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Latest Trends in Automotive Engineering and Technology

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ABSTRACT: The business world is changing at an impressive speed: the global financial crisis, challenging markets, technology and talent crisis have a major impact on business. The last century can be associated with the triumph of the automobile industry. At the beginning of the 21st century the automotive industry has experienced one of the largest shifts in the automotive history. The new CO_2 regulations on global level have determined the automotive industry to adopt new and original technologies faster than anticipated. The emerging tendency of car sharing in larger cities added to the media information related to the negative environmental effects of car mobility generate concerns that customers were seeking a replacement to the traditional, individual car ownership. The automotive industry will face challenging years ahead taking into consideration the shifting paradigm in auto-mobility. In this context, this article aims to provide a general perspective of the tendencies in the automotive sector.

KEYWORDS: Automobile, Industry 4.0, Future Technology Trends.

I.INTRODUCTION

In the last decade, the industry has witnessed a lot of ups and downs. However, as more technology is adopted in many sectors, the car business is continually progressing, allowing industrialists to earn more money and end-users to discover more novel driving approaches. Furthermore, as McKinsey predicted in 2016, the car business is progressively transitioning to the future age, in which manufacturers will generate more income and users will enjoy novel driving solutions. In the last 10 years, the industry has undergone extraordinary ups and downs. Because of the Covid-19 epidemic, 2020 was a quiet year, with few people purchasing automobiles. However, the industry is beginning to recover, giving everyone reason to be optimistic. They've become more streamlined, safer, and capable of reaching faster speeds. The automobile sector is preparing for a massive transformation in upcoming years, because to the world's rapid digitization. technology is adopted in many sectors, the car business is continually progressing, allowing industrialists to earn more money and end-users to discover more novel driving approaches. Furthermore, as McKinsey predicted in 2016, the car business is progressively transitioning to the future age, in which manufacturers will generate more income and users will enjoy novel driving solutions. In the last 10 years, the industry has undergone extraordinary ups and downs. Because of the Covid-19 epidemic, 2020 was a quiet year, with few people purchasing automobiles. However, the industry is beginning to recover, giving everyone reason to be optimistic. They've become more streamlined, safer, and capable of reaching faster speeds. The automobile sector is preparing for a massive transformation in upcoming years, because to the world's rapid digitization.

II.TECHNOLOGY

Technology is adopted in many sectors, the car business is continually progressing, allowing industrialists to earn more money and end-users to discover more novel driving approaches. Furthermore, as McKinsey predicted in 2016, the car business is progressively transitioning to the future age, in which manufacturers will generate more income and users will enjoy novel driving solutions.

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SENSORS SELF STEERING: steering systems that use camera that watch road markings and radar and laser sensors that track other objects.

LIDAR: Optical remote sensing technology to measure distance to target by illuminating with light.

GPS: Space based satellite navigation system that provides time and location information anywhere.

DGPS: Enhancement to GPS to improve location accuracy to 10 cm.

DIGITAL MAPS: Process by which a collection of data is compiled and formatted into a virtual image.

