The New Way of Driving

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The New Way of Driving

Introduction

In the past years, Google has been trying to create an autonomous car, a car that can completely

drive itself without any needed assistance from a driver. The focus of this paper will be

exploring what technology is used so the car can drive itself, the benefits from this technology,

are there any legal issues at hand, if there are any ethical issues that need to be focused on, and

what security issues need to be addressed before the technology is released to the public.

Background

There is new technology being created and mastered every day. Not long ago people did not think that there would be cars that could control what they are doing, but now there are cars that can park themselves and there is technology being perfected for cars that can drive themselves with no assistance from a driver. Google, which is heading the technology for the self-driving cars, already has numerous cars on the road in the three states that it is legal in, Nevada, Florida, and California. The three states do require that there is a person with a driver's license in the driver's seat. According to Hachman (2010) Google started these tests with two people in the cars, one person who has a perfect driving record and the other is an engineer for Google. These cars have already logged over three hundred thousand miles with just one accident. Google claims that the accident happened when the car was being manually controlled. Anthony Levandowski said that Google will "expect to release the technology in the next five years," reported by Howard (2013). That is in the very near future and there are still questions to be answered.

The technology that is being used on the car is quite complex. This technology is also used on many other projects including mapping coast lines, security cameras, and what the police use to catch speeders. The car uses a LIDaR, Laser Imaging Detection and Ranging, system. Anderson, McGaughey, Reutebuch, Schreuder, & Agee (2013) concluded.when LIDaR is mapping terrain from a plane it uses "four major pieces of equipment. These are a laser emitter-receiver scanning unit attached to the aircraft, global positioning system (GPS) units on the aircraft and on the ground, an inertial measurement unit (IMU) attached to the scanner, which measures roll, pitch, and yaw of the aircraft; and a computer to control the system and store data." The LIDaR system creates a 3-D map of the terrain in just moments by taking the time it

takes the laser. The LIDaR system being used with the Google self-driving car is more complex

than that. When being used to drive the car Google puts the system in a rotating drum on top of

the car that rotates ten times per second. It also has 64 lasers instead of the 32 lasers being used

on other projects. By doing this it allows for the system to generate 1.3 million data points per

second. The system can also identify pedestrians, street signs, street cones, and other possible

hazards because the reflective parts of these objects will show up with a higher intensity than the

road. The car combines these images with Google's mapping software and GPS which allows

for the car to be able to drive down the road without any assistance from a human driver.

Potential Benefits

The potential benefits of this technology is unlimited. If the vehicles could drive

themselves it could make for a much more productive commute. Silberg & Wallace (2012) said

"Approximately 80 percent of the U.S. work force loses 50 minutes of potential productivity

every workday." That would equate to thirteen thousand minutes of potential productivity lost

every year. There are a lot of things that could be accomplished in that time frame. According

to MADD (Mothers Against Drunk Driving) adults drank and drove 112 million times in 2010

reported by Johnston., O'Malley., Bachman., & Schulenberg (2011). If the car could drive itself

it would not matter if the driver was intoxicated or not, which could dramatically cut down on

accidents. The car could also give more freedom to disabled humans or handicapped ones. The

blind, paralyzed, amputees, mentally challenged, and elderly could all have the ability to "drive"

to their destinations, instead of having to rely on someone else to reach their destination.

Legal

There are numerous legal issues that Google will have to work through to make this car

available to the public. However, the laws will have to catch up to the technology before the cars

can become public. The legislative branch will need to decide who is liable in an accident

involving a self-driven car, who gets sued and who does not get sued in an accident. Currently

there are only three states the car can drive in, and they are only allowed for experimental

reasons. They require that there is a person who has a valid driver's license sitting in the driver

seat at all times. Google has a feature that they want to add to the car, but first they need to find

a way around the regulations and sanctions on driving. They want to add a "come pick me up

button" on the vehicle so the "Self-driving cars would be able to drop you off at work and then

pick up another person instead of idling in a parking lot" says Kelly (2013). The current law

from the Geneva Convention on Road Traffic (1949) states that a driver "shall at all times be

able to control their vehicle," reported by Brandom (2012). This is a big problem for the feature,

by current law it would be illegal for the car to pick you up without a person in the car, but if you

put a person in the car it would make that feature pointless. Another issue would be that if the

car got in an accident it is the legal requirement that the driver helps out any injured person in the

accident, this cannot be accomplished if there is no driver. A lot of the legal issues that have to

be overcome are the way laws are phrased. These laws assume that there is a real person behind

the wheel and states the driver must do this or do that. For example it is required a driver

exercises due care, which a computer will not be able to understand and practice.

<center>Ethical Issues</center>

There are not many ethical issues Google will have to deal with, however there are some.

