Successful online learning for sustainable last mile logistics

SUSMILE Capsule 3.2.3 Source 1

Word document

NEW ACTORS IN INFORMATION COLLECTION

The basis for the emergence of intelligent transport systems was based on 3 basic theses:

- Provide global information and knowledge to road users and control centres,

- improve lifestyles and increase economic efficiency,

- improve traffic safety and, most importantly, ecology.

ITS (Intelligent Transport Systems) encompass a wide range of applications, subsystems and systems that provide a large number of services. In the early days, they were understood in a very narrow sense, more as better equipment for cars or as specifically targeted applications. In the past, the systems were not sufficiently interconnected and technical coordination of the systems was problematic. Over time, the need to interconnect the systems has arisen, so ITS cannot be seen as a single application but as a complex large system.

Intelligent Transport Systems (ITS) are the most important solution for the world's growing mobility. In general, they can be characterised as traffic management and routing systems that ensure the safety and fluidity of traffic. They offer a variety of transport measures for traffic situations that arise. The main purpose of ITS applications is to expand the capacity of the roadway and to allow vehicles to pass more quickly.

ITS applications bring with them significant benefits, in particular:

- Increasing the capacity of road networks by 20-25%,

- an increase in road safety,

- a reduction in the number of traffic accidents,

- reduction of journey times,

- reduction of energy consumption,

- improving the quality of the environment,

- improving travel comfort.

Intelligent transport services can be divided into several areas, in particular services for:

- passengers and drivers,

- infrastructure managers,

- transport operators,

- public administrations,

- safety, rescue and crisis management.

Technical subsystems

The application of telematics systems can be successful if an infrastructure is in place that includes actuators and sensors. Actors act on road users and influence their behaviour, while sensors are important to measure traffic, weather and other parameters that affect the traffic situation on the roads.

Information technology and the communication environment are also technical subsystems. The group of actors includes:

- traffic lights,

- variable message signs,

- information boards.

Traffic lights are commonly encountered, they are used to regulate the traffic flow by means of the red signal Stop. In Europe, energy efficient 10 Volt sources are used. However, LED traffic signals are now becoming more widespread, but their disadvantage is still the higher purchase price.

Variable message signs direct and control traffic on roads and inform road users in real time. They are divided into light-reflective and light-emitting variable message signs, are usually covered with a reflective film and are often illuminated by an external source.

Information boards help to inform drivers through simple pictograms or alphanumeric characters.

Traffic sensors are for example:

- traffic detectors,

- video detection systems,

- environmental monitoring.

Traffic detectors are the basis for the application of traffic telematics. There are a large number of them and they are classified according to physical principles, e.g. electromagnetic, infrared, optical or microwave detectors.

Video detection systems are the basis for successful traffic monitoring. They recognise the image and thus enable the positioning of detectors, e.g. speed or direction detectors, in the

field of view of the camera. At the same time, they can also detect violations of traffic rules and thus assist in dealing with traffic situations.

In telematics systems, environmental monitoring is the measurement of, for example, pollutant concentrations or weather conditions.

Equipping road infrastructure with ITS systems

Red light detection

Red light running detection is an intelligent traffic system that works by detecting and documenting vehicles that run red lights at intersections. An overview camera detects and documents the signal image of the respective traffic light and records the situation inside the intersection. Another camera captures vehicles passing through red lights and recognises their registration plate.

Traffic detectors

Traffic detectors are devices that provide input data and information for other traffic telematics systems. They started to be used during the 1960s mainly to measure traffic volume. Measurements are made using sensors - sensors that are usually placed either beside the road, above the road, directly into the road or on the road surface.

Environmental monitoring

Ecological monitoring measures the concentration of pollutants and their effect on the surrounding environment, weather conditions, noise and its effect on the surroundings, the effect of hazardous transport of dangerous goods, the quality of the road surface and other factors affecting the issue.

Measurement of section and instantaneous speeds

Instantaneous speed measurement systems are important telematics elements that contribute to reducing vehicle speeds, for example at the entrance to towns and cities. The basic element of the system is a microwave transmitter-radar and receiver built into an integrated cabinet together with electronics and a digital display

Penalty systems

Penalty systems, or also offence systems, remotely provide information about an offence against the rules of the road. This primarily involves the provision of evidence, usually a digital image of the vehicle, where the registration plate and other data proving the offence is legibly recognised

Variable traffic signs, information boards

Variable message signs convey information to road users through visual contact, which allows them to directly influence the traffic flow. They can be divided into light-reflecting, so-called passive, and light-emitting, so-called active variable message signs.

