AI in Vehicles Self Driving Cars and Bikes

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Abstract: Automated vehicle technology is becoming increasingly mature with the development of Artificial Intelligence and information communications technology. This study focuses on the applications of AI in Self-Driving Cars and Bikes. Big data collected using sensors and lot devices allows AI to analyses the surroundings and make appropriate decisions for the movement of the car and the bike in the following steps: Data Collection, Data Processing, Path Planning and Action. The problems of conventional cars and bike like poor road safety, lesser independence for the disabled, high costs, less productivity, traffic congestion, high travel time, and environmental pollution can be prevented with self-driving cars and bikes via the application of AI. However, AI powered self- driving cars and bikes face challenges like social acceptability, road conditions, traffic, weather, data privacy and cybersecurity. Companies developing and testing the autonomous cars and bikes Tesla for cars and Honda and BMW for the bikes. AI is future of automobile industry every car and bike manufacturing companies try to build fully automated cars and bike. This AI based cars and bikes will cause a huge change in people's life, we will research and analyses the various impacts on society, legal and ethical challenges, and importantly environmental constraints. We will also research on the previous similar technologies and take a look the way researchers are working to make this technology even better in the future.

Keywords : Self Driving Cars and Bikes, Self Balancing Bikes, Advantages and Disadvantages, Artificial Intelligence

INTRODUCTION

Autonomous Vehicles: The Rise of AI on the Road

The pervasive integration of AI in transportation has been driven by the abundance of data from various sources, including smartphones and sensing technologies, which have revolutionized urban mobility (Wilbur et al., 2023). Additionally, these advancements in data management and analysis enable AI systems to optimize traffic flow, reduce congestion, and enhance overall efficiency, thereby contributing to the creation of smarter and more sustainable urban environments (Alshriem, 2020) (Wilbur et al., 2023). Furthermore, the implementation of intelligent transport systems has the potential to significantly improve mobility provisions, thus reshaping urban landscapes and fostering the development of smart cities that prioritize user satisfaction and societal needs while minimizing risks associated with automated transport solutions. (Alshriem, 2020) (Nikitas et al., 2020) Moreover, AI's role in analyzing traffic patterns and mitigating road accidents is crucial, as such capabilities not only enhance safety but also facilitate the optimization of routes and the reduction of emissions, establishing AI as a critical component in advancing cleaner and more efficient transportation systems

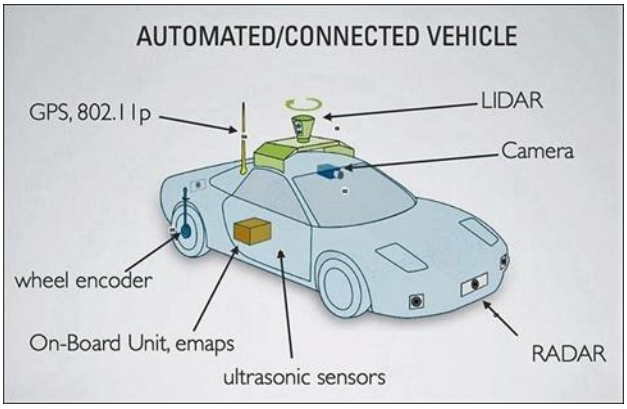
In the rapidly evolving landscape of transportation, the integration of artificial intelligence into vehicles has emerged as a transformative force, revolutionizing the way we navigate our roads and cities. The development of self-driving cars and bikes not only enhances mobility but also raises essential questions about safety, infrastructure adaptation, and the societal implications of relinquishing control from human drivers to automated systems, ultimately necessitating a framework that addresses both technological advancements and user-centric considerations.

AI makes the human life in more comfort zone. Artificial intelligence (AI) uses data, computers and technology to simulate the human mind's problem-solving and decision-making abilities. AI is making our daily lives more convenient and efficient. One of the growing applications of AI is in the field of automotive industry and self-driving cars and bikes. Self-driving vehicles, also known as autonomous or driverless cars, are cars or bikes which do not require human drivers to take control, for safely operating the vehicles. Such cars are composed of sensors in software to control, navigate and drive the vehicle. Self-driving cars and bikes are essentially built using

artificial intelligence. In self-driving cars and self balancing bikes applications of AI can be deployed in conjunction with advanced technological innovations like GPS, radar, camera, cloud services and control signals. AI can further enhance users' experience by adding value features such as blind-spot monitoring, emergency braking and driver-assist steering. The first self- sufficient and truly autonomous cars appeared in the 1980s, with Carnegie Mellon University's Navlab and ALV projects in 1984 and Mercedes-Benz and Bundeswehr University Munich's Eureka Prometheus Project in 1987, Then in March 2015, Tesla motors announced that it will introduce its Autopilot technology by mid-2015 through a software update for the cars equipped with the systems that allow autonomous driving. Some industry experts have raised questions about the legal status of autonomous driving in the U.S. and whether Model S owner would violate current state regulations when using the autopilot function. The few states that have passed laws allowing autonomous cars on the road limit their use for testing purposes, not the use by the general public. Also, there are questions about the liability of autonomous cars in case there is a mistake.

