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Autonomous Vehicles: Is it Only a Dream?

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Abstract: Our civilization is at a juncture in the history where the latest engineering and the cutting edge technologies are pushing the development of the products and the allied services that a human being could only dream of, or saw it in the Sci-Fi movies. This paper looks at the viability, feasibility and the reality behind the tipping point in the transportation industry which is being touted as the major disruption or a game changer—named Autonomous Vehicles (AV) or driverless cars. Many experts have predicted the year 2025 as the key milestone year that will see the demand touching a trillion US dollars and with that market potential, there is a gold rush to grab that pie of the market. Another aspect that the paper explores is the allied and affiliated markets such as manufacturing in the automotive, transport or mobility services by the service providers and the freight transporters that goes with this. Going the high tech route, questions are being raised how real is the dream, if that is a dream at all. Are we, in fact, okay to delegate the activity of driving to a certain Artificial intelligence (AI), or, are we ready to repose that much faith in the hands of the machine and be safe? One thing is for sure, the race is ON.

Fig. 1: Image Credit: AlealL/ Getty Images

Introduction

Per Elon Musk, the owner of Tesla, leading Electric vehicle manufacturer, within a span of a couple of years, people will be travelling, sleeping or working to their offices. He is a dreamer and has proved many pundits wrong in many of his previous predictions. However, this one needs careful evaluation and analysis. Experts are of the opinion that the AVs could be a practical case in point only in a span of about 10 years from now. See image below to underline the point.

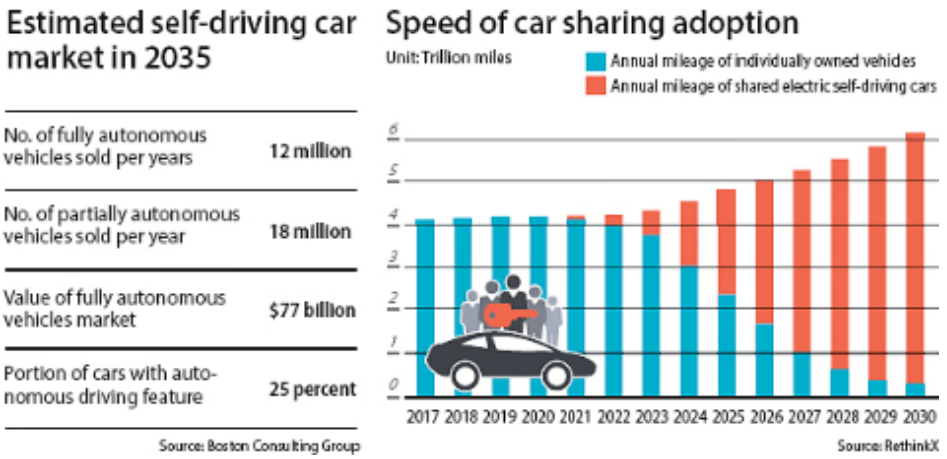

Fig. 2

As there are many other obstacles that are beyond the technological realities of today, to look at closely where we are:, prominently, cars of today need drivers to do most of the activities that are defined as driving, signals, steer, pedals and more. There are levels that have been designated as industry standards and it goes from 0 to 5 in ascending order of level of automation.

