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Keep No Hands on the Wheel

Executive Summary: This is a position paper advocating for the existence of autonomous–self-driving–car technology. After reading and studying scholarly peer reviewed journal about the matter, this paper explains how the technology behind autonomous cars work and that by having them will generate additional mobility and safety to the community.

The iPhone 6, the Google Nexus 9, and the Xbox One. These devices are example of how technology is rapidly improving over the years. Available technology today might appear unreal to people 20 years ago. 20 years ago there were no smartphones, no tablets, and no physical, interactive gaming systems. With such great technology existing today, one question happens to pop up a lot. What will they think of next? An answer to this is autonomous–self-driving–cars. Imagine riding in a car that is driving itself without you or anyone else having to maneuver it. It would be incredible. You would think that this sort of thing will not be around for very long time. However, it already exists today. According to Jerome M. Lutin, "Google revealed in 2010 that it had developed and was testing a fleet of self-driving cars" (par. 3). It seems that the future has arrived. Lutin also reports the success that Google has had with its autonomous car stating that: "Google has logged 500,000 miles of autonomous driving with no crashes under computer control" (par. 3). This is quite an achievement. Still, with such an achievement, autonomous cars

are not ready to be sold to the public. According to Lutin, “Continental Automotive Systems expect to produce highly automated cars by 2025” (par. 19). Within a decade, driverless cars will start roaming the streets. Autonomous cars are intricate technology that have the potential to bring about advancements of mobility and safety to the world in the near future and therefore must be brought to the public.

The idea of a car being able to drive itself seems like magic, but unfortunately it is not. There is always a reasonable explanation of how magic is done. The same goes for how an autonomous car operates. According to Lutin, “Although autonomous vehicle technology is complex, its elements can be divided into four basic component categories: sensors, mapping, perception, and communication” (par. 15). There is no involvement of magic behind the reason of how the car moves. There is only math and science. The first part of an autonomous car is sensory.

Sensory is essential for an autonomous car in order for it observe what is happening while driving. Lutin states, “Sensor technology includes a variety of such hardware as multiple video cameras for daylight conditions, forward-looking infrared sensors for night conditions and detection of humans and animals, radar for measuring range and velocity, global positioning systems (GPS) to determine location, accelerometers and gyroscopes to detect changes in speed and direction, and light detection and ranging (LIDAR) that employs spinning lasers and photoreceptors to create a three-dimensional model of the immediate environment” (par. 15). Think of sensory technology as the eyes for cars when they drive.

The next part of an autonomous car is mapping. It is not enough for a car to see where it is going, it needs to know the whereabouts of point A and point B. Lutin states, “Mapping typically uses coordination files of points and line segments representing streets, origin and

destination addresses, and other features, including digital aerial photography, ground-level imagery of roadway features, traffic control devices, and obstacles" (par. 16). It is easy to get lost without having a map. Next in the categories is perception.

Perception is the mean to make good decisions while driving. A driver with poor perception is eligible for trouble. According to Lutin, the perception in autonomous cars: "includes determining and maintaining the vehicle's position within the traffic lane and with respect to other moving vehicles, monitoring and reacting to traffic control devices, detecting and reacting to pedestrians and other obstructions in the vehicle's path, keeping track of the vehicle's location with respect to the map, and monitoring and reacting to the forces acting on the vehicle" (par. 17). In other words, leave the decision making to the car.

The last component in an autonomous car is communication. While on the road, it is important to communicate with the other drivers at the appropriate time and at the appropriate way. This includes turning on your blinkers to tell other drivers that you are going to make a turn either to the left or right, and the use of the car's tail lights in order to signal the cars following that you are slowing down. With autonomous cars, drivers are not obligated to communicate with other drivers. Instead, the cars talk to each while on the road. Autonomous cars are equipped with communication technology that utilizes vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) (par. 18). According to Lutin, "V2V communication can allow vehicles to exchange information about their position and movement intentions allowing other vehicles to anticipate and respond to maneuvers. V2I communications can allow vehicles to communicate with traffic control devices and allow the exchange of mapping data between stationary sources and vehicles" (par. 18).

