IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A Study On People's Perception Towards Autonomous Vehicles

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Abstract

Autonomous Vehicles (AVs) or self-driving cars have flourished in the international markets and have led to the investments of billions of dollars into this particular industry. They work with the help of complex sensors and machine learning and have the ability to automatically operate themselves. Autonomous vehicles have proved themselves beneficial as they reduce time, provide easier access to parking and even help with the mobility of the disabled. The concept has taken a few decades to reach its existing point and would require significant contributions in the tech and transportation sector to be widely accepted across the globe. This paper reviews previous studies on this concept and provides a brief idea about Autonomous vehicles, how they function, their advantages and disadvantages along with light on how India is planning to adopt this technology. This paper also includes a study that was conducted in the month of June 2023, in which the Google Forms platform was used to have a closer look at people's opinions towards Autonomous Vehicles where they were asked for their opinions and preferences towards the aforementioned vehicles.

Introduction

Autonomous vehicles are such vehicles that are equipped to perform complex manoeuvers such as - braking, clutching, steering, etc. without the need for any human input, these vehicles are backed by clusters of data that train the machine to drive and complex machine learning algorithms too. Autonomous vehicles have sensors such as LiDAR and Radar which detect the surroundings of the vehicle using beams of light and make certain decisions according to the situation. These vehicles are extremely beneficial as they aid in reducing time, emissions, and noise pollution. Autonomous vehicles also provide efficient parking and quicker mobility. People who are unable to drive or commute can use autonomous vehicles for their daily needs without any hassle too.

Being dependent on technology, which seems to be taking huge leaps day by day - Autonomous vehicles are constantly being developed and enhanced with every coming day with many global vehicle manufacturers trying to get their share in possibly, the future of transportation. Vehicle manufacturers all across the globe have started their work towards such vehicles and the same arena has been entered by major tech companies such as Apple & Google with Google already working on this project for more than a decade now. Companies such as Tesla and Aurora have also emerged while being completely focused on technology. Such competition with elevated demands for technology in present day has led to the belief that the autonomous vehicle market would reach 615 billion dollars by 2026.

The paper includes a literature review of existing previous studies regarding autonomous vehicles, their functioning, purpose, challenges, and even information regarding the relationship between autonomous vehicles and India. To have an actual and broader perspective while analyzing the market and its adaptability, the paper consists of the analysis of a study, which was conducted with the help of Google Forms in which people's opinions about the market were collected in brief. Insight was gathered regarding almost all major aspects related to the field - from the pricing to their opinions on whether India's infrastructure could support such technology. The detailed analysis of previous works along with the study on the general public's opinion, would easily help to develop an understanding of the field

Literature Review

Autonomous Vehicles & The Developing Technology:

Over the past few decades, we have seen the transportation sector advance and flourish with every upcoming day. In the 1920s, scientists worked on the communication factor between vehicles using radiowaves (The Milwaukee Sentinel, 1926). The 1940s witnessed the enhanced technology of an Electromagnetic Guidance System and the 80s gave us the first look at possibly, the future of transportation which is Autonomous Vehicles (Davidson & Spinoulas, 2015). An autonomous vehicle is a vehicle that can drive itself and perform complex manoeuvres with the help of machine learning, deep learning, sensors and cameras (Singh & Saini, 2021). To be precise, "An Autonomous Vehicle is a vehicle in which the operation of the vehicle occurs without direct driver input to control the steering, acceleration, brake or clutch" - as stated by The U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA). (Padmaja et. al, 2023).

The market of automated vehicles is extremely huge and this concept has developed significantly in this present decade. Car manufacturers are constantly trying to implement Self-driving vehicles into their fleet of cars with huge competition and even major tech companies such as Google And Uber are looking into it (Raza , 2018). When it comes to technology and data, Google proved itself as the biggest tech company and began its work towards self-driving cars back in 2009. This decade-long research has led Google to be certified to launch a fleet of self-driving cars in four states of the United States of America where they have covered more than 700,000 miles (Shukla, 2022). Well-established car companies like Audi, BMW, Ford, GM, Nissan, Toyota, etc have too made their path into this industry (Fagnant & Kockelman, 2015). Electronic chip manufacturing and graphic giant Nvidia has begun its collaboration with Volkswagen to develop its own fleet of self-driving cars too.

Such experiments with existing car manufacturers and tech companies along with individual companies such as Tesla have come a far way in introducing this niche concept to the market (Shukla, 2022). In China, the web service company, Baidu has brought deep learning into the Asian markets on a huge scale. The tech involves complex mechanisms such as obstacle perception, cloud simulation, HD maps, and route planning.

In India, Tata and Mahindra have begun to pave the way to develop technology relevant to local conditions in the past few years (Daily, 2017). Asian companies such as KIA and Hyundai along with Honda are working towards further enhancing existing technology regarding self-driving cars. The race between such companies has led to thrilling new discoveries in the field and has made itself into a good conversation topic for the general public. The projected market value for autonomous vehicles (self-driving cars) is projected to be 615 Billion USD by 2026. (Padmaja et. al, 2023).

