

# AUTONOMOUS FUTURE OF THE ROAD TRANSPORT - AV-POLAND 2021 CONFERENCE / INFORMATION MATERIAL /

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Transport is one of the most important components of the world around us. Effective and modern logistics allows to achieve economic growth. Means of transport influence the lifestyle of residents and the way in which urban space is designed and used today.

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## 1. Changes taking place

The 21st century represents a rapid transformation of means of transport and the implementation of innovative transport models. Looking to the near future, experts see an impending revolution in the way transport functions and its organization. Today, the key trend in this area is the concept of mobility, which focuses its attention on the aspect of movement and change of location. The need in this respect (which is answered by the public zone and business) is the ease of movement of people from point to point by various means available. The term is intended to reflect the change in social habits.

As the source of change can be seen an increasing number of journeys made by people with a wider availability of the transport means. A resident of a modern city can choose the method of transport from his own car to a taxi, which he can order using, for example, a smartphone. The idea of Mobility as a Service (MaaS) is the concept of integrating the methods of travelling into one service for the target customer.

Mobility is also related to the so-called multimodality, i.e. the ability to combine different means of transport. In this aspect, investments are made in the form of transfer centres and Park and Ride car parks, which allow a quick change from a car to public transport. More and more often in communication nodes there are points for renting e.g. scooters, bicycles or motor-scooters. These are just some examples of how the means of communication are combined. Such a model is also related to the elimination of the driver's strong attachment to driving an individual vehicle. He can leave the car in the designated place (along the route) and reach the destination, saving time and money while taking care of the natural environment.

Another feature of the new mobility services is vehicle sharing. Examples included in sharing are applications for connecting drivers with passengers. Thanks to this, one driver can transport several people at the same time. The cost of the trip is shared between the passengers. The denominator of sharing is digital technology. It allows to locate vehicles and create tools for quick borrowing and return without the involvement of physical workers.

Thanks to the implementation of the broadly understood idea of sharing and limiting individual transport, it is also possible to reduce the negative impact of transport on the environment. Research and statistics clearly show that transport in general has a negative effect on the Earth's climate. In Poland, it is responsible for approx. 16 percent of CO<sub>2</sub> emissions, and in Europe it is approx. 22 percent. The largest share of this emissions comes from passenger cars. Combustion of fuels in the transport means contributes to the emission of greenhouse gases, but also generates other pollutants, the so-called suspended dust. In the large Polish cities, smog generators are mainly individual vehicles. One of the answers to the above challenges is the broadly understood electromobility. The exhaust gases are only responsible for part of the air pollution. A dangerous source of emission is the secondary dust lifting and operating waste, e.g. from brake pads.

## 2. Technology in automation

The most revolutionary and technologically advanced change, however, is related to the possibility of using autonomously driving vehicles. It is a response to the challenges also related to the aging society, as there will be a possibility of comfortable travel for the elderly and disabled people. It will also be important to be able to perform other tasks, e.g. business tasks, while travelling by car (so-called multitasking).

Changes in the area of transport are possible thanks to the dynamically developing technology. It allows to introduce significant improvements in this sector. Today, automation relies heavily on artificial intelligence, and machine learning technology in particular. Over the last 10 years, the number of patent applications in the field of artificial intelligence has increased significantly. The scale of the increase is illustrated by the available data of the World Intellectual Property Organisation. Artificial intelligence affects many sectors of the economy. Data on patent protection clearly highlights two leaders: the transport and telecommunications industries. In transport, patents related to autonomous vehicles lead, followed by intelligent traffic management systems and technologies for driver and vehicle recognition. In addition, patents in the field of telecommunications are often related to automation in transport, which includes communication between vehicles. High technological advancement will in the future lead to the creation of patent management structures. The market advantage can be built on the standards and models for the administration of intellectual property rights.

## 3. Market area

Today we cannot yet say that a separate market for autonomous transport has developed. Individual solutions are constantly developed by industry entities, however, this is only at the initial stage of work. One should expect high dynamics of growth in this area. As the PWC data for 2018 illustrates, only in Europe, passenger cars drive a total of almost 3.7 trillion km each year. Forecasts assume that 27 million autonomous vehicles (thanks to more efficient use) may be responsible for over 40% of journeys in 2030. The estimated sales of automated vehicles, i.e. in the 4th or 5th level of automation, in 2025 in Europe may reach even two million cars. Technological changes will also apply, or above all, to the heavy goods vehicle sector. The TSL industry currently employs over 600,000 people. employees, and with indirect employment is responsible for over a million employees. In 2017, it was estimated that the value of services sold by transport companies amounted to PLN 200 billion.