Road weather stations

Local governments use road weather stations for environmental monitoring. These provide early warning of dangerous influences such as ice, frost, fog, strong winds, snow and other phenomena that affect the condition of the road.

Traffic lights

The most common type of traffic actor to be encountered in normal traffic are traffic lights - semaphores. They display coloured light signals that are used to directly influence the traffic flow. Nowadays, so-called intelligent traffic lights are rapidly increasing in Czech cities and towns.

Weighing systems

Overloaded trucks cause the most damage to roads and thus reduce the safety of all road users. Weighing vehicles on the move will thus make it possible to eliminate this.

Video detection systems

Information about the presence of vehicles in a monitored location can also be obtained through image analysis. Video detection makes this possible. In the case of this technology, there is no intervention in the roadway, but a so-called virtual loop is created. The main advantage of this system is the ability to detect an obstacle in traffic and subsequently draw attention to it.

Visual surveillance

The camera system is mainly used for road management and maintenance. It monitors the current meteorological situation, the condition of the road surface, the road passability, the traffic volume, etc. It publishes visual data for the general public, which is freely available via information portals. However, this activity is seen as a by-product of the camera system.

ITS communication infrastructure

The ITS communication environment recognises 3 basic functions, data transmission, voice transmission and image transmission. The communication infrastructure of transport telematics includes e.g. Dedicated Short Range Communications (DSRC) which is mainly used for toll payment, multimedia transmissions which transmit e.g. SOS audio, CCTV and other data flows in a Local Area Network (LAN) or Wide Area Network (WAN) environment.

GSM transmissions via short text messages provided by mobile operators and RDS-TMC radio transmissions can also be used in the communication infrastructure.
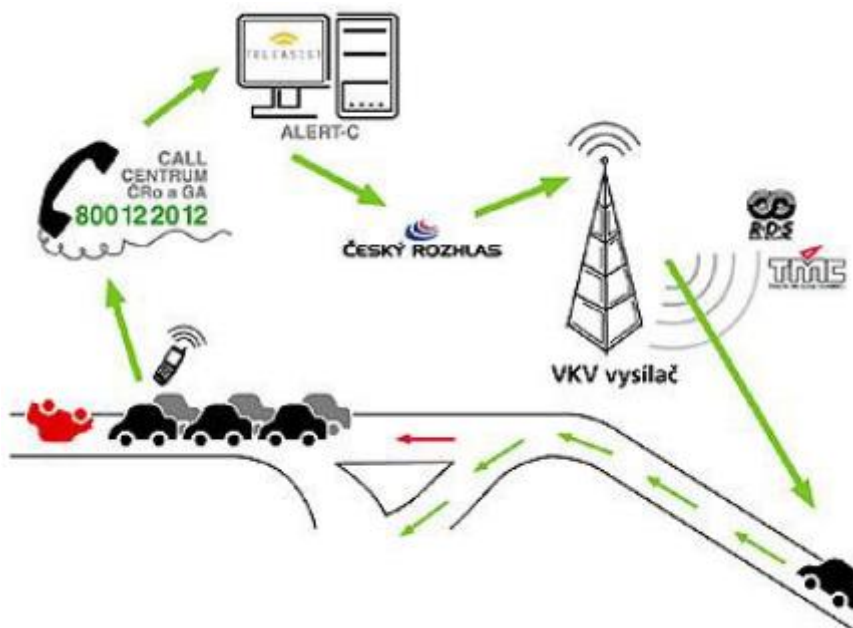
The benefits of traffic management using telematics applications

The intelligent traffic systems in place provide a high potential for reducing traffic accidents. ITS also have a positive impact on traffic congestion by providing timely information on the current state of traffic. They have also been shown to reduce energy, fuel and negative environmental impacts. The most important benefit of ITS is the sustainability of transport and the improvement of transport safety.

Transport sustainability

By managing and optimising traffic, ITS ensure the sustainability of transport. The main objective of state and local governments is to improve the mobility of the population by reducing traffic delays and travel times. However, telematics systems are not sufficiently interconnected and the information obtained is in many cases not up-to-date in time.

Road safety

Improving road safety and thus reducing road accidents is another important objective of the national and local government. ITS introduces preventive applications that should minimise the risk of traffic accidents.

An example of a free online intelligent transport system can be the programme Waze (www.waze.com) which offers GPS, maps, live navigation and traffic and information about road conditions.

Sources

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