Vehicles are classified into various categories based on the complex processes they can overcome. They are -

Level 0 - The vehicle is manual with no automated process meaning every step (breaking, accelerating etc.) is manual

Level 1 - The vehicle has cruise control enabled which helps to monitor and set the speed of the vehicle

Level 2 - The vehicle has cruise control enabled and also has assisted steering in which the automatic steering can be supervised

Level 3 - Vehicles have environmental detection enabled, however, manual input and supervision is necessary

Level 4 - High automation, The requirement for manual input is optional. The vehicle can perform automated tasks by itself

Level 5 - Total automation. Human contact, input and supervision is not required. The vehicle can perform all tasks automatically.

(Sushma & Kumar, 2022)

Working

Autonomous vehicles require two key things when it comes to their function: Data and Software. Both play hand in hand to perform tasks and ultimately help the car drive itself. (Janai et al. , 2020). The Data and vehicle automation giant Tesla is fuelled with data. People often believe that Tesla is a car company but the whole company is dependent on one thing - data. AI (Artificial Intelligence) and Big Data (Clusters Of Information used to train machines) are the most crucial part when vehicle automation comes to mind (Shukla, 2022).

Most of the vehicles obtain this data with the help of various sensors and cameras. Autonomous vehicles are fitted with visible light cameras which provide 360-degree vision even in the dark. Infrared cameras are used more often when it comes to darkness. The vehicles have Radar Sensors - which use radio waves to calculate the distance, velocity, and other essential aspects of the environmental surroundings of the vehicle (Parekh, 2022). One of the main tasks of Radar sensors is to detect the presence and the distance of nearby vehicles and obstructions. This data obtained when pooled forms big data which hence, helps to train complex autonomous softwares (Sushma, 2022). The vehicles also have LiDAR sensors which emit light beams to capture the surroundings and provide a 3D image of the surrounding environment and process it to the car's computing system. Other miniature sensors such as ultrasonic sensors are used in aspects such as short-range parking, loading, unloading, and distances which are covered by lesser speeds. As mentioned above, the data obtained by all of the components of an autonomous vehicle helps to train the software rather than make decisions as these sensors have a short range for detecting input (Vargas et al., 2021).

At times, ultrasonic sensors are used which detect sudden audio spikes in the surroundings when an immediate manoeuver is needed or when a potential collision is approaching (Shukla, 2022). When it comes to software, ML (Machine learning) and DL (Deep Learning - An enhanced form of machine learning) are used to make Neural networks. Neural networks in short form the brain of the computer and they are taught what to do in every situation (turn, obstruction, etc.) (Padmaja et al., 2023).

The main role of decision-making is done by the computing part of the autonomous vehicle which is a neural network made up of multiple neurons (programs). More data means more training which hence means better accuracy while making predictions or decisions at every turn, curve, or bend (Vargas et al., 2021).

Needs and benefits of autonomous vehicles

Autonomous vehicles can be extremely essential for the day-to-day user. It can overall decrease the number of accidents and minimize driver mistakes which can hence decrease the number of on-road accidents and casualties which are caused by rash driving. (Shukla, 2022). The World Health Organisation (WHO) states that 1.3 million people die annually worldwide due to car accidents and the casualties are mostly reported in ages 5-29. This number can be significantly minimized with the help of self-driving cars which always keep safety in mind. In another study, a strong percentage of people (22.22% agree and 15.56% strongly agree) felt that autonomous vehicles would be better at driving and operating in contrast to human-operated vehicles (Islam, Md Rakibul, et al., 2022). Alongside this, autonomous vehicles can help with providing efficient transport to those who are unable to operate standard vehicles (elderly, people with disabilities, etc.) (Parekh, 2022).

In metropolitan cities, parking can be a big issue by itself. It is often tough to find appropriate and accessible parking during peak hours. Autonomous vehicles prove themselves desirable as they can park themselves even in narrow parking spots which is tough for a normal driver to park in (Padmaja et al., 2022).

Another important factor in such vehicles is environment. Taking India's example, most of the cities in the country don't even have fresh air. Noise pollution is prominent and the environment is not considered clean amongst the masses. Autonomous vehicles are likely to be electrically operated rather than having internal combustion engines which are petrol, CNG and diesel based. These vehicles' speeds are consistent which lessens the braking and accelerating actions we see in cars which further reduces emissions and makes the vehicle environmentally sustainable and reliable while being electric and they do not promote noise pollution at all (Sushma & Kumar, 2022). Some other minor benefits of autonomous vehicles include - convenience while driving at night, ease with navigation and avoiding human based limitations like facing unfamiliar roads (Jana et al., 2019).

Challenges being faced by this industry

When it comes to autonomous vehicles, there can be quite many issues that are required to be addressed for the consumers, manufacturers, and even legal bodies which are relevant to the transportation department. In the end, this whole project and industry are dependent directly on the consent of legal bodies (Padmaja et al., 2023). One of the main issues which usually persists in developing and developed countries is the lack of standardisation in the road infrastructure. Road networks are poorly planned, there is a lack of lanes and important aspects such as warning signs, road barriers, and an abundance of aspects such as potholes, road damages and speed breakers. In conclusion to this point, it is pretty evident that in order to implement enhanced vehicles out in the open, we require an enhanced and stable system of roads and infrastructure, so vehicle technology is not the only thing required to be developed. (Thomas & Trost, 2017).