TESLA'S SELF DRIVING CARS

One of the key ways that Tesla is using AI and big data analytics in their self-driving cars is through the use of advanced sensor systems. These sensors, such as cameras, radar, and lidar, are used to gather data about the vehicle's surroundings and road conditions. This data is then analyzed by the car's onboard computer, which uses AI algorithms to make decisions about how to navigate the road. if the car's sensors detect a pedestrian crossing the street, the AI algorithms will determine whether the pedestrian is in the car's path and, if so, will take quick action to avoid hitting them. This is just one example of how AI is being used to make the car's driving decisions more accurate and safe. Another way that Tesla is using AI and big data analytics in their self-driving cars is through the use of machine learning. Machine learning is a type of AI that allows the car to learn and adapt over time. By analyzing the data gathered by the car's sensors, machine learning algorithms can identify patterns and trends that can be used to improve the car's driving performance.



if the car's sensors detect a particular type of road surface, such as ice or gravel, machine learning algorithms can use this information to adjust the car's speed and handling accordingly. This allows the car to adapt to different driving conditions and make safer and more efficient driving decisions.

In summary, Tesla is using AI and big data analytics in their self-driving cars to improve the car's driving performance, enhance the overall user experience, and improve the car's overall safety.

SELF BALANCING AND DRIVING BIKES

Whether you believe it or not, but self balancing motorcycles is now a reality to see in the current time. The advancement of technology made it possible for people to experience such achievements from their eyes. The same is the case with the motorcycles, which most of the people might not believe in real. In the past, we have seen various cars made with technology to be self-driven across multiple surfaces. However, by the time you read this, the advancement might further refine for other aspects too in the car industry. If we talk about motorcycles, no one will ever believe that it will run without humans' support. It's easy to understand that cars contain four supportive wheels, making it easy to get natural balance and driving ability. However, a motorcycle can't do the same task on their own. The time has changed now, and we are living in an era where self-balancing works in the motorcycles as well.

If we talk about the masterminds behind this, so they are BMW, Yamaha, and Honda. Luckily, the Technology of Honda and Yamaha doesn't require any personal support for the perfect balancing of its motorcycles. However, the BMW technology can ride itself, but it does need some momentum to go. BMW

bike can't do self-balancing when it's not moving. As you are aware of these manufacturers, let's discuss more how their technology works for motorcycle balancing.

Honda Riding Assist

Honda Riding Assist is a concept introduced by Honda to ensure a self-balancing of its bike. In this concept, you can adjust the front forks angle. The steer-by-wire system and motor help the front wheel to work back and forth to maintain the bike's balance. You can't consider it as a gyroscope approach to handle the bike itself. All of this relies on a straightforward concept, which is the wheel-base extending feature to attain a perfect rake angle when the bike moves faster. When the motorcycle travels at a slower speed, the wheelbase tends to be tight so that the sharp turns could be handled correctly by the bike itself.

The self balancing motorcycle in the list belongs to BMW. The bike is not like the above two, where it will work on their own at a uniform speed. It doe require momentum to go forward on its own and stops.

The idea of creating this bike was not supporting any aim for an entirely self-driven motorcycle. It's only built to check the performances of Systems to get beneficial results to make the future vehicle safer for the peoples. IF we talk about the creation of this motorbike, so there were few things considered in it. The frame of this bike is made up of a 3D printing process. If we talk about its autonomous effect, so the company utilized the automobiles with Synergies. The significant components like wheels, swinging arms, and frames were made from lightweights. However, the material carbon was used for the high-strength. If we talk about the overall working of this bike, you will get to see the bike moving forward, accelerate itself, and also slow down at the desired stop without humans' support. It's important to know that the BMW autonomous bike is not all about giving a self-driven or balancing experiences to the bike owners. The bike was designed to make the technology useful for the company to create better future motorcycles that ensure safety, comfort, and advancement.

ADVANTAGES AND DISADVANTAGES

Improved Safety: One of the biggest advantages of using AI and big data analytics in self-driving cars and bikes is the ability to improve safety on the road. By collecting and analyzing large amounts of data from sensors, cameras, and other sources, self-driving cars and bikes can make more informed decisions and react more quickly to potential hazards. This can help to reduce the number of accidents and injuries caused by human error.

Increased Efficiency: Another advantage of using AI and big data analytics in self-driving cars and bikes is the ability to improve efficiency. By analyzing data from traffic patterns, weather conditions, and other sources, self-driving cars and bikes can make more efficient routes and avoid traffic congestion. This can help to reduce travel time and improve overall performance.

Enhanced User Experience: Another advantage of using AI and big data analytics in self-driving cars and bikes is the ability to enhance the user experience. By analyzing data from user interaction ,self-driving cars and bikes can learn and adapt to the preferences of individual users. This can include things like preferred routes, music, and temperature settings.

One major disadvantage is the cost. AI and big data analytics require a significant investment in technology and infrastructure, which can be costly for self driving cars and bikes. Additionally, the ongoing maintenance and updates required to keep the systems running smoothly can also add to the overall expense.

Another disadvantage is the potential for data breaches and hacking. As self-driving cars collect and store a large amount of data, they are vulnerable to cyder attacks. A successful hack could compromise the privacy and personal information of the vehicle's passengers and put them at risk.

Lack of Transparency: AI and big data analytics can be complex and difficult to understand, which can lead to a lack of transparency in how the technology is being used in self-driving cars and bikes. This can make it difficult for consumers to trust the technology and understand how it works.

CONCLUSION

In conclusion, use of AI and big data analytics in their self-driving cars and bikes are prime examples of how these technologies are revolutionizing the automotive industry. Autopilot system uses a combination of cameras, ultrasonic sensors, radar, and GPS to gather data on the car's and bikes surroundings, which is then processed using AI algorithms to make driving decisions. This allows the car or bike to navigate roads, detect obstacles, and even change lanes on its own, making the driving experience safer and more convenient for passengers.

Furthermore, use of big data analytics allows the company to continuously improve the performance of its self-driving cars and bikes. By collecting and analyzing data from all of its vehicles on the road, Companies can identify patterns, identify areas for improvement, and make updates to the software to optimize the performance of its cars and bikes.

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