

ARTIFICIAL INTELLIGENCE IN AUTOMOTIVE ENGINEERING AND TRANSPORT TECHNOLOGIES..

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Анотація: У статті розглядається впровадження штучного інтелекту в транспорт і управління транспортом для ефективності та іновацій. Проаналізовано переваги та процвітання технологій ШІ в транспортних системах США, Швеції, України.

Ключові слова: штучний інтелект, транспортні технології, автомобілебудування, технічне обслуговування, управління дорожнім рухом, автоматизація.

Abstract: The article considers the introduction of artificial intelligence in transportation and traffic management to enhance efficiency and innovation. The advantages and prospects of AI technologies in the USA, Sweden, Ukraine transport systems are analyzed.

Keywords: artificial intelligence, transport technologies, automotive engineering, maintenance, traffic management, automation.

Introduction

Artificial Intelligence (AI) is a branch of computer science focused on creating systems that can perform tasks that typically require human intelligence. These tasks include problem-solving, learning, decision-making, and language understanding. AI enables machines to analyze vast amounts of data, recognize patterns, and make informed decisions with minimal human intervention.

AI is used across various industries to enhance efficiency and innovation. In healthcare, it aids in diagnosing diseases and personalizing treatments. In finance, AI helps detect fraud and optimize trading strategies. In transportation, it powers autonomous vehicles and improves traffic management. AI is integral to smart assistants, recommendation systems, and robotics, shaping the future of technology and automation.

Statement of basic materials

Metropolitan Transportation Authority (MTA) in New York City is collaborating with Google to tackle subway delays using AI technology. By equipping subway cars with sensors and microphones, the system collects data to detect anomalies in realtime, allowing for proactive maintenance and enhanced safety. As part of the prototype program, Google retrofitted Pixel smartphones in standard plastic cases onto R46 subway cars

The phones used sensors and microphones to track sounds and vibrations along the route, sending the data to cloud systems in realtime.

During the initial prototype run, TrackInspect collected 335 million sensor readings, 1 million GPS locations and 1,200 hours of audio, according to the transportation agency.

An AI learning model running on Google Cloud then detected any anomalies in the data that could indicate the need for preventive maintenance.

Human track inspectors working for New York City Transit served as “humans in the loop,” checking out locations flagged by the algorithm to confirm whether there were any issues, according to the MTA.

The inspectors would provide feedback to the algorithm on whether there had been an issue, helping to improve the learning model’s accuracy rate.

New Jersey partnered with infrastructure consulting firm Aecom on a pilot program completed in 2023 that used artificial intelligence and cameras to track passengers boarding and exiting trains, providing improved real-time travel data.

The Chicago Transit Authority last year launched an AI-powered pilot program that leveraged existing security cameras to detect guns on the train system and near transit property.

A step up from its palm-scanning technology, Beijing last year introduced a program across its subway system to scan the faces of passengers and match them to a database system, eliminating the need for tickets. In April, US-based Aurora Innovation, which partners with Volvo, Uber and FedEx, plans to commercially deploy up to 10 driverless trucks hauling freight between Dallas and Houston. Autonomous technology could massively disrupt a \$4.6tn global market for road freight which is under pressure from a shortage of truck drivers, as well as the rising cost of logistics and volume of online parcels. How does the technology work? Self-driving trucks are equipped with a series of sensors and radar and camera systems to offer a 360 degree view of the surroundings to detect pedestrians and other obstacles, even under challenging weather conditions. The hardware is also integrated with an artificial intelligence system that analyses millions of data points to learn new routes and to navigate obstacles. Start-ups in the space — including Aurora, Kodiak Robotics and Einride — are all aiming for “level 4” autonomy, which involves autonomous vehicles driving themselves with no human behind the wheel in limited, pre-mapped areas. While the technologies involved are similar to those behind robotaxis, proponents of autonomous trucks say they are simpler to develop since they are not envisioned for use in congested urban cities, for now. These trucks will spend the bulk of their time on highways, moving freight from one location to the next using mostly the same routes.

In 2019, Swedish start-up Einride became the first company globally to deploy a fully autonomous truck on a public road. Its founder and chief executive Robert Falck says the company already has technological capabilities to deploy fully autonomous systems at scale, but other factors — such as regulations and customer readiness — still need to come into place before there is mass adoption. While its system is already fully autonomous, Einride currently has workers who monitor the trucks remotely and assist with any problems. Regulations vary according to markets. In the US, 39 states expressly or implicitly allow the deployment of autonomous trucks, according to Aurora. But there is no federal regulation on the use of self-driving trucks. The EU also set out a legal framework for fully automated vehicles in 2022 but the use of these vehicles is mostly limited to individually approved routes and “hub-to-hub” transport. And regulations also vary according to each country.

Waymo, a leader in autonomous taxi services, is leveraging AI to provide driverless transportation in major U.S. cities. Operating in San Francisco and Phoenix, with plans to expand to Los Angeles and Austin, Waymo's AI-driven taxis aim to become the world's most trusted drivers. The company reports operating 100,000 paid rides weekly, highlighting the growing acceptance and reliability of autonomous urban mobility. Since early 2023, the company has published more than 20 safety papers, including data showing their artificially intelligent “Waymo drivers” have an 85% reduction in crashes involving injuries compared with human drivers on the same roads.

Over the past 5 years, Ukraine has already risen from 105th place in the world to the top 10 countries in digital system. But at the moment, developments in civilian life have slowed down and the focus is more on the country's defense system. The Ministry of Digital Transformation plans to launch e-residency. This will allow foreign entrepreneurs to start online businesses in Ukraine and pay taxes, creating a new ecosystem for competition in the IT arena.

Conclusion

Artificial intelligence (AI) is a key technology shaping the future of the global economy and society. Europe focuses on ethical and safe AI implementation, establishing strict regulations and developing technologies in industry, healthcare, and transportation. The United States remains a leader in AI development, investing in major tech companies, startups, and military projects that set global trends. Ukraine, despite the challenges of war, actively integrates AI into the military sector, logistics, and digitalization of public services, demonstrating a high level of adaptability and innovation. Artificial intelligence (AI) continues to revolutionize the world of logistics, offering new opportunities to enhance efficiency and reduce costs. In Ukraine, this technology is becoming increasingly relevant and in demand.

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