Bringing light to this point in the relevance of India is extremely essential because India primarily lacks in such infrastructure. Along with this, certain legal aspects such as the laws need to be enforced in accordance to the technology and the roads (Padmaja et al.,2023). Another major issue which arises is the lack of data. As mentioned in the previous section, data is extremely essential to train and enhance such technology, and it is frequently common that data cannot be collected due to the lack of technology or environmental conditions such as - less developed areas and localities. This problem can exist almost everywhere and in remote areas but can be a major issue in less developed countries like India (Kanaudia, 2020).

Apart from infrastructure, uncertain factors such as traffic, pedestrians, and other objects are required to be monitored but to have such technology, a lot of investments are required which can be a potential problem (Sushma & Kumar, 2022). Coming back to the Indian sphere, accident rates have been skyrocketing for the past few decades with India having almost 400 deaths every single day which sets extremely high expectations from self-driving cars (Daily et al., 2017). Association Pastor for Streets and Transport, Nitin Gadkari says that the idea isn't supported in India as he feels that self-driving cars will render people jobless (Jain et al., 2020).

Problems can even arise outside the geographical and economical sphere. The mentioned LiDAR sensors are extremely costly and cheaper sensors such as Radar do not provide accurate responses (Sushma & Kumar, 2022). Overall, the rate of development of autonomous vehicles has been pretty slow, Many innovations have come to market and have crashed instantly after launch. The instability of the market hence poses a major problem (Z. Xu et al., 2018).

Finally, a moral problem that sustains is - "In the case of an unfortunate event that leads to casualties, who is held responsible?". Such hard-hitting moral questions are yet to be tackled whose answers can affect how we adopt such advanced driving systems. (Sushma & Kumar, 2022)

The Indian Perspective

As mentioned, the implementation of autonomous vehicles in India can help eliminate traffic, reduce casualties, help with parking and so much more. The technology which is required to do so is far from the status quo in India (World Bank) (Kanudia, 2020).

One of the main problems for India when it comes to transport is always going to be the streets in India. From cows to auto-rickshaws, trucks, and cycles - Indian roads truly are tough to navigate around. If these roads are so unpredictable when it comes to humans then autonomous vehicles would certainly face countless issues. The country lacks in infrastructure too and with the help of the study, the population too believes that the roads are not yet suitable for autonomous vehicles.

Nitin Gadkari - The Minister of Road Transport and Highways in India doubts the concept of autonomous vehicles as he feels that a large number of drivers would be rendered jobless. He feels that the legislature too, would not be open to possibilities that limit the number of jobs that exist in the country. He even adds to his points by mentioning that Indian roads and environmental conditions are not suitable for self-driving cars (Jain, 2020). In a country like India, the maximum population suffers from unemployment, inferior environmental conditions, and poor education.

People's mindsets are currently skeptical towards autonomous vehicles and this would obviously require time and effort from legal bodies (Jana et al., 2019). The use of data is extremely essential in training the vehicles to operate themselves but it is considered difficult with reference to India
The former CEO of Uber, Travis Kalanick says that he feels that India is the last place where autonomous vehicles should exist
In short, the problems of associating autonomous vehicles in India are -

- Lack of infrastructure to capture data and develop technology
- Lack of standardization in the environment of the vehicle
- Import duties on technology and sensors
- Disbelief in the Idea
- Lack of support from legal bodies such as the legislature

(Kanudia, 2020)

However there is hope as since 2016, bills have been passed to propose amendments to the motor vehicles law which will empower the government to promote testing and the manufacturing of autonomous vehicles. (Thomas & Trost, 2017).

Autonomous vehicles are expected to integrate themselves into the Indian markets slowly but surely. Indian manufacturer Mahindra is working to integrate autonomous (self driving) technology into their farming equipment to make work easier and test the market. The government also seems like it is close to adopting autonomous and electric vehicles due to the alarming pollution rates and vehicle congestion in metropolitan cities.
The adoption of the technology also seems possible in the masses as many Indian car owners can afford to pay for a chauffeur (Daily, 2017).

Groups from IIT Kanpur, Bombay and Kharagpur are trying to take a shot to invoke enthusiasm amongst Indian vehicle manufacturing companies with respect to the Indian market itself (Jain, 2020).

Methodology

To observe and gather insights into people's perception towards autonomous vehicles, a questionnaire was made with the help of Google Forms dated 12th June 2023. The form informed respondents about the questionnaire and its purpose. This particular method to obtain information was chosen as it could help gather people's opinions on a wider and more efficient scale. Many questions from the form allowed individual responses to help in getting all sorts of perspectives and thoughts from everyone. Sufficient information regarding autonomous vehicles was also provided such as - their use, purpose benefits, and the requirements for them to function. The form received 165 responses from a wide pool of people of various ages and backgrounds and was finally shut on 24th June 2023 and did not have any particular biases.

