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ARTIFICIAL INTELLIGENCE IN AUTOMOBILES: AN OVERVIEW

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Abstract: The objective of this paper is to announce the idea of artificial intelligence in the domain of automobiles. The growth of artificial intelligence has taken an implication step in new years and since then, the development has taken place in every domain of the modern world. This paper informs the need of a robust artificial intelligence in the domain of automobiles and recent growth that has taken habitation till now in the arena of automotive.

Keywords: Artificial Intelligence, Machine learning, Deep learning & Cognitive Computing.

I. INTRODUCTION

In today's era, the word artificial intelligence or AI as it is addressed, is a technological revolution that is taking over all the domains in the world. Be it the software industry or the production industry, the AI has advanced its root in every aspect. However, being such a common technology today, the real spirit of this technology is still an abstract to many and it is important to first understand what artificial intelligence is. Although many definitions exist for this technology, the simple way to define artificial intelligence is as follows: -

Artificial intelligence (AI) is the intellect exhibited by machineries or software finished the study and project of smart agents, where a bright agent is a system that observes its environment and takes activities that exploit its chances of achievement.

Thus, when a mechanism mimics a humanlike behavior, for instance, learning, planning, cognitive, problem-solving, the awareness of the situation, natural language processing etc., and then it sprays under the group of Artificial Intelligence. John McCarthy, who invented the term in 1955, describes it as "the science and engineering of construction intelligent machines". Eric Schmidt, the managerial chairman of Alphabet, the parental company of Google, states that AI could be leveraged to crack major challenges, counting weather change, disease analysis, drug detection, microeconomics, theorem showing and protein collapsible. Mike Schroepfer, chief technology captain of Facebook, expresses parallel hopes that the control of AI technology can solve difficulties that gauge to the whole world. Beginning in the 1950s, modern AI absorbed on what was

named strong AI, which discussed to AI that could generally achieve any intelligent task that a hominid could. The lack of development in strong AI ultimately led to what's called feeble AI, or smearing AI techniques to narrower difficulties. Until the 1980s, AI research was divided between these two examples. But, around 1980, mechanism learning became a prominent area of research, its purpose to give computers the ability to learn and build models so that they could perform activities like prediction within specific domains.

II. LITERATURE REVIEW

Even still we are counting on Artificial Intelligence as the subsequent tool to transform the way we live, work and interrelate with respectively other, which will be typically enabled by machine learning methods, it remains indistinct as to how these bright agents will help to solve extra complex difficulties than the ones remaining while keeping in attention that the state of the skill in AI today is to perceptively recognize images and vigorously playing sports. If we also aspect at the present status quo and who is intricate in riding the rollers of progress in Artificial Intelligence, then some can easily find big initiatives like Google, IBM, Microsoft and Facebook and are the ones who are big companies in the arena.

The development in AI is likewise transporting stable penalties e.g. eradicating occupations by the means of work computerization, one such situation can be understood in the Industry 4.0 framework, which is currently in use in the automobile industry. Industry 4.0 makes what has been named a 'smart factory' wherein great number of robots take advancing the whole manufacturing procedure with the help of cyber-physical schemes, IoT and cloud computing. The current state of the art in AI research types it more capable in some domains than hominids, however, it is part of thin artificial Intelligence which is more attentive on a slim domain of difficulties e.g. iPhone Siri. In 2015, numerous milestones attained in the research and growth of AI provided rise to Artificial General Intelligence and this thoughtful of AI can be pragmatic all kind of difficulties. In cognitive science, intelligence is definite in many ways which comprise one's capacity for cognitive, logic, considerate, planning, problematic resolving, self-awareness, and passionate awareness etc. A Human-level

intelligent mechanism should have an ability to pass several tests; one of such examinations is the Turing test. However, there is no perfect test which can prove a mechanism perfectly human -level intellectual. If we guise at the present state of AI, the step of evolution of false intelligence is speeding up. NIPS (Neural Information Processing Network) session is one of the maximum famous sessions in the arena of Machine Learning & computational neuroscience.