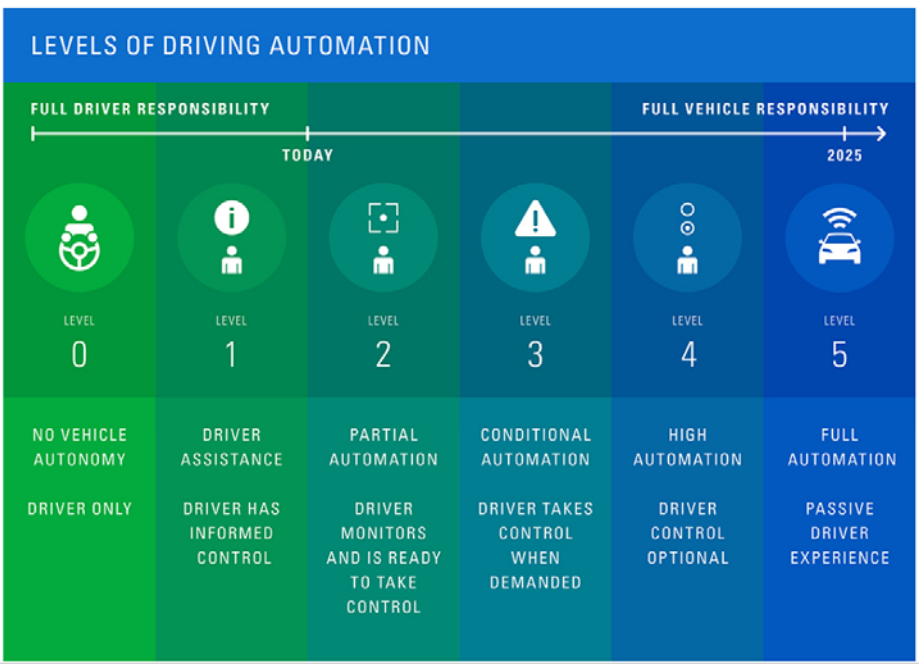

Fig. 4

Picture courtesy: The National Highway Traffic Safety Administration (NHTSA)

Talking of the mishaps and accidents, it was thought that the AVs could be far safer bets in terms of decision-making resulting in making them less accident prone. However, the new report that is published reveals that the truth is farther than that. It is only a bit safer than what has been pictured and envisioned. What has been put forth is that it is better that we adapted to this vision. The data collected can be used for lessons learnt and to fix the technology gap and subsequently making it safer for the generations to come. If we were to be daring enough and forecast, roughly a million plus lives could be saved over a span of half century. Fact check states that we are not in the mood to wait and watch. The reality is, they are seen everywhere on the streets of Arizona, Manhattan, San Francisco, Boston, Paris, Beijing and Munich to name a few.

One of the other areas of concern that has raised its head on the topic is the privacy. Since these vehicles will know the frequent places that were visited by the user, the businesses could build around the profile and the data generated could be a vicious thing to control, if it is not already secured. The intelligent transport systems that is being tagged proudly, has been reviewed and a USD 50 million was bid to develop technology in an attempt to reduce traffic jams and the data security. Questions are being evaluated on the data ownership and the need to have federal regulations on the data openness and security. One of the major objectives of the bid mentioned above is to improve the movement of people and the goods and streamline the road traffic. Road accidents in a country like Australia cause a burden on the society which ranges to a tune of 30 billion dollars. If the AVs work reasonably well, one can imagine the cost savings and the life savings.

Data management has come to be discussed in the same breath due to the need to handle the generated data. Various categories of data, like non-sensitive data, traffic congestion, personal such are the whereabouts, and the secret or intellectual property data. Idea is to use the AI to collect important data to understand the trends and such other details. They call it as rolling data, for, say last minutes or so. Data analytics is being roped in to mine the data and make sense out of it.

Objectives

The objective of this paper is to provide an encompassing review of overall trends and opinion son autonomous vehicles and its allied industries and introduction to the real life scenarios. A few of the overall objectives of writing this paper are as follows:

- ***Understand the Motives of the Players***: Perception of the users to find if the players such as Google, Amazon, BMW, or other players to add value in terms of minimizing accidents and saving human lives and add convenience, or it is just the garb.
- ***Real Benefits and the Inclination***: Are the users seeing the foreseeable benefits and how that may be real as per them? What are the inclinations of the users and how much do they buy in the vision they have been demonstrated aka promised.

- ***User Fears***: Does the common driver or rider think this is a good idea to put your life in some machine's hand everyday? Do they have inherent fears of getting off and taken for a ride?
- ***Cost Saving***: Does the user actually believe when they are told that the holistic approach taken by the vehicle mobility companies is to provide vehicles to the common public at a less cost without the hassle of owning it.
- ***Privacy***: Do the users accept the compromise on the data that will be shared? What's the readiness to open up Pandora's Box of private data to the world of big data?