Analysis

Background

The 165 responses included people from various backgrounds which helped to get a wider perspective to the concept of autonomous vehicles. 53.3% of the respondents were Female while 46.7% of the respondents were Male. When it came to age, 52.7% of the people were above the age of 45. 13.3% of the people were between 25-45 years old and 10.9% of the people belonged to the 18-25 age category. The form also received responses from those who were under the age of 18 who made up 23% of the respondents. The form also asked respondents about their educational background. 22.4% of the respondents were currently studying in high school. 10.3% of the people had studied up to 12th standard and 33.3% of the people had completed their graduation. 33.9% of the respondents had even completed their post-graduation in their respective fields. On asking about their marital status, 62.4% of the respondents were married while about 33% of the respondents were currently unmarried while a tiny fraction of the people did not want to share that piece of information.

People's ways to spend time in an Autonomous Vehicle

The respondents were asked what they would choose to do while their car would drive itself. 66.7% of the people chose to watch the road and observe their surroundings. A few responses even mentioned why so, as watching the road provides assurance about the safety of the passenger and helps them observe the vehicle and its surroundings. Throughout the form, safety was considered the utmost priority in various answers. Another study was conducted by Casley et al. in the USA and in that, 82% of the respondents felt that safety should be the key ingredient to autonomous vehicles (Kareem, 2021). Another survey by Schoettle and Sivak In major European countries showed that 92% of the respondents were greatly concerned about the safety of autonomous vehicles in bad weather (Schoettle & Sivak, 2014). 15.2% of the respondents chose to engage in activities such as scrolling through the phone, gaming or even watching television. 25.5% of the people mentioned that they would like to work while their car drives itself which even makes autonomous vehicles efficient and beneficial when it comes to time saving. 20.6% of the people mentioned that they would like to sleep while their car drives itself. This also provides an impression that many people would trust their car completely with their and can sleep while the car drives. The rest of the people shared their own thoughts which were pretty much on the same line as scrolling through their phone, catching up with people or even just answering their daily mail.

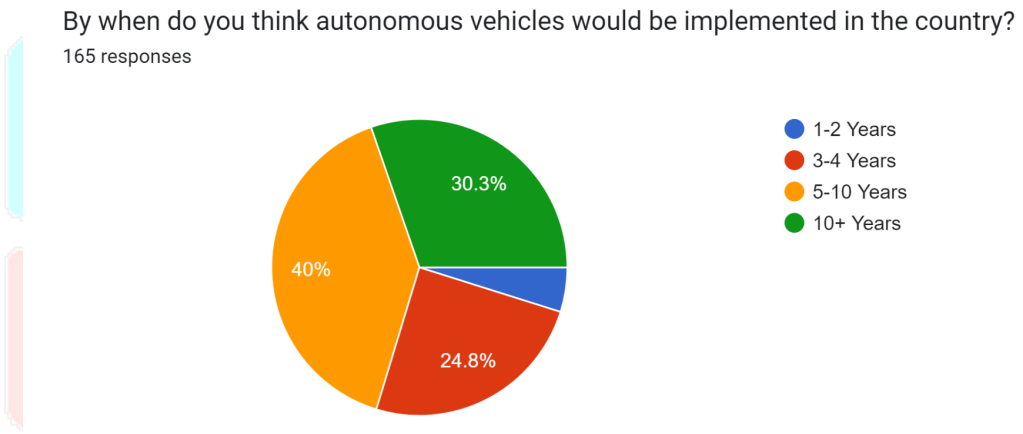
The presence of Autonomous vehicles in the market

A major thing which is also associated with autonomous vehicles is their presence in the market, which companies sell them? How would people like to buy them? The form asked respondents to choose how they would like to see autonomous vehicles in the market and who would they like to buy them from. About 39% of the people said that they would like to buy autonomous vehicles from existing vehicle manufacturers such as Mercedes, Tata, Honda etc. which could cater to all of the existing vehicle customers. Respondents mentioned that it would be better to buy autonomous vehicles from such companies as they already own a

share of the market and have existing customer relationships and trust. 44% of the people wanted to see autonomous vehicles being sold and developed by a new and separate company such as Tesla which would benefit the market the way it has done in the USA in recent years. 17% of the people felt that they would like to see autonomous vehicles being developed by major tech companies such as Apple, Google, Meta etc. as these companies are built from the ground up based only on technology. One of the respondents even mentioned that autonomous vehicles should exist in all of the aforementioned forms as that is the way to create competition in the market where all forms of companies are racing to create better and accurate autonomous vehicles.

Time period required to introduce autonomous vehicles in India

Respondents were simply asked to give their personal estimate with their existing knowledge on national and international trends, when they would think that autonomous vehicles would be implemented in the country. A tiny 4.8% of the respondents felt that "self-driving" cars would be available in India in the next couple of years. 24.8% of the people felt that autonomous vehicles would require at least 3-4 years to be launched and applied to the Indian streets. The majority of the people ie. 40% felt that autonomous vehicles would be implemented within 5-10 years as the process seems like a big task and often at times unsuitable for the Indian streets in the current scenario. 30.3% of respondents felt that autonomous vehicles won't be seen in India for at least a decade. They felt that the technology would take more than 10 years to be efficient or be even seen in India. This pool of opinions can tell us a lot about how people perceive technology and India together and as two separate things at the same time.