III. NEED OF ARTIFICIAL INTELLIGENCE

Early in the 1950s, present AI focused on what was named strong AI, which mentioned to AI that might usually perform any intellectual task that a humanoid could. The absence of progress in robust AI ultimately led to what's named weak AI, or applying AI methods to narrower difficulties. Until the 1980s, AI research was divided between these two paradigms. But, nearby 1980, machine learning turn into a protruding area of research, its purpose to give computers the ability to learn and build models so that they could perform activities like prediction within specific domains. Research prior to 1950 introduced the idea that the brain consisted of an electrical network of pulses that fired and somehow orchestrated thought and consciousness. Alan Turing showed that any computation could be implemented digitally. The idea, then, that building a machine that could mimic the human brain couldn't be far off. Much early research focused on this strong aspect of AI, but this period also introduced the foundational concepts that all machine learning and deep learning are built on today. Although you can successfully apply search to many simple problems, the approach quickly fails as the number of choices increases. Take the simple game of tic-tac-toe as an example. At the start of a game, there are nine possible moves. Respectively move consequences in eight likely countermoves, and subsequently on. The full hierarchy of transfers for tic-tac-toe comprises (optimized for rotation to remove duplicates) is 362,880 bulges. If one then extends this similar thought research to chess or go, you rapidly see the weakness of examination.

IV. PROBLEMS WITH MODERN AUTOMOBILES

i) Vehicle Accidents

Tens of millions of public have vanished their survives or have converted disabled worldwide in the last 10 years because of vehicle accidents. Almost all the traffic accidents are caused by human mistakes. Unfortunately, according to statistics, in the next 10 years, the number of lives lost each year will likely double. Agreeing toward the World Health Organization, road transportation injuries produced a projected 1.26 million demises universal in the year 2000. (Source: World Health Organization, 2000). Worldwide it was estimated in 2004 that 2.5 million persons were destroyed in transportation coincidences (4.7% of all deaths)

(World report on road traffic injury prevention, WHO, 2004).



Fig. 4: Road Fatalities per Capital (WHO) ii)Grand Theft Auto

The term is associated with the stealing of the automobile. This a major security concern in the entire automobile industry where hundreds of vehicles get stolen every year without any trace. Property losses due to motor vehicle theft in 2013 were estimated at \$4.3 billion alone in the United States of America as per Wall Street Journal. In India, as per Ministry of Transportation, the no. of vehicles stolen is roughly around 135431 in 2013.

iii) Driver Distractions

The safety factor while driving an automobile is something that cannot go neglected. It is one of the key feature that can cause or prevent a catastrophe. Even though all the standard or elite class auto mobiles has been equipped all the latest available technologies that increases the chances of driving safety, statistics tells a different story. As per “accident attorney” website, the major form of distraction is texting, talking to co passenger, high volume music, alcohol etc. And what is more concerning is that majority of them are caused in teenagers.



Fig. 6: Reasons for Crashes due to distraction

iv) Maintenance Scheduling

Maintenance of the automobiles is a very essential and necessary task for every vehicle owner. A good maintenance

scheduling results in better efficiency and better performance of the vehicle. However, it often happens that the regular or scheduled maintenance is not been done by the owner which leads to the downfall of performance for the vehicle.

Another situation arises when the owner is not sure when to go for a maintenance run. It may often lead to unnecessary servicing of the vehicle which is again not good for the vehicle and for the owner.

V) Miscellaneous Issues

There are few more issues which are not being addressed by modern automobiles. Although research works are being carried out by all the major automobile industries, it might take another five to six years to make these technologies available for commercialization. Till then, let us consider that they still do not exist. These issues include an automatic speed controlling device that will have a predefined speed limit by the user. Also, there is no technology which can do an automatic diagnosis of the vehicle and tells which part needs a replacement. There are other issues which are minute in nature, but can cause a major disaster on the road. For example, a bad mechanical component in any of the system can cause a havoc in the entire vehicle system. Bad weather conditions can sometimes cause unexpected tragedies which could totally be avoided. The condition of the vehicle is sometimes so awful that driving such vehicles are itself a disaster. The driver who has no experience prior to driving and automobiles might find themselves in a critical situation. So far, no technology or vehicle engineering has been commercialized that can help such drivers. Illegal driving is another factor that can be an issue. Any driver below the specified age for driving are often seen on the roads and the only way to catch these pricks are through the assistance of cops, which sometimes prove to be too late in some cases.

