

MOBILE ROBOTS AND AUTONOMOUS VEHICLES IN THE MOBILITY AS A SERVICE (MAAS) CONCEPT

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Annotation: The development of autonomous vehicles and mobile robots plays a key role in the concept of Mobility as a Service (MaaS), which aims to integrate various transport solutions into a single digital ecosystem. The use of artificial intelligence, the Internet of Things (IoT) and cyber-physical systems allows for effective urban transport management, congestion reduction and resource optimization. The article examines the technological aspects of the development of autonomous mobile systems within MaaS, their advantages and implementation challenges. The impact of autonomous transport on the sustainability of urban ecosystems, environmental aspects and prospects for integration into modern cities are analyzed.

Keywords: mobile robots, autonomous vehicles, Mobility as a Service, urban mobility, artificial intelligence, transport automation.

Modern urban processes require radical changes in approaches to the organization of transport infrastructure. The growth of the number of vehicles leads to environmental problems, congestion and inefficient use of resources. In this context, the concept of Mobility as a Service (MaaS) acquires particular importance, as it involves the integration of various transport solutions into a single platform based on digital technologies. The development of mobile robots and autonomous vehicles allows to significantly increase the efficiency of urban mobility, reduce the impact of the human factor on road safety and reduce CO₂ emissions. The introduction of cyber-physical systems and artificial intelligence in the transport sector opens up opportunities for the creation of intelligent routes, adaptive control systems and decentralized flow management. In addition, autonomous vehicles can be integrated with environmentally friendly energy sources, which contributes to the development of sustainable transport. The paper considers technological approaches to the implementation of MaaS, the challenges of introducing autonomous transport in urban conditions and the prospects for the development of this concept.

Mobility as a Service (MaaS) is a modern concept that involves the integration of various modes of transport into a single digital platform to ensure continuous and efficient mobility. The key element of such an ecosystem are autonomous vehicles (AVs) and mobile robots that are capable of independently performing the functions of transporting passengers and goods. Innovative solutions such as machine learning, cloud computing and blockchain allow for the creation of smart transport networks that adapt to the current needs of users.

One of the main advantages of using AVs in MaaS is the reduction of transport costs and improvement of the accessibility of public transport. Autonomous vehicles can operate on-demand, that is, at the request of users, which allows to significantly reduce the number of private cars and optimize the use of road infrastructure. In addition, thanks to demand forecasting systems and Big Data analysis, MaaS can effectively manage transport flows, preventing congestion and ensuring rational allocation of resources.

Mobile robots that perform the functions of autonomous delivery of goods are also an important component of MaaS. Such solutions are actively used in the field of logistics, for example, for the delivery of food, medicines or goods within the city. The use of robotic platforms for transporting goods allows you to reduce logistics costs, increase delivery speed and minimize the impact of the human factor. In addition, autonomous mobile robots can be integrated with urban infrastructure systems, including road markings, smart traffic lights and traffic control systems.

Despite the significant potential of ATR and mobile robots in MaaS, there are certain challenges to their implementation. In particular, it is necessary to ensure the reliability and safety of autonomous systems, develop effective decision-making algorithms in complex situations, and also take into account the legal and ethical aspects of the operation of such technologies. An additional important problem is standardization and interaction between various participants in the MaaS ecosystem, since for effective functioning it is necessary to ensure the compatibility of digital platforms, sensors and communication protocols.

The prospects for the development of MaaS in combination with autonomous transport include the widespread use of V2X (Vehicle-to-Everything) technologies, which allow ATC to interact with each other and with the infrastructure. This contributes to increasing road safety, minimizing accidents and reducing delays in traffic flows. In addition, the development of alternative energy sources for autonomous transport, such as hydrogen energy and new generation battery systems, can significantly increase the environmental efficiency of MaaS solutions.

CONCLUSIONS. The concept of Mobility as a Service is a promising direction for the development of urban transport, combining autonomous vehicles, mobile robots and digital platforms to ensure sustainable mobility. The use of ATC in MaaS contributes to the optimization of urban transport flows, reducing congestion and reducing the environmental load. At the same time, the integration of mobile robots into logistics processes allows to increase the efficiency of goods delivery and reduce operating costs. Despite numerous advantages, the implementation of MaaS faces technical, regulatory and security challenges that require further research and development of innovative solutions. Further development of V2X technologies, artificial intelligence and renewable energy sources will contribute to the widespread implementation of MaaS in smart cities of the future.

LITERATURE

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