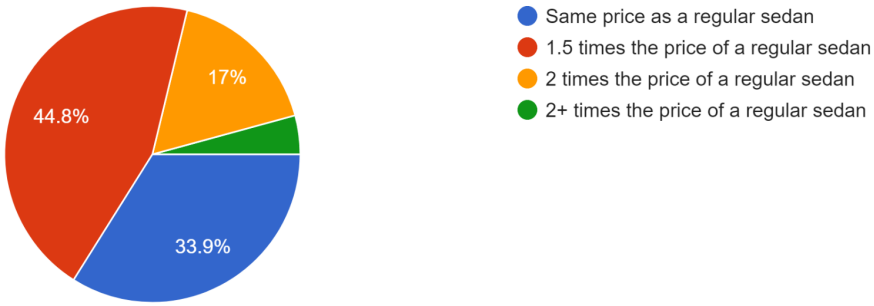
The concept of autonomous vehicles for the Indian audience

Respondents were asked if they were personally open to the idea of autonomous vehicles. 70.9% of the respondents mentioned that they personally like the concept of self driving cars and would like to own/drive one. 24.2% of the respondents said that they weren't up for this idea while the rest mentioned that they maybe would be interested but would need more concrete proof on things such as safety, technology and other things. One respondent mentioned that they were open to this idea and how the world is looking at the self driving technology but they were not up for the idea in the current state of India.

Pricing of autonomous vehicles

Respondents were even asked how much they would be willing to pay for an autonomous vehicle. The general price point was kept of a regular and average sedan on the Indian streets. 33.9% of the respondents felt that they would buy an autonomous vehicle at the same pricing of a regular sedan. With trends in international companies, this does seem unlikely but with certain developments and scaling, this does seem possible. 44.8% of the respondents were ready to pay 1.5 times the price of a regular sedan and the higher price point was there due to the advanced capabilities of the vehicle. 17% of the respondents felt that they would pay 2 times the price of a regular sedan and 4.2% of the people were ready to pay more than that. This even shows exclusivity towards technology with people getting ready to pay greater amounts for technology to make their lives easier.

How much would you be willing to pay for an autonomous vehicle
165 responses



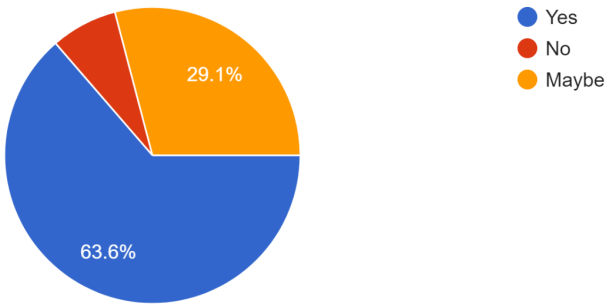
Purchasing autonomous vehicles in the first 2 years of launch

On adding to the question regarding the time required to launch autonomous vehicles in India, respondents were also asked if they would buy autonomous vehicles in the first two years of launch. 61.2% of the respondents felt that they would not want to buy autonomous vehicles in the first two years of launch, many added that they would not do so as they would wait for the concept to prove itself. Some felt that they would wait for the appropriate pricing or company to launch their fleet of self-driving cars. Quite a lot of the people were hesitant however 33.3% of the respondents were totally satisfied to buy autonomous vehicles in the first 2 years of launch in India. In another study,

Suitability of roads in India / Possible road developments in the future

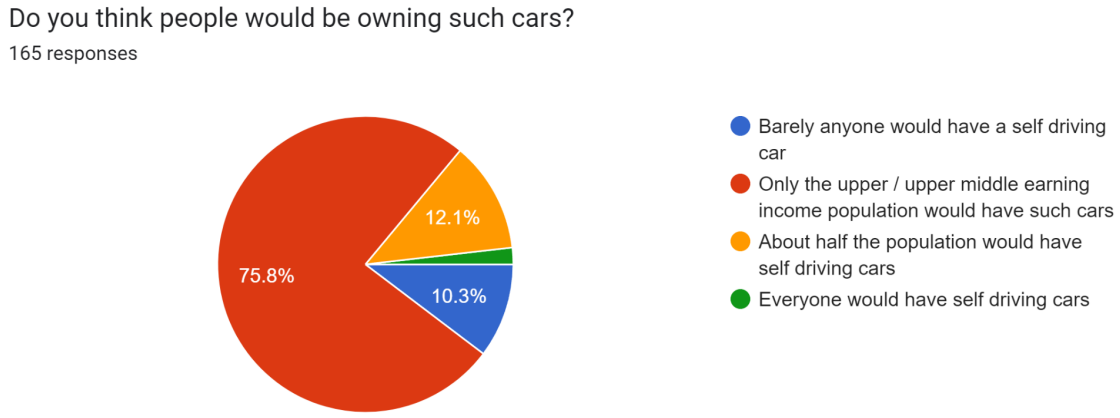
The questionnaire had mentioned that for autonomous vehicles to work, suitable infrastructure, road planning and quality was required. One of the questions asked the respondents if they felt that the roads in India were suitable for autonomous vehicles in present-day out of which 86.7% of the people felt that the current roads in India are not suitable for autonomous vehicles while 4.8% of the respondents felt that Indian roads are well equipped for autonomous vehicles. The rest of the respondents really doubted that the roads are suitable and some even criticized the current quality of the roads. People were followed up with another question if they thought that the road quality in India could improve from which 63.6% of the people felt that the roads could improve in India in the near future while 29.1% of the people felt that they could maybe improve. To add to this, 7.3% of people felt that the roads in India do not have a scope of improvement. This opinion hence means that they feel that autonomous vehicles cannot exist in India and that's simply because of the lack of infrastructure in the country.