## 4. Degrees of automation

There are six levels of vehicle automation. They were defined by the Society of Automotive Engineers (SAE). They range from no automation (level 0) to full automation (level 5). Currently, the second one (driver support) and the third (partial automation) level are most often being discussed. In levels 2 and 3, the vehicle can control speed and track. However, the driver must constantly supervise the operation of the systems, monitor the road situation and be ready at any time to take full control of the vehicle. Experts indicate that such solutions can distract the driver. Research shows that when systems work properly, even experienced users tend to lose concentration.

### 5. Polish Road to the Automation of Road Transport (AV-PL-ROAD)

Among the most important activities undertaken at the government level, related to the preparation of Poland for the safe implementation of autonomous vehicles, is the AV-PL-ROAD project: Polish road to road transport automation, implemented by the Ministry of Infrastructure, the Motor Transport Institute and the Warsaw University of Technology. The work covers both the passenger and truck transport sectors.

The project envisages, among the others, development of the Green Book of Autonomous Vehicles, as well as conducting social research in the field of awareness, knowledge, needs, expectations, threats and the expected effect of implementing these vehicles. Another important result of the pro-

ject is the roadmap for the introduction of automated vehicles to Poland. In the first phase of the project, the selected, most common driver support systems were prepared and tested, both on a closed test track and in real traffic conditions. Thanks to this work, knowledge was gained about how the systems operate in the non-obvious conditions of Polish road markings and national road infrastructure. In addition, the analysis covered the impact of the driving automating systems on the level of road safety. Work is also underway on regulations allowing autonomous and road-connected vehicles at the research and approval level. The results of the project will allow to conduct a comprehensive analysis of the issues in the discussed area. Proposals of formal and organizational solutions will be presented. In addition, as one of the key effects of the project, the first Competence Centre in Poland in the field of autonomous and connected vehicles was launched.

Fig. 1. AV-POLAND Conference.



Source: ITS

Fig. 2. Groups of participants of the AV-POLAND Conference.



Source: avpoland.com

Fig. 3. The first edition of the AV-POLAND Conference (2017).



Source: ITS

## 6. AV-POLAND 2021 Conference

As part of the AV-PL-ROAD project, the Motor Transport Institute organised the second edition of the conference entitled Autonomous future of road transport. AV-POLAND 2021. The organisation of this event enabled the exchange of expert knowledge and experience on technical, psychological and legal issues related to road transport automation. In addition, the goal was also to raise public awareness and prepare for the safe and effective use of autonomous and connected vehicles.

Topics of the conference included issues related to the progress in the preparation of technological solutions for automated and autonomous vehicles in the EU countries, including the countries of the Visegrad Group. Moreover, problems related to legislative changes were discussed and recommendations for Poland in the discussed scope were presented. An important issue was also the educational challenges resulting from the growing level of automation and the change in the scope of competences - necessary for the proper use of automated vehicles. The speakers also focused on the trust and acceptance of users for the CAD technology.

Fig. 4. Official launch of the Competence Centre for Autonomous and Connected Vehicles (CK: PAP) by prof. Marcin Ślęzak, Ph.D., D.Sc.- Director of the Motor Transport Institute and Małgorzata Pędzierska (Deputy Head of the CK: PAP)



Source: ITS

The honorary partner of the conference in 2021 was the Ministry of Infrastructure and the Parliamentary Infrastructure Committee. The content partner of the event was Polish Network of Transport Research Institutes - POLTRIN and Robotec.ai, while the scientific partner was the Faculty of Transport of the Warsaw University of Technology and the Transport Committee of the Polish Academy of Sciences. TVP Info and Polskie Radio Kierowców were among the media patrons.

Another edition of the conference is planned for 2022. Currently, it is one of the most important events in the automotive industry. It is a great place for commercial companies. The partners of the event have the opportunity to present technologies and achievements developed over many years, which is an undoubted attraction for the guests of the event.

## 7. Competence Centre for Autonomous and Connected Vehicles

During the AV-POLAND 2021 Conference, the Competence Centre for Autonomous and Connected Vehicles (CK: PAP) was established within the structure of the Motor Transport Institute. It is also one of the main results of the AV-PL-ROAD project financed under the GOSPOSTRATEG program from the NCBiR funds. The initiative described is one of the greatest achievements of the Motor Transport Institute in recent years. Among the employees of the Centre are experts in the field of road safety, transport psychology, automation, intelligent transport systems and type approval.

## 8. Summary

Automation is currently one of the greatest technological challenges in the field of road transport. Safe and effective implementation of automated transport is a long and multi-threaded process. It is necessary to conduct extensive tests, and to undertake normalisation and standardisation activities for the solutions developed. It is also necessary to adapt the infrastructure, urban space and ways of using it.

It is also important to increase the awareness of potential user groups, drivers and other road users.

It is necessary to conduct in-depth studies of the social attitude to the automated transport means. It is important to understand the concerns and needs of the users. This will make it easier to take action that reflects social needs.

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