How will the self-driving car be able to decide what happens in case of an emergency. If the car

is driving itself down a road and a deer runs out at the last second, is the car going to hit and kill

the deer, or will it try to avoid the deer and put the passenger's lives in greater risk? What will

happen when there is an unavoidable accident and the car will have to choose between hitting a

car with three small children in it or hitting a car with just a single adult in the car? Google also has to think about all of the jobs they would be shutting down. If the self-driving car becomes legal we will not have a need for taxi drivers, bus drivers, or any sort of personal driver. The economy is already in a bad position and cutting out all these jobs would just worsen it. Google also needs a way to not invade on a person's personal privacy. By having a computer in the car it would be easy for Google, or anyone Google gives access to, to be able to track a person's location and where they have already been. If the car is being monitored it would be an obvious invasion of personal privacy.

In a recent interview with Lois Dalton (Lois Dalton, personal communication, February 17, 2013) said that she "does not trust a computer to control her life. I want to have my life in my hands. I just would never feel comfortable having a computer driving me around." This raises a couple of concerns. How will the creators of this technology feel if it gets numerous people killed? Google is going to have to come up with numerous software updates to keep upgrading the computers "mind" so that they are the best that they can be. Google needs to be able to guarantee that their system will react and think better than a human being is capable of.

<div align="center">Security</div>

This needs to be a major concern for Google because of hackers. People can hack into computers and steal information or download a virus onto it. If a hacker hacked into the car it would be a major security breach. The hacker could make the car crash into other cars which could create horrific scenarios. The hacker could steal personal information and know everywhere that car has been. The hacker may even be able to reroute where the car is headed and that could make for some dangerous situations.

<div align="center">Conclusion</div>

The self-driving car is definitely a product that could be on the streets in the future. The technology is already available, but there are some things Google has to tweak and laws that have to be changed in order for the car to reach the streets. This is going to take some time for this to happen. Laws cannot be changed overnight and the legislators need more time to learn about the technology behind the car and to either change how the laws are phrased or create new laws to accommodate self-driving cars. Google also has to figure out a way to perfect yielding to traffic. The biggest issue of research needed is how the car deals with someone who runs a stoplight or stop sign. There is also the problem of the system costing 70,000 dollars accoding to Silberg & Wallace. Do not be surprised if you see a person reading a book and seemingly not paying any attention to the road, it may be happening in the close future!

References

Anderson, H., McGaughey, R., Reutebuch, S., Schreuder, G., & Agee, J. (n.d.). LIDAR

Overview. *Cooperative for Forest-Systems Engineering*. Retrieved February 23, 2013,

from http://forsys.cfr.washington.edu/JFSP06/lidar_technology.htm

The authors talk about how LIDaR works and what parts are required for it to work.

They talk about the technology of LIDaR in order to graph terrain. Anderson,

McGaughey, and Reutebuch are all part of the USDA Forest Service. Schreuder and

Agee are from the College of Forest Resources

Brandom, R. (2012, December 14). Self-driving cars can navigate the road, but can they navigate

the law? | The Verge. *The Verge*. Retrieved February 21, 2013, from

http://www.theverge.com/2012/12/14/3766218/self-driving-cars-google-volvo-law

Russell Brandom discusses all of the legal issues concerning the self-driving car. He

is a Yale graduate and now is a reporter

Hachman, M. (2010, October 9). Google developing a self-driving car, and it works. *PC

Magazine*, *13*. Retrieved February 21, 2013, from the Factiva database.

This article talks about the early development and testing of self-driving cars. Mark

Hachman has been a news editor for ExtremeTech and later became a write for Pc

Magazine

Howard, B. (2013, February 8). Google: self-driving cars in 3-5 years. feds: not so fast |

ExtremeTech. *Latest Technology News | Tech Blog | ExtremeTech*. Retrieved February

26, 2013, from http://www.extremetech.com/extreme/147940-google-self-driving-cars-

in-3-5-years-feds-not-so-fast

Howard discusses what the government is going to have to do in regards of new laws

and legislation to allow these cars to travel the roads. Howard was the executive and

senior editor of PC Mag from 1985 to 2001 and now is a writer for extreme tech

Johnston., O'Malley., Bachman., & Schulenberg. (2011, October 4). MADD -Statistics. *MADD –*

Mothers Against Drunk Driving. Retrieved February 26, 2013, from

http://www.madd.org/statistics/

Johnston, O'Malley, Bachman, and Schulenberg review the statistics of drunk driving.

The authors use factual data to point out key facts to try to make people rethink

drinking and driving. This was used in my research paper to point out the amount of

lives the technology could save

Kelly, H. (n.d.). Self-driving cars now legal in California - CNN.com. *CNN.com - Breaking*

News, U.S., World, Weather, Entertainment & Video News. Retrieved February 23,

2013, from http://www.cnn.com/2012/09/25/tech/innovation/self-driving-car-california

Kelly talks about how the cars have been doing on the streets in the test runs. She also

talks about how it will benefit the public. She is a writer and producer for CNN.

Silberg, G., & Wallace, R. (n.d.). Self-driving cars: the next revolution. *Kpmg.com*. Retrieved

February 20, 2013, from

https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/self-

driving-cars-next-revolution.pdf

Silberg and Wallace go into great detail about how the technology works to allow the

car to drive itself. They also talk about how this car would be able to benefit the

public. Gary Silberg is a partner of KPMG and Richard Wallace is the director of

transportation systems analysis center for automotive research