Are we really prepared for full autonomy?

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Abstract: The subject of artificial intelligence has become a very fashionable field today. Its transposition into practice is increasingly widespread, starting with the development of self-propelled cars, which are not just opportunities of the future, but it represents a huge social change in our present. In this study we give a short insight to the international literature of autonomous cars, focusing on their acceptance among the society. The main part of our research is to find out the causes of their fears and to detect the impact of self-driving cars to people.

Keywords: self-driving cars, acceptance, society

1 Introduction

The purpose of this study is to circle a quickly developing, therefore very exciting topic. Nowadays automated devices and features can be utilized in many areas in our everyday lives. However these machines can be taught to perform certain processes, but they only solve problems and optimize processes. In order to be able to make good choices the so-called machine learning is needed, which works by drawing conclusions based on a behavioral pattern and then they can react to a given situation (Autószektor, 2018).

With the advancement of this progress, the human presence is becaming more and more useless, but besides positive effects it also can be dangerous. Asimov's three laws of robotics are all about the maintaining the protection of people and that the robots can not rise above on mankind, but the question is that we are really going to stop developing on time? Thus it is a huge change and risk for society, we need to pay attention at people's attitude towards self-driving cars.

Firtsly we would like to describe the definition of self-driving cars, then briefly the automation levels, because it is important to make people aware of these concepts. Then finally within the framework of our own research, we are dealing with the issue of acceptance and concerns about self-driving cars.

2 Self-driving cars

Autonomous cars are those vehicles which are driven by digital technologies without any human intervention. They are capable of driving and navigating themselves on the roads by sensing the environmental impacts. With the help of the system built up by different sensors, hardware components and a complex software, the car can go from one place to another safely. Their appearance is designed to occupy less space on the road in order to avoid traffic jams and reduce the likelihood of accidents (Liden, 2017, USC, 2018).

Desipte of this enormous developments accepted atomated cars on public roads in 2017, were not fully autonomous: each one needed a human driver who noticed when it is necessary to take back the control over the vehicle (Liden, 2017).
NVIDIA predicts that within four years, autonomous vehicles will be actually aproached to public roads. They will not only be technically ready, but the rules will be resolved by then (Reuters, 2017).

2.1 Levels of autonomy

In transport, the human factor has a prominent role beside the vehicle and environmental conditions, as one can correct the mistakes and shortcomings of the other two factors. To track what's happening as we make the transition from human to robot drivers – a transition that will have enormous repercussions for the way we live, work and travel in the future-, the National Highway Traffic Safety Administration (NHTSA) adopted the levels of the Society of Automotive Engineers for automated driving systems, which provides a broad spectrum of total human participation to total autonomy (Reese, 2016).

These are the levels of SAE:

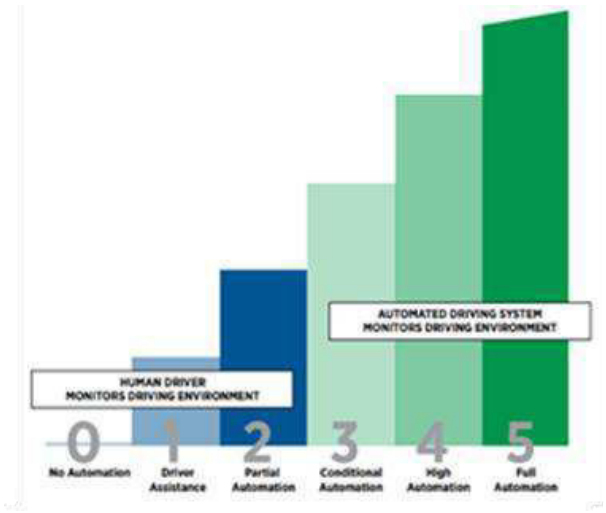

Figure 1

Types of autonomous vehicles (SAE, 2017)

Level 0: No Automation (Blain, 2017)

In this case, there is 100% of human presence. Acceleration, braking and steering are constantly controlled by a human driver, even if they support warning sounds or safety intervention systems. This level also includes automated emergency braking.