Do you think Indian road systems can be further developed to support autonomous vehicles
165 responses



Owners of autonomous vehicles in India

Respondents were also asked to mention who would own self-driving cars in the country. 75.8% of the people felt that self-driving cars would be owned by the upper middle-income / upper-income earning population would own such cars. 12.1% of people felt that about half the population would be owning such cars and 10.3% of the respondents felt that barely anyone would be owning a self-driving car. This could be due to the lack of proof of the concept or just the mindset of the general population in the years to come. 1.8% of the respondents felt that everyone would be owning autonomous vehicles. Due to the assumed pricing and technology, it seems that most people would see autonomous vehicles being catered only to the higher sections of the population, therefore, classifying such technology into the luxury segment.

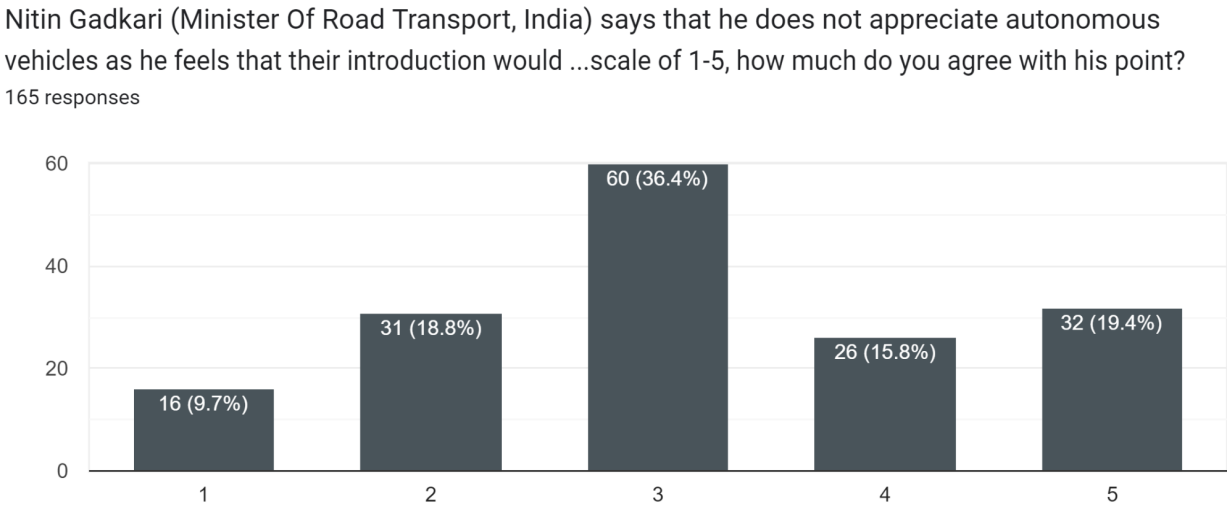


Responsibility in case of an accident

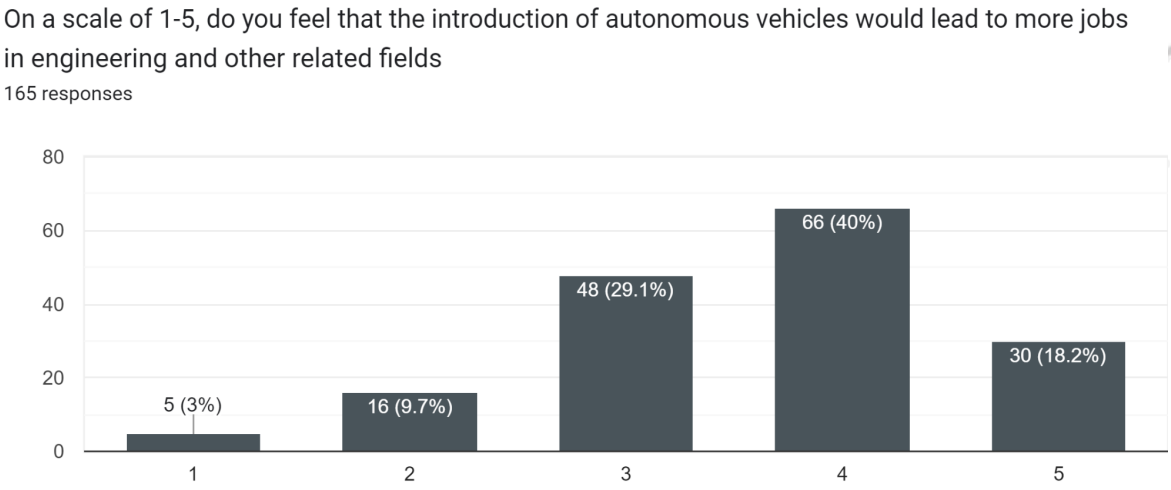
Regarding moral and ethical questions too, respondents were asked who would be in charge in the unfortunate event of an accident. 29.7% of the respondents felt that the owner of the car is totally responsible if and when an accident takes place. 23.6% of the respondents felt that the company selling the car would be held responsible in such a case while 38.8% of the respondents felt that the company which makes the software of the car is held responsible. The company selling the car could be making the software itself or could be licensing it from another company. The rest of the respondents said that the whole blame would be placed depending on the scenario and the situation. This includes aspects such as the location of the accident or how and when did it occur. In another survey, 60% of the people were extremely concerned about the liability of self driving cars in an accident. Extreme numbers regarding people's opinions displays the fact that people are really not ready to trust technology in normal conditions and even strong weather conditions to a certain extent (Kareem, 2021).

Autonomous vehicles decreasing/increasing jobs in India

