

ARTIFICIAL INTELLIGENCE IN CARS

Katsenka U.U., student

Yurlou D.S., student

Scientific supervisor – Ladutska N.F., senior lecturer

English language department № 1

Belarusian National University of Technology

Minsk, Republic of Belarus

Artificial Intelligence (AI) is transforming transportation by optimizing traffic flow, creating autonomous vehicles, and enhancing safety systems. In contemporary technologies, AI predicts maintenance needs and prevents accidents. Looking ahead, AI will advance autonomous systems, personalize mobility services, integrate with smart infrastructure, and promote environmental sustainability. AI is reshaping transportation for efficiency, safety, and sustainability.

Autonomous vehicles rely on sensors like cameras, radar, and lidar to perceive surroundings. Artificial intelligence processes this data for real-time decisions on steering, acceleration, and braking, enabling autonomous navigation. Leading autonomous vehicle developers include Tesla, Waymo, Uber, Cruise (a subsidiary of GM), Aurora, and Zoox [1]. Each presents different approaches to autonomous vehicle technology for cars, trucks, and even flying taxis.

Advantages include enhanced road safety, increased efficiency (e.g., reduced travel time and fuel consumption), and improved accessibility for people with disabilities. However, risks such as potential cyber-attacks, legal issues, and ethical and social concerns regarding safety and reliability exist with autonomous transport.

Smart city systems utilizing AI for traffic management optimize road traffic by analyzing real-time data from various sources, predicting congestion, regulating traffic lights, and optimizing routes. Examples include traffic prediction systems like Google Maps and Waze, adaptive traffic signal control systems like SCATS, and route optimization platforms like TomTom and Moovit [2]. These systems reduce travel time, congestion, fuel consumption, and improve air quality while enhancing road safety. However, challenges include reliance on accurate data, pri-

vacy concerns, high implementation costs, and the risk of technological disruptions or cyber-attacks.

AI optimizes logistics through demand forecasting, route planning, and warehouse management. For instance, it predicts demand accurately, helping companies like Amazon and Walmart optimize inventory levels. AI also optimizes delivery routes for companies like UPS and FedEx, reducing fuel costs and delivery times.

Additionally, it improves warehouse efficiency, reducing costs and enhancing order fulfillment accuracy. AI offers benefits like increased efficiency and reduced costs, but challenges include the need for high-quality data and initial investment costs. Careful implementation is crucial for successful integration.

AI enhances transportation safety and reliability by preventing accidents, predicting technical failures, and ensuring cybersecurity. For instance, AI analyzes real-time sensor data to detect hazards and alert drivers or autonomous vehicles, as seen in Tesla's Autopilot system [3]. AI also predicts technical failures by analyzing sensor data, enabling proactive maintenance to ensure the reliability of transportation systems. Additionally, AI-driven cybersecurity solutions protect against cyber threats, such as hacking attempts on autonomous vehicles or traffic management systems. Overall, AI offers promise in improving transportation safety and reliability, but ongoing research is needed for effective implementation.

AI enables personalized transportation solutions by analyzing user preferences and real-time data, seen in ride-sharing platforms like Uber. Companies like Waymo and Cruise are developing AI-driven autonomous vehicles for personalized transport. Benefits include convenience and efficiency, but risks include data privacy concerns and questions about system reliability and safety. Ethical issue is crucial for its success.

Hypersonic transport vehicles, like the Hyperloop, operate on the principle of vacuum tubes where capsules move at high speeds due to reduced air resistance. These systems employ magnetic levitation to keep the capsule inside the tube and electric motors for propulsion. Potential applications of hypersonic technologies such as Hyperloop include high-speed passenger transportation for long distances, significantly reducing travel time between cities. Additionally, hypersonic systems can be utilized for freight transportation, accelerating deliveries and reducing logistics costs.

However, the development of hypersonic technologies faces several challenges and opportunities. These include the need for infrastructure investments, the development of safe and reliable life support systems, and addressing legal and regulatory issues associated with the introduction of new transportation modes. At the same time, the advancement of hypersonic technologies opens up prospects for creating new markets and innovations in transportation, providing environmentally cleaner and more efficient transportation methods [4].

In summary, artificial intelligence (AI) plays a pivotal role in modern and future transport technologies, revolutionizing various aspects of transportation. From optimizing traffic flow and enhancing safety to enabling autonomous vehicles and personalized mobility solutions, AI promises to reshape the transportation landscape. However, as AI continues to evolve, it presents both opportunities and challenges, including the need for ethical implementation, addressing privacy concerns, and ensuring reliability and cybersecurity. Overall, the integration of AI into transportation systems holds immense potential to improve efficiency, safety, and sustainability, driving innovation and transforming the way we travel in the years to come [5].

References

1. 28 self-driving car companies you should know [Electronic resource] – Mode of access: <https://builtin.com/articles/self-driving-car-companies>. – Date of access: 19.03.2024.
2. What is traffic prediction and how does it work? [Electronic resource] – Mode of access: <https://www.tomtom.com/newsroom/behind-the-map/road-traffic-prediction/>. – Date of access: 24.03.2024.
3. How Tesla is using AI and big data analytics in their self-driving cars? [Electronic resource] – Mode of access: <https://medium.com/dare-to-be-better/how-tesla-is-using-ai-and-big-data-analytics-in-their-self-driving-cars-7072e410c1b8>. – Date of access: 20.03.2024.
4. What is Hyperloop? Everything you need to know about the race for super-fast travel [Electronic resource] – Mode of access: <https://www.zdnet.com/article/what-is-hyperloop-everything-you-need-to-know-about-the-future-of-transport/>. – Date of access: 30.03.2024.
5. The future of autonomous driving with AI [Electronic resource] – Mode of access: <https://medium.com/@benhoyt14/the-future-of-autonomous-driving-with-ai-db3ff71fcbbd>. – Date of access: 30.03.2024.