Ethical and Legal Questions around autonomous vehicles:

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# Introduction:

In this essay I will be arguing the ethical issues, the legal issues and the advantages & disadvantages of autonomous vehicles.

# Description:

What defines a “self-driving” car? Well to understand this we need to first understand what it means for a car to be “self-driving” or fully automated. Especially as automation is becoming ubiquitous across most industries out there; for example, in manufacturing global sales of industrial robots are expected to almost double in volume in 2017 (reaching 400,000 units).

Firstly, when it comes to vehicles a large majority already have some level of automation. For cars, grades or definition of levels of automation do not really have been defined but if we take trains for example; there are 5 levels of automation or “Grades of Automation”:

* GoA 0; fully manual – visual avoidance of traffic.
* GoA 1; manual vehicle operation with automated signaling (ATC/ATP).
* GoA 2; starting and stopping are automated but a driver in the cab starts the vehicle.
* GoA 3; driverless train operation.
* GoA 4; unattended train operation.

In addition, the next generation of automate control concepts (or ACCs) will be “co-operative”, meaning that they will take data from adjacent vehicles and react accordingly. We can expect similar grades of automation in cars.

However, there is an ongoing debate about how exactly they will be taking data from nearby vehicles as this raises some data protection and hacking problems.

Secondly when it comes to a vehicle being in control of itself this tends to make people extremely uncomfortable, “It appears that people are more comfortable with a pilot directly at the controls, and on the plane,” says aeronautics expert Stephen Rice, even though 95% of pilots are relying on auto pilots for 95% of flight today. Therefore, how to convince people that a self-driving car is safe and who is to blame if there is an accident?

I will be expanding further on these points below.

# Ethical Issues:

The biggest ethical problem with a self-driving car is a debate that has been going on for over 50 years; commonly known as the trolley problem. The problem is as follows, a tram is speeding down a track that has five people tied to it, you can pull a lever to switch to another track, however, it has one person tied to it. Do you choose to kill one person to save 5 or would you do nothing and kill 5 people? Engineers and lawyers will now have to tackle these questions and then some as driving is far more complex and has far more variables. “It won’t be just the choice between killing one or five” says Reich a professor of political science; “will these cars optimize for overall human welfare, or will the algorithms prioritise passenger safety or those on the road”.

# Legal Issues:

One of the first countries and one that is really leading the race for self-driving cars is Germany. On August 23rd, 2017 Germany has adopted new laws that lay out the legal framework for self-driving cars and allows automated driving on German Roads. It’s the first country in the EU which has passed such a detailed set of regulations and thereby paving the way for greater legal certainty around self-driving cars. Furthermore, this is largely due to Germany wanting to become the leading market for automated driving and wants ultimately to results with these news regulations being established eventually across the EU. Furthermore, under this law “the driver can remove his or her hands from the wheel and yield driving control to the vehicle”, however, “the drive must maintain attention and perceptiveness at all times in case of the need to take back control of the vehicle.

So, what does the law say if an accident happens? First, the driver still holds responsibility for vigilance and taking control back, if the driver fails to do so he may find himself liable in the event of an accident. However, if the accident is caused by a failure of the system at a time when the driver was properly relying on it, the driver will be able to exclude his liability; this is achieved through a black box recording data from all the sensors in the vehicle. Furthermore, the data must be kept for 6 months and in case of an accident for 3 years and fines are applicable if the data is not deleted after the period required with General Data Protection. However, the law has been criticised for leaving it open to who is responsible for recording and deleting the data, the details on the technical design and location of the black box, the methods of recording the data and the measurements required to protect the recoded data against hackers.

# Economic Considerations:

When it comes to car accidents 81% of the time it is a result of human error, therefore, if a computer was implemented a lot of the danger and errors would be taken out of the equation as computers can make split second decision most people cannot. For example, computers use complicated algorithms to determine appropriate stopping distance and following distances with much more precision and consistency than a person ever could. A computer we could say is not influenced by human stress, causing us to speed, take more risk. Furthermore, Forbes has pointed out that there is also a cost savings association as a person can use the driving time to catch up on reading or chat with passengers all without worrying about driving.

# Conclusion:

To conclude, in theory a self-driving car would be much more reliable, safe and could increase productivity and cost savings, however, there is a long way to go still before this becomes a reality as the laws, ethical decisions and trust from the public need to be ironed out. We could expect the first real successes in more regulated, or even more dictatorial, environments. We could expect self-driving cars to be more rapidly in for example Singapore, Dubai, between cities with highly dense traffic. In cities like Mumbai, Cairo it is probably further away that we can expect self-driving cars to be available.

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