V. SOLUTIONS WITH ARTIFICIAL INTELLIGENCE

Artificial intelligence is pleasing the automobile manufacturing by rainstorm while all the major automobile companies are using their resources and knowledge to come up with the finest. In the similar way, when intellect is applied to the knowledge within an automobile, it would distinguish the atmosphere and evaluate the appropriate suggestions when it traffics or appearances any hurdles. In 2015, the connect rate of AI based systems in fresh vehicles was just 8%; this amount is expected to soar to 109% in 2025. This is since different types of AI systems will be installed in vehicles.

i) Driverless Car

The thought behind driverless cars was around from the 1970s, so it is not completely new. AI powered cars,

depicted in pictures over the centuries, have continuously taken our thoughts. But the lack of technical brilliance and resources probably kept it from becoming a reality, until recently. Eventually, all the factors leading to artificial intelligence shaped up and now driverless cars have become a reality. Well, virtually, it is impartial a substance of time beforehand you start to see real intellect in them. The idea is to authorize the automobile to act like a humanoid motorist and ambition finished various conditions. This may complete easy, but is in not at all method a simple job since a lot of careful calculating is obligatory. Through methods like sensor fusion and deep learning, researchers could develop a technology that would help build a three-dimensional map of all the activities that happen around the car. Some of the leading tech and automotive giants like Google and Tesla are spending millions of dollars in research to come up with better technology and to make autonomous cars a commercial reality.



Fig. 8: Autonomous car under development by

Google

ii) Driver Assist Feature

Although relatively few corporations are occupied on fully-automated replicas, a growing amount of builders are facilitation in that way. By presenting features that assist the motorist without captivating the wheel, many businesses are taking a cautious method to AI-based features, while still rotating out vehicles with progressive safety features. Involuntary braking, crash avoidance systems, ordinary and cyclists' alerts, cross-traffic warnings, and intelligent cruise panels are some of the smaller features being motorized by AI. The willingness of automobile manufacturers to grow automated cars, transmission trucks, and other automobiles opens an affluence of new opportunities. Corporations that can put rubber to the street and revolutionize in this thrilling new bazaar will find asset dollars plenteous.

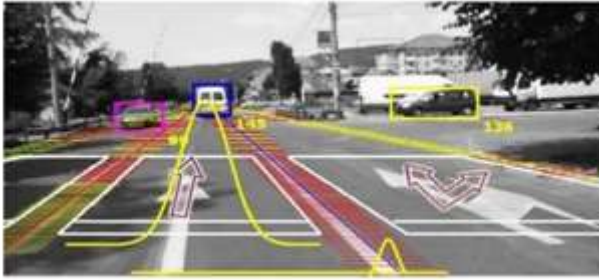


Fig. 9: Driver assistant software

iii) Cloud Hosted Intelligence

Cloud computing has certain advantages that make it the perfect platform for staging and deploying AI technology in the automotive field. Among these are fast processing speed, big data access and analytics, and centralized connectivity. As companies endeavor to develop cutting-edge automotive technology, cloud-based platforms will be developed to support them. One instance of anywhere the control of the cloud is being cast-off is the company among General Motors and IBM's Watson supercomputer. An extension of GM's popular OnStar system, the platform being developed will include AI-enhanced features



Fig. 10: Vehicle connected to the cloud settings iv) Internet of Things

As a result of 2020, manufacturing specialists approximation that almost 250 million cars determination be associated to the Internet. With new cars coming prepared with a crowd of keen sensors, entrenched connectivity requests, and big data improved geo analytical competences, it only brands intelligence to have an IoT relationship as healthy. At this time are fair a few of the habits IoT technology is impacting, or will quickly impact the motorized manufacturing.



Fig. 11: Internet of Things utilized in an automobile

v) Cognitive Capabilities

The driverless rebellion will continue to vacation along the roads, and you determination be witness to not just minor cars with AI competences, but huge 18-wheel trucks resounding an assortment of properties as well. This is occupied a step further with cognitive examination that kind of copies the human conduct by looking at the behavior designs and data mining competences. Cognitive systems are hypothetical to work just similar a human would understand a real-life condition, and to do that, a deeper sympathetic of formless data is essential.

Insights wanted be drawn from plenty of formless data to decide on how to answer naturally in actual time. Cognitive capabilities wanted be able to switch dynamic operating circumstances as well. Car manufacturers have previously started integrating this into their automobiles.



