

### Annotated Bibliography

[1]BBC, "Can we banish the phantom traffic jam?," in *BBC*, 2016. [Online]. Available: <http://www.bbc.com/autos/story/20160428-how-ai-will-solve-traffic-part-one>. Accessed: Oct. 28, 2016.

This article discusses how traffic is currently affected by human operated vehicles and how it could be improved by autonomous vehicles. The main idea is that autonomous cars would be able to communicate with each other and therefore coordinate how they move. In this way, all cars at a stop light could accelerate at the same time rather than one after the other which greatly impacts the flow of traffic. This is just one of the several advantages of autonomous cars that will be discussed in my paper.

[2]B. Berman, "Tesla drivers test Autopilot features and the results are scary," *MIT Technology Review*, 2016. [Online]. Available: <https://www.technologyreview.com/s/542651/drivers-push-teslas-autopilot-beyond-its-abilities/>. Accessed: Oct. 30, 2016.

Tesla's autopilot is a automated driving system which is meant to be used to assist drivers on the road and not as a fully autonomous car. Currently, it is designed to be used for highway driving and the driver needs to be ready to take over if the software gets confused or makes a mistake. However, people are trying to use the software as an autonomous system which is resulting in dangerous driving and near crashes. In this way, while Google is trying to build an autonomous car right away, Tesla is slowing implementing new features which will eventually lead to a self-driving car. This is an important distinction which will be explained in my research paper along with how it relates to the dangers of current self-driving cars.

[3]A. Budisteanu, "Using Artificial Intelligence to create a low cost self-driving car". [Online]. Available: <http://budisteanu.net/Download/ISEF%202%20Autonomous%20car%20Doc%20particle.pdf>. Accessed: Oct. 30, 2016.

Budisteanu goes into depth about what technology is behind the ability for cars to drive themselves. He begins with talking about traffic accidents and why it is important that autonomous cars become available to the public. The paper then goes more into depth on how certain aspects of the car function such as traffic lane recognition and GPS software. The layout of this article is very similar to what I want to try to accomplish in my paper and will therefore serve as a kind of guide for part of my research.

[4]D. Dudley, "Google self-driving car perfect for elderly drivers," in *AARP*, 2015. [Online]. Available: <http://www.aarp.org/home-family/personal-technology/info-2014/google-self-driving-car.html>. Accessed: Oct. 28, 2016.

Another advantage of autonomous cars is that they give people who are unable to drive or for whom it is unsafe to drive a means of personal transportation. This article focuses on the elderly and how as a person gets older, their reactions and vision normally deteriorate and therefore so does their driving abilities. This results in either a greater probability of crashes or otherwise the person has to give up driving and therefore the freedom they had from being able to do so. This can then be extrapolated to people that have never been able to drive such as people that were born blind. This is an advantage of autonomous cars that is normally not talked about as often as some other more obvious ones.

[5]A. Essex and G. Dubois, "Self-driving vehicles legislation," 2016. [Online]. Available: <http://www.ncsl.org/research/transportation/autonomous-vehicles-legislation.aspx>. Accessed: Nov. 1, 2016.

This article was written by the National conference of State Legislatures and it shows the different laws that are currently in place for each state in terms of the use of autonomous vehicles. Most states allow autonomous vehicles to be used with the requirement that a person has to be sitting in the car. Some states such as California and Nevada, however, allow autonomous cars to be without pedals, steering wheels and passengers as long as some other requirements are met. This is helpful for my research because it shows that a lot of new legislation will have to be passed in order for autonomous cars to be viable which will, more than likely, take some time.

[6]L. Gomes, "Google's self-driving cars still face many obstacles," *MIT Technology Review*, 2016. [Online]. Available: <https://www.technologyreview.com/s/530276/hidden-obstacles-for-googles-self-driving-cars/>. Accessed: Oct. 30, 2016.

While there are many potential advantages to self-driving cars, there are also a lot of obstacles that engineers face before they are completely viable for public use. This article describes some of these obstacles such as what happens if a new stop light doesn't show up on the car's map right away or the fact that current sensors can't differentiate between something like a rock and a crumpled piece of paper in the road. A lot of these sources focus on the advantages of autonomous cars whereas this one actually talks about why they may not be currently viable which is a large component of my research paper.

[7]N. J. Goodall, "Can you program ethics into a self-driving car?," in *IEEE Spectrum*, IEEE Spectrum: Technology, Engineering, and Science News, 2016. [Online]. Available: <http://spectrum.ieee.org/transportation/self-driving/can-you-program-ethics-into-a-selfdriving-car>. Accessed: Oct. 25, 2016.