Level 1: Driver Assistance (Blain, 2017)

The computer never controls steering and accelerating or braking simultaneously. In certain driving modes, the car can take control of the steering wheel or pedals. The best examples for the first level are adaptive cruise control and parking assistance.

Level 2: Partial Automation (Blain, 2017)

The driver can take his hands off the steering wheel. At this level, there are set-up options in which the car can control both pedals and the steering wheel at the same time, but only under certain circumstances. During this time the driver has to pay attention and if it is necessary, intervene. This is what Tesla Autopilot has known since 2014.

Level 3: Conditional Automation (Blain, 2017)

It approaches full autonomy, but this is dangerous in terms of liability, so therefore, paying attention to them is a very important element. Here the car has a certain mode that can take full responsibility for driving in certain circumstances, but the driver must take the control back when the system asks. At this level, the car can decide when to change lanes and how to respond to dynamic events on the road and it uses the human driver as a backup system.

Level 4: High Automation (Blain, 2017)

It is similar to the previous level, but it is much safer. The vehicle can drive itself under suitable circumstances, and it does not need human intervention. If the car meets something that it cannot handle, it will ask for human help, but it will not endanger passengers if there is no human response. These cars are close to the fully self-driving car.

Level 5: Full Automation (Blain, 2017)

At this level, as the car drives itself, human presence is not a necessity, only an opportunity. The front seats can turn backwards so passengers can talk more easily with each other, because the car does not need help in driving. All driving tasks are performed by the computer on any road under any circumstances, whether there's a human on board or not.

3 Acceptance of self-driving cars

Self-driving cars may be the future of transportation but we do not really know whether it is safer than non-autonomous driving or not. Automakers are spending billions each year to develop self-propelled cars. But it turned out from different studies that people are more concerned than enthusiastic about the appearance of this new technology (Enwemeka, 2017)

3.1 International researches

Numerous researches and surveys have been made in this topic and the majority shows the same results- people do not want the introduction of self-driving cars.

According to AAA's latest survey, the number of Americans who are afraid of fully self-propelled cars has fallen. The survey included fortuitously selected mobile and wire phone number owners, thus 1004 American adult participants took part in it. 63% of the respondents belong to the refusers group, which is an improvement, compared to the previous year's (2017) 78%. The results also show

that both sexes and generations are influencing factors, as 72% of women and only 52% of men fear from the new technology. In addition, the members of the Baby Boom generation are more concerned than members of younger generations who have a much more adaptive attitude (Naughton, 2018, AAA, 2018, Korosec, 2018)

It's important to deal with people's concerns because they will be the potential buyers later on.

3.2 Own research

As the quantitative part of our research we made a questionnaire survey, where besides the issue of social acceptance, the various fears, we also examined moral issues. The form was available online and we could reach 207 person. 110 male and 97 female. The youngest person was 16 years old and the oldest was 65 years old. In terms of age groups, most of them were from the 20-25 year-old group, thanks to the circle of acquaintances

3.2.1 Accidents

During the development faster and more useful vehicles can be produced, but in our accelerated world, with more and more cars, the number of accidents have increased considerably. In most cases, these accidents are the fault of the driver, therefore it could be theoretically replaceable with the help of self-propelled cars. (Szikora, Madarász, 2017)

According to the Statistics Office, in 2017 the number of personal injured road accidents was 16,489. If we consider that one of the main positive aspects of self-propelled cars may be that the number of road accidents can be greatly reduced, it is worth examining the causes of accidents and their distribution.

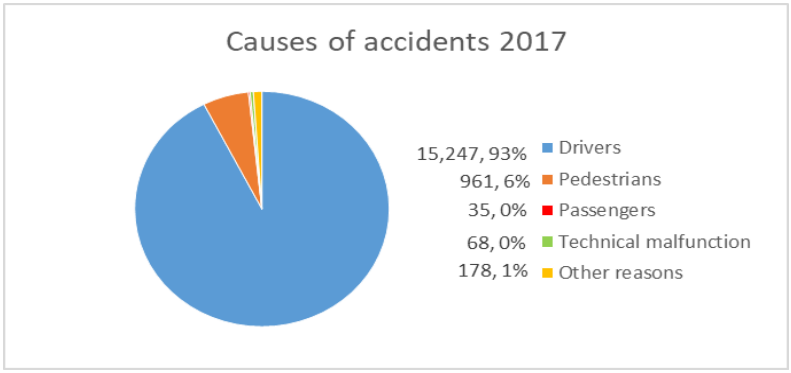

Figure 2
Causes of road accidents (Own edition by KSH data)

It can be seen that 93% of accidents are caused by the drivers, so if it could be filtered by using the driverless cars, the number of accidents would be only 1242 in a year in Hungary (KSH, 2017).