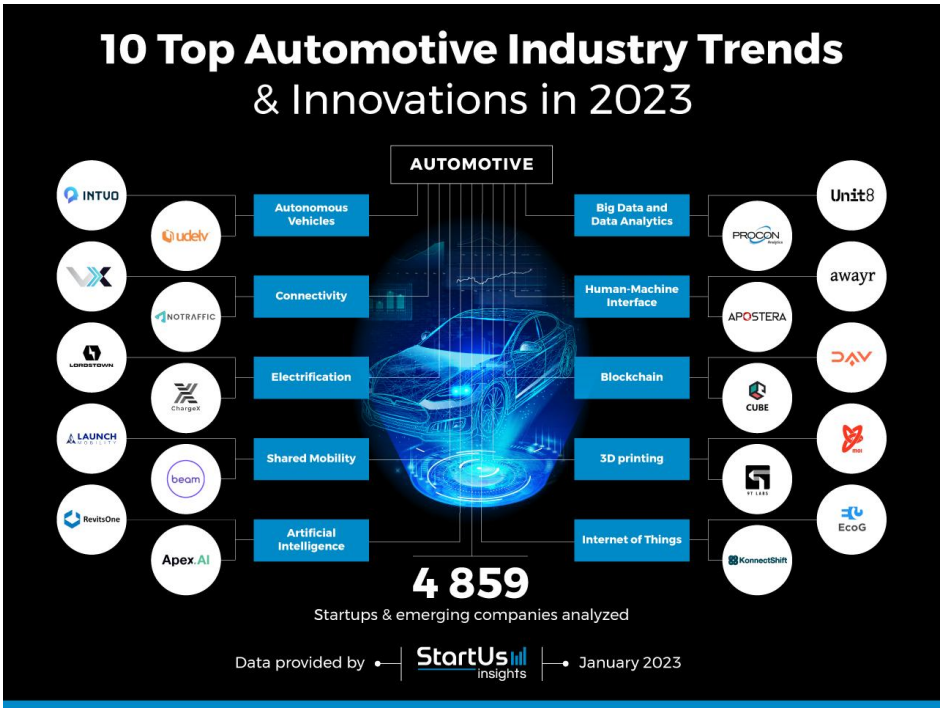
BUMPER MOUNTED RADAR: 4 radars mounted on the car's front and rear bumpers enable the car to be aware of vehicles in front of it and behind it and to keep passengers and other motorists safe by avoiding bumps and crash.

ULTRASONIC SENSORS ON REAR WHEEL: An ultrasonic sensor on one of the rear wheels helps keep track of the movements of the car and will alert the car about the obstacles in the rear.

MICROPHONE: Can detect sirens of approaching emergency vehicles.

III. THE FUTURE TECHNOLOGY AND TRENDS IN AUTOMOBILE AND AUTOMOTIVE INDUSTRY

Given here is a list of five trends that are likely to change the landscape of automotive industry in the coming years.
1.Driverless Cars
2.Internet of Things (IoT)
3.Crossover Vehicles
4.Shared Mobility
5.High Performance Electric Cars



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1. Autonomous Vehicles (AVs)

Self-driving or autonomous vehicles minimize the need for human drivers and look poised to transform everyday transportation. Fleets of AVs expand the scope of last-mile deliveries, reduce downtime, and aim to make public transportation relatively safer. For example, by reducing accidents caused due to driver fatigue or negligence. AVs are equipped with advanced recognition technologies, such as AI-enhanced computer vision to identify obstacles along the route.

2. Vehicle Connectivity

Nowadays, vehicles come with a tamper-proof digital identity that differentiates them from other vehicles in the network. This enables easy tracking of vehicular data for various use cases such as insurance, driver safety, predictive maintenance, and fleet management. Sharing vehicular data helps not just the individual customer, but overhauls the entire mobility ecosystem. Startups and scaleups develop vehicle connectivity solutions that enable them to connect and exchange data with other vehicles (V2V), an electric vehicle grid (V2G), public infrastructure (V2I), as well as with new and emerging ways to utilize vehicle data (V2X).

3. Electrification

The depleting fossil fuel reserves and the harm to the environment caused by their use call for promoting the use of electric mobility solutions. For greater adoption, EVs need to address issues such as high price, poor battery, inadequate charging infrastructure, fleet electrification, as well as powering renewable energy-based charging grids. These challenges, along with the need to tackle increasing greenhouse gas emissions across the world, startups are working on electrification solutions.

4. Shared Mobility

With connected vehicles, new business models have come up that focus on shared mobility as an alternative to traditional vehicle ownership. This enables mobility-as-a-service (MaaS) and discourages unused vehicles. Such solutions meet the requirements of a city or a business without adding new vehicles, thus reducing waiting time for fleets and pollution caused by petrol or diesel vehicles.

5. Artificial Intelligence

Artificial intelligence technologies such as machine learning, deep learning, and computer vision find applications in robotic automation within the automotive industry. These guide self-driving cars, manage fleets, assist drivers to improve safety, and improve services such as vehicle inspection or insurance. AI also finds applications in automotive manufacturing, where it accelerates the rate of production and reduces costs.

