident-statistics/>
- Castro, D., & McQuinn, A. (2015). *The Privacy Panic Cycle: A Guide to Public Fears About New Technologies*. <https://www2.itif.org/2015-privacy-panic.pdf>
- CDC. (2023, January 10). *Road Traffic Injuries and Deaths—A Global Problem*. Centers for Disease Control and Prevention. <https://www.cdc.gov/injury/features/global-road-safety/index.html>
- Drunk Driving Car Accidents by Time of Day*. (n.d.). Retrieved November 3, 2023, from <https://datawrapper.dwcdn.net/ZBchp/3/>
- Exploring the implications of autonomous vehicles: A comprehensive review—PMC*. (n.d.). Retrieved October 30, 2023, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8885781/>
- Global: Trains number of users 2018-2027*. (n.d.-a). Statista. Retrieved November 9, 2023, from <https://www.statista.com/forecasts/1033357/number-of-users-in-the-trains-market-worldwide>

- Grenham, H. (2020). The mechanical monster and discourses of fear and fascination in the early history of the computer. *Humanities and Social Sciences Communications*, 7(1), Article 1. <https://doi.org/10.1057/s41599-020-00650-4>
- Journey into Fear: Nineteenth Century Travel, Transportation, and the Disquieting Effects of Change* - ProQuest. (n.d.). Retrieved October 30, 2023, from <https://www.proquest.com/docview/2033432435?pq-origsite=gscholar&fromopenview=true>
- Kalra, N., & Groves, D. G. (2017). *The Enemy of Good: Estimating the Cost of Waiting for Nearly Perfect Automated Vehicles*. RAND Corporation. [https://www.rand.org/pubs/research\\_reports/RR2150.html](https://www.rand.org/pubs/research_reports/RR2150.html)
- Mokyr, J., Vickers, C., & Ziebarth, N. L. (2015). The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? *Journal of Economic Perspectives*, 29(3), 31–50. <https://doi.org/10.1257/jep.29.3.31>
- Moore, T. (2023, August 9). *Fatal car crash statistics 2023*. USA TODAY Blueprint. <https://www.usatoday.com/money/blueprint/auto-insurance/fatal-car-crash-statistics/>
- Nadeem, R. (2022, March 17). 4. Americans are cautious about the deployment of driverless cars. *Pew Research Center: Internet, Science & Tech*. <https://www.pewresearch.org/internet/2022/03/17/americans-cautious-about-the-deployment-of-driverless-cars/>
- Nyst, A. (2023, July 14). *134 Social Media Statistics You Need To Know For 2023*. Search Engine Journal. <https://www.searchenginejournal.com/social-media-statistics/480507/>
- Othman, K. (2022). Exploring the implications of autonomous vehicles: A comprehensive review. *Innovative Infrastructure Solutions*, 7(2), 165. <https://doi.org/10.1007/s41062-022-00763-6>

- Pettigrew, S., Talati, Z., & Norman, R. (2018). The health benefits of autonomous vehicles: Public awareness and receptivity in Australia. *Australian and New Zealand Journal of Public Health*, 42(5), 480–483. <https://doi.org/10.1111/1753-6405.12805>
- Rainie, L. (n.d.). Americans' complicated feelings about social media in an era of privacy concerns. *Pew Research Center*. Retrieved December 1, 2023, from <https://www.pewresearch.org/short-reads/2018/03/27/americans-complicated-feelings-about-social-media-in-an-era-of-privacy-concerns/>
- Sahebi, S., & Formosa, P. (2022). Social Media and its Negative Impacts on Autonomy. *Philosophy & Technology*, 35(3), 70. <https://doi.org/10.1007/s13347-022-00567-7>
- Social Media Statistics Details—Undiscovered Maine—University of Maine. (n.d.). *Undiscovered Maine*. Retrieved November 9, 2023, from <https://umaine.edu/undiscoveredmaine/small-business/resources/marketing-for-small-business/social-media-tools/social-media-statistics-details/>
- Terror Of Trains*. (n.d.). AMERICAN HERITAGE. Retrieved December 1, 2023, from <https://www.americanheritage.com/terror-trains>
- The top 10 causes of death*. (n.d.). Retrieved October 30, 2023, from <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
- Thomas, E., McCrudden, C., Wharton, Z., & Behera, A. (2020). Perception of autonomous vehicles by the modern society: A survey. *IET Intelligent Transport Systems*, 14(10), 1228–1239. <https://doi.org/10.1049/iet-its.2019.0703>
- Trains, terror, and technological change: 19th-century hysteria about railways*. (n.d.). History Skills. Retrieved November 9, 2023, from <http://www.historyskills.com/classroom/year-9/steam-train-fears/>

User preferences regarding autonomous vehicles. (2017). *Transportation Research Part C: Emerging Technologies*, 78, 37–49. <https://doi.org/10.1016/j.trc.2017.01.010>

Vos, T., Lim, S. S., Abbafati, C., Abbas, K. M., Abbasi, M., Abbasifard, M., Abbasi-Kangevari, M., Abbastabar, H., Abd-Allah, F., Abdelalim, A., Abdollahi, M., Abdollahpour, I., Abolhassani, H., Aboyans, V., Abrams, E. M., Abreu, L. G., Abrigo, M. R. M., Abu-Raddad, L. J., Abushouk, A. I., ... Murray, C. J. L. (2020). Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*, 396(10258), 1204–1222. [https://doi.org/10.1016/S0140-6736\(20\)30925-9](https://doi.org/10.1016/S0140-6736(20)30925-9)

Wang, J., Zhang, L., Huang, Y., & Zhao, J. (2020). Safety of Autonomous Vehicles. *Journal of Advanced Transportation*, 2020, e8867757. <https://doi.org/10.1155/2020/8867757>