However, things are not that simple. Car manufacturers often think that the vehicle is ready for use, but some accidents have already happened in which the self-driving car was partly or wholly defective and these events made people more concerned than before.

3.2.2 Causes of concerns

Trust in a new technology is never easy, and this will be a major challenge for the public, as few feel secure about using a new, and in addition, non-proven, well-functioning transport technology.

To find the major concerns of people, we have highlighted some of them and we asked the respondents to indicate their degree. They were rated 1 to 5, 1 meant the smallest, and 5 meant the largest. The distribution of this is shown in the diagram below.

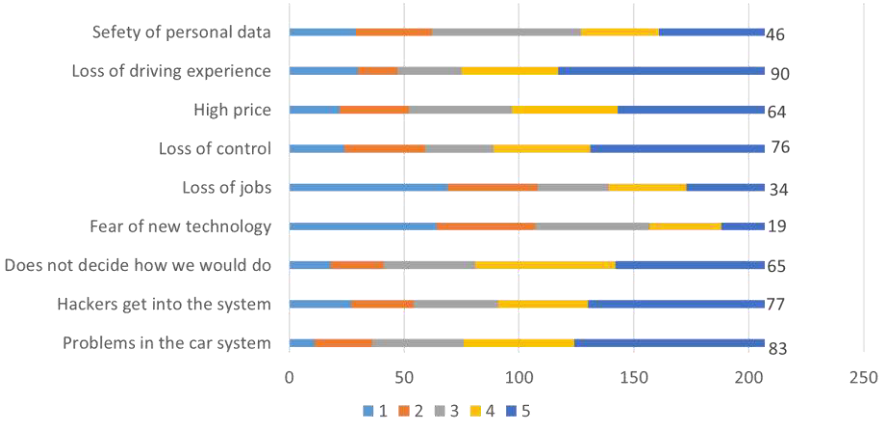

Figure 3
Concerns (per person) (Own data)

In most places the largest degree (5) was indicated by most people, which are the following from the highest to downwards:

- loss of driving experience (90);
- problems in the car system (83);
- hackers get into the system (77);
- loss of control (76);
- does not decide how we would do (65 people).

Except for driving experience, outstanding results can be linked to security issues. Of course, these are not the only factors of fear, the basis for questioning was the most commonly occurring concerns in international researches.

3.2.3 Acceptance

We asked the respondents whether they would support the introduction of self-propelled cars. Since many researches found that answers are differ by gender, so the results are represented in the table by gender.

	Women (person/%)		Men (person/%)	
Oppose & rather oppose	35	36%	25	23%
Neutral	30	31%	19	17%
Support & rather support	32	33%	66	60%

Figure 4
Gender differences (Own data)

Who are supportive among women respondents were only "33%", 31% gave neutral answers, and the rest (36%) did not support the introduction of self-propelled cars. While this percentage among men seems to be completely different. 60% of them support driverless cars, 17% are neutral and only 23% of those who do not support the introduction of them.

Conclusions

Different researches highlighted the factors that cause the various fears and, according to my own survey, it was found that the acceptance of the loss of control is a huge difficulty for society. Those who oppose self-propelled cars are also mentioned these factors: how will the computer decide in an accident; who will be responsible; how can we avoid hacker attacks, driving experience will disappear etc. The essence of sceptical questions about the complete automation of transport is the same: do we dare to give the control over to our computers?
These vehicles are useful, but as long as the car manufacturers do not overcome the mistakes and do not find a solution for moral issues and other concerns, people will not accept them.

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