In this article, Noah Goodall addresses the ethical implications of autonomous cars as a means of transportation. It details the ways in which a car could be programmed to respond to stimuli in an ethical way and the advantages and disadvantages of each. This includes options like programming cars to never break laws or only breaking them if they are at a certain level of confidence that they will not crash. The article also explains a few methods that Google has patented in order to manage some of these risks. This article fits well with my research paper because it shows some of the current concerns of autonomous cars in terms of ethics and a few ways in which to solve them.

[8]C. Isidore, "Delphi driverless car finishes 3,400 mile cross-country trip," in *CNN*, 2015. [Online]. Available: <http://money.cnn.com/2015/04/03/autos/delphi-driverless-car-cross-country-trip/>. Accessed: Oct. 30, 2016.

In April of 2015, An Audi SQ5 autonomously drove 3,400 miles from on a coast-to-coast trip through the US. Due to state laws, there was a person in the driver's seat for the whole trip but 99% of the drive was done in automated mode. The test was organized by auto parts maker Delphi in order to test some of its autonomous features. Along the way, the car encountered complicated situations but was able to face the majority of them on its own. This shows that while autonomous cars may not be currently viable for the public, the technology is getting closer every day.

[9]T. Jiang, S. Petrovic, U. Ayer, A. Tolani, and S. Husain, "Self-Driving Cars: Disruptive or Incremental?," in *Berkeley*, 2015. [Online]. Available: <http://cet.berkeley.edu/wp-content/uploads/Self-Driving-Cars.pdf>. Accessed: Oct. 25, 2016.

The main focus of this article is to discuss how autonomous car technology may develop in the future. It includes product names such as automated highway driving assistant and adaptive cruise control technology and which car manufacturers intend to introduce the technologies. It also estimates how the global market might be affected in the upcoming years. Finally, it details federal and state regulations for autonomous cars. The article talks about the developing technology behind autonomous cars which is an important part of my research paper.

[10]W. Knight, "The future of self-driving cars," *MIT Technology Review*, 2016. [Online]. Available: <https://www.technologyreview.com/s/520431/driverless-cars-are-further-away-than-you-think/>. Accessed: Oct. 30, 2016.

This article argues that, while autonomous car technology has been evolving, self-driving cars are still a long ways away. It starts by examining the need for autonomous cars in order to make the roadways safer. Knight then describes his experiences in several autonomous vehicles that he has driven in. As impressive as this technology is, however, there are still many hurdles to leap in order to reach full autonomy such as lowering expenses, passing new regulations and continuing to develop the artificial-intelligence required to function in complex situations. These arguments are important to my research as they present an alternate view to a lot of articles which seem to think that driverless cars are just around the corner.

[11]K. Naughton, "Driverless cars also struggle in the snow," *Bloomberg*, 2016. [Online]. Available: <https://www.bloomberg.com/news/articles/2016-02-10/robot-cars-succumb-to-snow-blindness-as-driving-lanes-disappear>. Accessed: Oct. 30, 2016.

For autonomous cars, winter in areas in which snowfall is common is worrisome. Snow and ice not only make roads slippery, they also make it difficult to see important road markings which autonomous cars rely on in order to function. Cameras and lidar sensors can easily be covered up by snow or interfered with by falling snowflakes. However, technology is currently being developed in order to filter out interference from snow and advances in artificial intelligence can also help. This article shows how some previous concerns have already been solved or are being solved.

[12]B. Schweber, "The autonomous car: A diverse array of sensors drives navigation, driving, and performance," in *Mouser Electronics*, 2016. [Online]. Available: <http://www.mouser.com/applications/autonomous-car-sensors-drive-performance/>. Accessed: Oct. 25, 2016.

Autonomous cars require multiple subsystems and sensors to ensure that they are able to get from point a to point b in an efficient and safe manner. In this article, Bill Schweber, an electronics engineer with a masters in electrical engineering, details a few of these systems. The first thing a self-driving car needs to know is where it is and where it is going which can be done with a GPS or an inertial measurement unit(IMU), when GPS signals are blocked. This doesn't provide enough accuracy for the vehicle to drive safely so it needs additional sensors such as a LIDAR system and radars so that it can see where it is going. In my paper, I want to talk about what technology is currently available and how it needs to be improved, both of which are discussed in this article.

[13]Tesla press information," in *Tesla Motors*, 2016. [Online]. Available: <https://www.tesla.com/presskit/autopilot>. Accessed: Oct. 25, 2016.

This is the official website for Tesla Motors, an electric car company founded by Elon Musk. Along with the company offering cars that run on sustainable energy, the technology in the cars is becoming more and more autonomous. This website details the specifications of Tesla's different cars and what features are being offered. This includes things like collision avoidance and Tesla's autopilot features. It is useful to my research because it identifies another company that is developing autonomous cars and what they currently offer and what their plans are for the future.