6. Human-Machine Interfaces (HMI)

As self-driving cars and connected cars transform the automotive landscape, it will fundamentally change how drivers interact with vehicles. Human-machine interfaces use voice-based or haptic feedback to operate vehicles. These expand the scope of how and what aspects of a car that users control. Consequently, such interfaces make the driving experience safer and more enjoyable. Another form of HMI includes smart virtual assistants who help drivers and riders interact with the vehicles and other service providers.

7. Blockchain

Blockchain enables multiple applications in the automotive industry. These include sharing vehicle data over a secure network for connectivity and shared mobility solutions such as ride-hailing, urban transportation, and deliveries. Moreover, blockchain finds application in verifying the supply chain of spare parts or making sure that the raw materials and spare parts are sourced exclusively from legal and trusted sources.

8. Big Data & Analytics

The age of big data and advanced analytics informs various decisions throughout the lifecycle of a vehicle. Data gathered from vehicles enables predictive maintenance, informs managers about their fleets, and alerts concerned authorities in case of

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accidents. Moreover, customer automotive data finds applications in driving sales, optimizing supply chains, and enhancing product design for newer vehicles. Startups and emerging companies develop big data solutions to help automotive manufacturers, as well as ancillary industries, streamline their operations to maximize their margins.

9. 3D Printing

3D printing helps the automotive industry in three primary ways. Firstly, it enables rapid prototyping with 3D printed models that accelerate the design and testing phases of production. Secondly, it allows manufacturers to print spare parts to match their requirements. Lastly, additive manufacturing of composite materials leads to automotive parts that are lighter, stronger, and more durable.

10. Internet of Things

In the automotive industry, IoT enables secure communication between vehicles as well as vehicles and infrastructure components. The technology improves road safety, solves traffic congestion, and reduces pollution and energy expenditure with better fleet management. Startups and emerging companies develop advanced sensing technologies to gather more data about the vehicle as well as allow the vehicle to understand its surroundings. The technology also automates payments for fuel and tolls.

IV. FUTURE PERSPECTIVES

Describing the future is describing the unknown. It is necessarily indicative based on developments we see today, combined with logic derived from history and professional views. This way the trends below have been selected

3.1 Designs by Tiers Like R&D Design is all about product creation. In the automotive world R&D has traditionally been done by OEM but has over the last three decades moved largely from OEMs to Tiers. Applied research for component and system development is almost in all cases the terrain of Tiers. The early research phase and the last stage of vehicle integration are a joint field of action. OEMs expect their Tier-1s to come up with ideas on how their product and systems should evolve over time and make proposals on how this would fit the OEM product line-up. As a result a likewise development is taking place between Tier-1s and Tier-2s and further down the line. One example is suppliers of sunroofs like Inalfa and Webasto that propose new solutions to OEMs to enhance their product offer. A remarkable front runner in this development is Apollo-Vredestein. As tire manufacturer they supply products that are necessarily circular and still they have decided to hire top designer Giugiaro to make Design a prime market profiling tool for their brand. It has brought them name, image and sales. 3.2 Design trends Design is a sign of the times. It is in a constant change, influenced by trends with often a much wider base than the world of products. They can reflect social developments and feelings around emancipation, sustainability or economics. There is a relation with fashion on the one hand and with technology on the other. 3.2.1 Inspired by nature Sustainability is by far the most important megatrend in automotive product creation in the western world. It is mainly a technical issue but also an inspiration to designers like Laurens van den Acker who translated patterns of deserts and sea life into automotive design. Adrian van Hooydonk takes the air patterns of wind tunnels as an inspiration for the Vision concept car. In a more subdued form this trend can be recognized in the natural curves of interior handgrips and instrument panel.

V. CONCLUSION

Autonomous vehicles will also make the rural communities more attractive because shared travel to nearby cities becomes widely available, affordable and does not lead to loss of productive time. Consider autonomous vehicle only development areas and highways that are limited to autonomous vehicles. This could reduce costs as lane markings and signage would no longer be needed, the lanes could be narrower and throughput per lane would be higher. Autonomous vehicles could greatly

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decrease greenhouse gas emissions in urban traffic because Car-sharing services could offer local mobility for a highly competitive price based on a fleet of smaller, lighter cars which therefore cause fewer emissions.

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