Nitin Gadkari (Minister Of Road Transport, India) says that he does not appreciate autonomous vehicles as he feels that their introduction would deem alot of drivers jobless. Respondents were provided with this statement and were asked to agree with this statement on a scale of 1 - 5 where 1 means disagreeing and 5 means totally agreeing. 36.4% of the respondents felt that they agree with this statement and gave it a score of 3. 19.4% of the respondents gave this statement a score of 5, meaning they totally agree with this statement. Autonomous vehicles indeed, affect the lives of owners and drivers but this even shows that people value the lives and jobs of the people who make a living out of driving. 18.8% of the people give this statement a score of 2, meaning they barely agree with this and 15.8% gave it a 4. The rest 9.7% gave this statement a 1 where they did not agree with the given statement.



Assuming that autonomous vehicles decrease the number of jobs in the country, we even need to consider the fact that this technology would be requiring the need of engineers in extremely high numbers too. Respondents were once again asked to give this statement a score of 1-5 with 1 being disagreeing and 5 being totally agreeing. Barely any of the respondents felt that jobs in engineering would be created (3%) while 29.1% of the people scored this statement a 3. The majority of the respondents ie. 40% gave this statement a score of 4. People seem to have an understanding of how technology requires the work of hundreds and thousands of people. Existing vehicle companies already have a huge workforce and the introduction of autonomous vehicles would seem to increase the workforce.

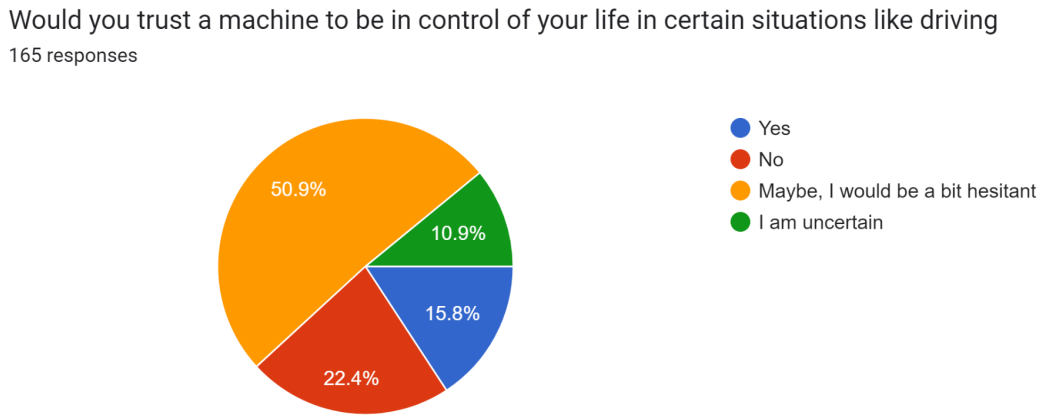


Consent from the government / legal bodies

Implementing autonomous vehicles would also require the support of the government and any concerned legal bodies. Respondents were asked if they feel that the government would be supportive of this idea. 57% of the respondents felt that the government would not be in favor of this concept and with considerations towards the lives and jobs of drivers etc., 29.7% of the respondents felt that the government would be open to the idea of autonomous vehicles and would help with the legal side of their operation. The rest of the respondents were either unsure about the support of the government or felt that the government maybe be keen to lend its support in the near future.