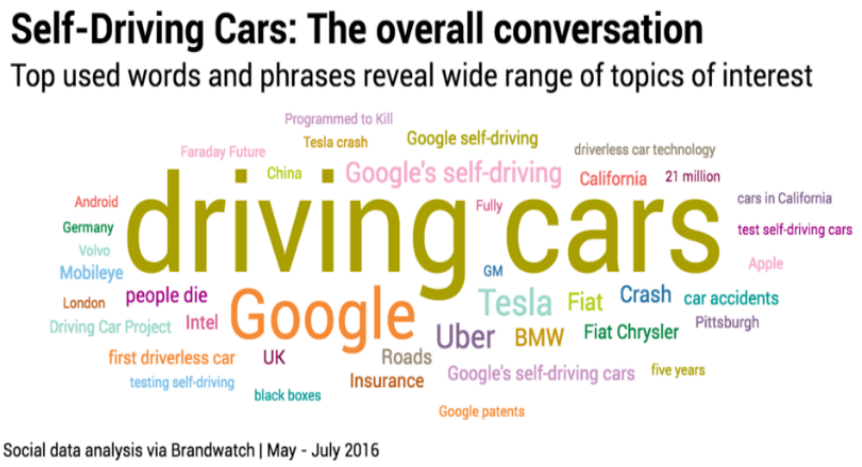

Fig. 4

Method

Methodology that was followed includes brief surveys and detailed interviews. We had various opportunities to interview participants, and sample selected from the peers from various offices and allied suppliers. Outside work, participants included people from friends, family, local garage owners, conferences attended on various manufacturing and automotive topics in the USA, India and other regions from Europe, namely England and Germany. A few in the areas of China and Australia were talked to. A total of more than 100 participants were interviewed either briefly or in details. A sample of around 60% were from the US, 25% were from the EU and the remaining from the Asia Pacific region. Later, the studies were combined to present as the findings and conclusion.

Other than the primary data, secondary data from various research journals were used to understand the trends. Also, various conferences, supplier meets and the user group meetings were also forms of inputs.

The *modus operandi* for the interviews was either face-to-face, WebEx, Skype or audio only. The tool used was the descriptive questionnaire that was designed using samples created with the help of subject matter experts. The sheets of the questionnaire were improved and enhanced as we went along the research on the topic. The online surveys were created on the websites with the help of website developers. The results were ported out and a summary of the overall study was used to predict the findings and the conclusions.

Findings

Following were some of the interesting findings during our study:

- ***Happy Versus Unhappy Riders****:* There were group of people who think they can be happy riders. They were not worried that the robot like system will transport them door-to-door. They were of the opinion that they need not see all the technologies being deployed in the vehicle for them to believe. Actually it is the reverse. They imagine it could be distraction and worrying if all the details were allowed to them. There is another drastically other sets of riders who are extremely scared to venture in. So, the split we gathered was almost half-and-half. However, they see a tremendous economic benefits in the entire food chain.

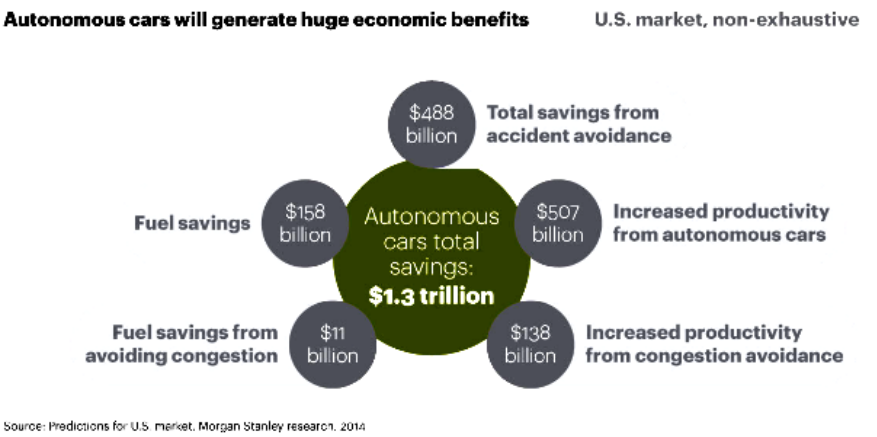

Fig. 5

- ***Steering Wheel****:* Most handled equipment in the moving vehicle it is. However, the survey shows that the participants wanted this to be completely taken out. They were thinking it as a major distraction to have the steering being moved around by some system and not being controlled by them. So, better to be out of sight. People who drank alcohol and the senior citizens preferred that the steering is least important to them. However, the level 4 with full autonomy and human control is the sweet spot of the vehicle independence.