Fig. 12: BMW harnessing the cognitive abilities of IBM Watsonvi) Infotainment System

Artificial Intelligence changes in-vehicle infotainment systems in a major way. Because of this trend, the demand for high quality hardware and software solutions has also soared because they all must be compatible with AI. In the infotainment category, you can expect a spike in features like speech recognition, eye tracking, monitoring driving, gesture recognition, and database of natural languages. Eventually, this will also go a step further to consider driver condition evaluation, camera attached machine vision systems, sensor fusion engine control units and radar-based detection units. There are infotainment human machine interfaces already attached to vehicles and this can monitor and act according to the algorithms collected from cloud based neural networks. This would then be used to perform advanced tasks.



Fig. 13: Infotainment system connected to the automobiles through Wi-Fi

viii) **Intelligent Risk Insurance Assessment** Always looking for ways to reduce risks, insurance companies have partnered with automotive and technology companies to help identify risky drivers. One such partnership involves Nauto, a technology developer, BMW Ventures, and Toyota Research Institute, as well as the insurance company Allianz Group. Nauto has established agreements with the others to develop AI-based products that aid in fleet management, logistics, and driver safety. Using deep learning AI technology, Nauto is developing a cloud based platform that will track driver alertness, near misses, and unsafe driving habits. Eventually, Nauto plans to have a connected car network that will include an ever increasing number of connected cars. Nauto's AI platform and associated network will help fleet companies operate their vehicles more safely and more efficiently. By tracking driver behaviour, the system will help insurance companies identify drivers prone to have risky driving habits. Premiums will, no doubt, be adjusted accordingly. Nauto's efforts represent just one of countless opportunities for innovators in this niche space.

VI. MERITS & DEMERITS

As you have already realized, we have a lot of data from the car, and we have a lot of data from the owner of the smartphone. Artificial intelligence, which we also offer for the car, gives you recommendations. For example, we already know that you have a meeting tomorrow morning because we accessed your calendar, and we also know that your gas level is not enough. With AI we will send a notification to your smartphone saying, "please leave half an hour early because you need to get gas". The best features include: - a) Safety

- b) **Convenient**
- c) **Cost Effective**
- d) **Predictive Driving**
- e) **Great for Disabled People**

AI is developing with such an incredible speed, sometimes it seems magical. There is an opinion among researchers and developers that AI could grow so immensely strong that

it would be difficult for humans to control. Humans developed AI systems by introducing into them every possible intelligence they could, for which the humans themselves now seem threatened. The demerits include: - f) Threat to Privacy

g) **Technical Errors & Software Bugs**

h) **Ambiguous Decisions**

VII. ECONOMICAL ASPECTS

The use of artificial intelligence in the automobiles can be a major change in the automobile industry and can change the way automobiles and the terms associated with it has been seen till today. However, all good things come with a price. The technology of artificial intelligence may sound like a fantasy and more like a sci-fi movie, but this technology carries a heavy price tag on its head. The usage of sensors, smart screen, touch sensitive screens etc. are not available cheaply in the market. These electronic components are the most sophisticated things available in the market and artificial intelligence needs their sophisticated nature to work at its best. Also, not to forget, the usage of the microprocessors and microcontrollers are a key factor in this technology. They are the one who will be running and controlling all the features and functions that was mentioned earlier. Hence, they need to be the best in the market, which indirectly implies that the cost factor will rise. The industries and the companies who wish to imply such technologies need to invest a huge sum of money to make it successfully commercialized. In fact, statistics suggests that there has been a 4.7 billion USD has been spent so far by the firms who are developing artificial intelligence related technologies.

VIII. CONCLUSION

It seems that we are standing at the point on the timeline where it is difficult to foresee the future of humanity in the context of Artificial Intelligence. We always embrace new technologies which seemed to be changing our way of living. However, the vital fact here is that the sympathetic of change we are acceptance must bring a positive outcome for the wellbeing of society and eventually of humankind. Artificial intelligence is the kind of alteration which we positively should not take for granted. It is different than any other knowledge which humankind has ever industrialized and the fact which brands it unique is its ability to act separately. It is the alteration which not only starts displaying soon its positive influence on society but harshly negative impacts, too. So, if we are espousing it as a change which is expected to change the way Research Gate as we live, then we should be happily ready to face the significances whether it is related to employment, privacy, or ultimately the very being of humanity. However, at all the case will ultimately be, we certainly need a legal policy outline which can brand sure to moderate the challenges associated with



AI and compensate the affected parties in case of a fatal error.

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