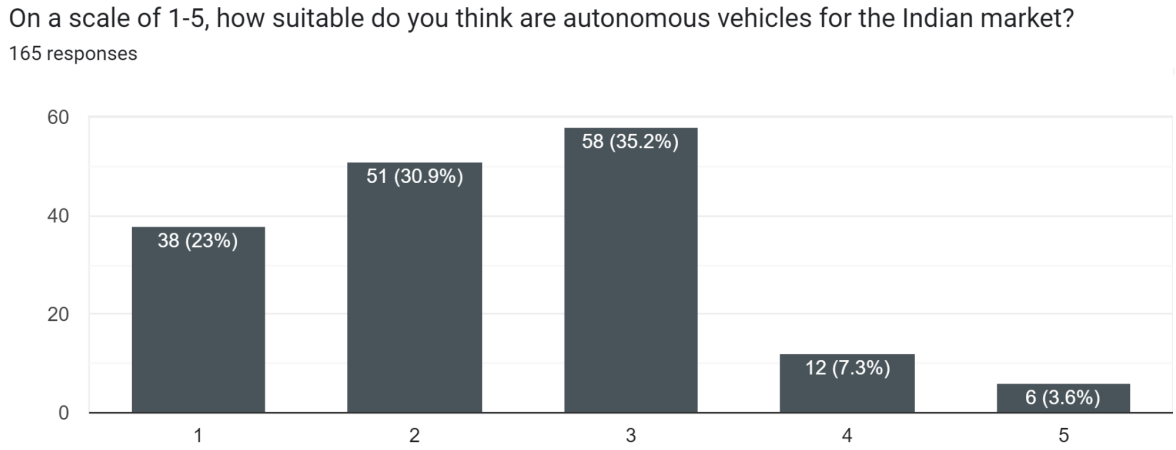
Having a machine be in control of your life

Another moral question that arises to this concept is if people are open to trusting a machine with their life. 50.9% of the respondents felt that they would be slightly hesitant to trusting a machine but would might be open to it. 15.8% of the respondents said that they would be satisfied to trust a machine with their life. This can be due to their intense faith in technology and it's development in the passing years. This section of people even includes those who were okay with sleeping while their car drives itself. 22.4% would not let a machine be in total control of their life in situations that include driving while 10.9% of the respondents were uncertain or did not have a clear answer to the question.



Suitability of autonomous vehicles in the Indian market

Respondents were finally asked how suitable they felt autonomous vehicles were for the Indian market. Respondents had to provide an answer on a scale of 1 to 5 with 1 being barely suitable to 5 being extremely suitable. 23% of the respondents gave the concept a score of 1, 30.9% of the respondents provided 2 as their response. The majority of the respondents (35.2%) gave autonomous vehicles a score of 3 in the Indian market. 7.3% and 3.6% of the respondents gave 4 and 5 as a response respectively.



Discussion

Having thought and answered all of the questions, it seems clear that respondents were well equipped to have an authentic and unbiased opinion towards autonomous vehicles and the potential market in India. They responded to questions of all sorts which tackled ethical, moral, social, and economic debates. The information in the form also mentioned how autonomous vehicles would allow better access to transportation and how it can reduce error. A strong percentage of people in another study (22.22% agree and 15.56% strongly agree) felt that autonomous vehicles would be better at driving and operating in contrast to human-operated vehicles however 47.94% of people chose not to develop an opinion on this statement due to them feeling that they are not well equipped to answer the question (Islam, Md Rakibul et al., 2022)

We now get a clear idea of how badly people want autonomous vehicles in India. We have a look at how much people would be willing to pay for them, People's thoughts towards the road conditions, technology, and the consent of the government. In conclusion, we also see that people are not ready to see such technology immediately, they would be willing to wait for a while till the roads develop and build trust with technology while observing its progress in international markets as well.

Conclusion

With the help of previous studies, we have a brief idea of what AVs are, and what they mean. This even helps to develop an opinion on whether they are suitable or not. The paper mentioned how the market made its way up and where it stands. A brief overview was given of all of the companies who are racing against each other to secure the market. It was shown that Autonomous Vehicles require expensive and complex sensors which are fitted around the vehicle which help in capturing the surroundings and making crucial decisions for the vehicle. The benefits of Autonomous Vehicles were given with respect to the general public and also how such vehicles can help the disabled and elderly travel with ease. Light was shed on the fact that these vehicles also help with the environment. They help in reducing certain types of pollutions (noise and air) and also save up energy by monitoring the accelerating and breaking rate. Disadvantages of such vehicles were also provided and the challenges which need to be tackled have also been mentioned such as - lack of suitable infrastructure, people's issues regarding trust and even responsibility. A brief analysis was given of the Indian segment of this market and various factors such as employment, road conditions, etc. were looked upon. The Indian market was carefully studied and observed upon with the help of a questionnaire. The paper shows studies and graphs of people's opinions and even bears explanations to why they feel so. In conclusion, we can say that there is a demand of autonomous vehicles and India indeed can be one of the biggest markets for that as long as the technology has a more reliable structure which would help the Indian population feel safe about this. People also mentioned that road conditions require severe improvement and the majority of the respondents feel that the Indian roads are miles away from their expected condition. With the help of major companies like Tesla, which still dominates the self-driving car market, and most importantly time, The Automated sector of transportation can truly change the way we look at transportation and all its key factors.

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