- ***Help in Ascending and Descending**:* One of the concerns that was spoken to us was what happens for the car seats mounting for infants, boarding and on boarding of the senior citizens or handicap riders. They were thinking that the help of the driver is immense in these situations and needs to be answered.
- It was the millennials (25–34 age group) those were more welcoming towards the AVs than the Gen-X(35–50 age group). It makes sense as the new crowd wants to be more hands on with phones, tabs and video games rather than driving. However, Gen X are less educated and are scared to jump into something unknown. On the contrary, the more experienced millennials in the age group 25–34 are ready to venture out being in their prime with dollars to spend.
- ***Price Consciousness**:* Significant price for this technology would drive away the crowd from using it. The more viable it becomes financially, the better usage it will find to become more popular.
- ***Yuppie Crowd and the Geeks**:* There is a whole new market for these categories irrespective of the age or other demographics. The study finds that this segment has more leaning to use the AVs as they are already using the more advanced features in the BMWs or the Tesla or the Ubers of the world they ride in.
- ***Safety and Privacy**:* There was the dominant set of group of people who leaned towards the AVs when the topic of safety comes to the fore. The safety factor almost was at the close to the heart of the participants. What is clear is that the focus group has prominent opinion of the technology making sound decisions and keeping us safe. However, for that information sharing and connectivity becomes more important. In which case, it was thought that the balance between the appropriate information shared for the sake of safety without compromising the privacy was an important finding.
- ***Software Hacking and Screw-ups**:* These issues of taking cars for a ride by the hackers are of significant importance to the prospective riders. There are questions on the backup software support if anything were to go awry makes them ponder if this is worth a ride. Are there jammers and such other gadgets that can be deployed and someone from the control room can help them defuse the situation is what respondents mentioned to the interviewers.
- ***Readiness**:* Users who can jump into this venture in reality was almost 15% by the end of this decade. So, the remaining 85% still think that the concept is yet to be solidified and made more robust to risk their lives at the hands of the self-driving vehicles.

Discussions

Users interviewed had maximum concern on the self-cars ride due to the cyber attacks and the intellectual property protection. The respondents were vary of the various news they saw or read

on the social media and articles from the experts or conferences. The concern was if the state is ready with regard to the legislation and the possible safety that the governments can provide the users if the unthinkable happens. What happens if the vehicle is used for some anti-social activities? Identity theft and resulting spiraling effects also had many users interviewed squirm. They were also concerned about the insurance regulations for the cars and the personal injury. As they are no more the driver's personal liability, compliance with the state and federal regulations and consumer data privacy were the points of interest. The negative responses range from 'loss of control', 'does not feel safe', 'idea sounds dangerous', other trivial points brought up were: they needed someone to talk to in the vehicle, if the driver goes away who they should be talking to? A few of them said we want to have a good visualization of what car is seeing of the roadmap ahead of them in real time. A few of them mentioned that completely automated cars would be better as they felt safe not seeing steering turn without driver in sight, almost like a spooky view. Take away the anxiety and make us more relax. Not only that, they asked if there could be different modes in the vehicle that will be: read mode, sleep mode or wake up mode. Many users mention of the idea of the automated driving to be cool. Affluent class obviously were looking for more: looking for adventure and classy rides which the AVs could be it.

Conclusion

This cutting edge has a lot of benefits in making the mobility safe and convenient. Senior citizens are positioned to take advantage of such increased mobility as they can rely on this machine. Age, imagined utility, cost viability, social, lifestyle and overall factors that are the key drivers in accepting this were of prime importance to the respondents. This concept will have an earth shattering repercussions' in the mankind of the future that was the verdict. As the experience of using the high tech increases, the chances of adapting the technology will improve. So familiarity will make it more normalized in usage. Various age groups has a marked behavioural patterns as discussed during the findings. Young guns would like to be the leaders in adapting. However, very young does not think it as viable due to the affordability and such. The findings point additional miles under the car tyres to be really confident in using this. Also, more research was required on the overall behaviour predictions on the generation difference in extrapolating with the experiences of the past, imagined advantages, technological experiences, and more technological trainings. That's when the overall plan of the big players will be known and its grandness unraveled. Users always have the suspicion of the reality behind throwing all the big bucks in this upcoming disruption and the motives behind it. The study completely corroborated ulterior motive, if any, from the service providers.

In conclusion, almost 70% of the interviewed say that they believed that the AVs are a reality and that too pretty soon. The opinion however is diverse and widespread. The past cases of sharing the data illegally and the identity theft seem to be of the highest concern, making the users go away from the AVs. Cost becomes secondary if it can provide more security and comfort, especially, of not buying the AVs at all and let the service providers provide the ultimate experience of taking the users safely along point A to point B.