Since autonomous cars have not hit the market yet, automobiles must rely on drivers to operate them. This can be rather unfortunate seeing that there are factors, such as age, that restrict one from becoming an adequate driver. According to Lutin, “The population of Americans ages 64 and older will increase from 47.7 million, or 14.8 percent of the U.S. Population in 2010, to 65 million, or 18.8 percent of the population by 2025” (par. 6). With the increase of more elderly comes more of the likeliness of them driving around in cars. Lutin states, “As driver age increases, changes in visual acuity, flexibility, strength, reaction time, and memory all impact ability to drive” (par. 7). Knowing this, an increase in the driving population made up with elderly should not be allowed in order to keep them safe as well as everyone else. According to Lutin, “People over the age of 75 have more vehicle deaths per 1,000 than any other cohort of the population except those under age 25” (par. 7). This is where driverless cars come in handy. With a driverless car, elderly can get to places that they want to be without the risk of driving. They can pickup their own medicine and go to the grocery store themselves.The elderly are not the only group of people that would benefit from autonomous cars. It would also benefit the blind as well as the disabled and help give them the opportunity of having the enjoyment of mobility just the same as with licensed drivers.

Everyday people are on the move because they need to be somewhere. Other than running errands, getting to school, and getting to work, mobility is necessary to engage in social interactions. Examples of such interactions include family gatherings, meeting with friends, or going on a date. A lack of social interaction is very unhealthy for one’s life. According to Lutin, “Social isolation due to the inability to interact with friends and family, and the inability to shop and get to health care services, can lead to depression and degradation of one’s physical and emotional well-being” (par. 9). This is a good reason to have autonomous cars because it will

allow people who are restricted from driving, due to age or disability, access to participate in social interactions.

When it comes to driving, safety is crucial. According to Lutin, “In the United States, for 2010, 5.4 million reported motor vehicle crashes killed 32,885 people and injured more than 2.2 million” (par. 4). This is why all drivers must be alert and make good judgments every time they are on the road in order to avoid accidents. However, even if you are the safest driver in the world, this would not excuse you from getting into an accident. Lutin states, “Analysis of a nationally representative survey sample of 5,471 crashes in the period from 2005 to 2007 showed that 92.3 percent of all crashes were attributed to driver error” (par. 5). So even if you are a really safe driver, the person driving on the side or in the front of you may not be. Some of the drivers next to you could possibly intoxicated with alcohol. According to Lutin, “In 2011, 9,878 vehicle crash fatalities – 31 percent of all motor vehicle traffic fatalities – were attributed to alcohol-impaired driving” (par. 5). Self-driving cars offer a solution to these safety issues. Unlike humans, cars cannot get drunk. Also according to Luis E. Ferreras, most researchers agree that: “Autonomous vehicles are more reliable than human drivers because their design and instrumentation perform better than human perception, leading to fewer accidents, especially at higher speeds” (par. 13). With autonomous vehicle technology, the number of car crashes is certainly to decrease.

Autonomous cars are going to change the world in a major due to their innovated technology involving sensors, mapping, perception, and communication. This technology will start a new era with greater mobility and safety. Some of the changes that it will bring include saving lives by preventing fewer car accidents and helping the elderly, blind and disabled move around as much as they please. It is amazing to know that such technology already exists in the

world we live in today. It is also great to know that in about a decade, these cars will be able to purchase. Slowly but soon, everybody will be riding around in autonomous cars. The impact that self-driving cars will surely outdate the cars that are around today. With this in mind, the next thing to do would be to wonder. What will they think of next?

Works Cited

Ferreras, Luis E. "The Driverless City." *Civil Engineering (08857024)* 84.3 (2014): 52-55. *Academic Search Premier*. Web. 20 Nov. 2014.

Lutin, Jerome M., Alain L. Kornhauser, and Eva Lerner-Lam. “The Revolutionary Development of Self-Driving Vehicles and Implications for The Transportation Engineering Profession.” *ITE Journal* 83.7 (2013): 28-32. *Applied Science & Technology Full Text (H.W. Wilson)*. Web. 20 Nov. 2014.