

THE USE OF IOT IN RAIL LOGISTICS

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The Internet of Things (IoT) is a concept that involves connecting physical objects, devices and systems with the Internet and with each other to collect, exchange, and analyze data.

IoT technologies allow to integrate all assets of the railway system – rolling stock, infrastructure, cargo, security systems and visual means of information display – into a single information network.

This allows to create an integrated management system that optimizes the work of all elements.

Applications of IoT technologies in the railway industry:

1) Nowadays, IoT is being actively implemented in the operation of passenger and freight cars, locomotives and electric trains. IoT enables the monitoring of train movements and locations, which creates new opportunities to improve passenger services. With the information collected, railway staff can optimise processes such as loading and unloading, significantly improving overall operational efficiency.

In addition, the information from the sensors monitors the technical condition of the railway rolling stock and makes it possible to predict possible malfunctions. This helps to prevent breakdowns of individual components, which in turn enables a rapid response to problems, increasing traffic safety and reducing repair costs;

2) IoT technologies have a significant impact on railway infrastructure. For example, devices can be used at railway stations to control the flow of passengers and freight, IoT technologies also monitor the condition of railway tracks to prevent accidents;

3) IoT is also used to monitor the condition of drivers. This system can monitor their working hours and automate scheduling processes by managing work and rest times according to norms. The installed cameras

can record the driver's level of attention to the road, which can prevent cases of fatigue or safety violations.

However, at present, to realise a more effective IoT, it needs to be used in conjunction with artificial intelligence, machine vision, augmented reality tools, etc.

IoT is only one part of the digitalisation process, and companies need to build business processes that include both classic and innovative technologies.

Examples of effective IoT implementation in railway logistics are:

1) Rio Tinto: AutoHaul autonomous trains deliver goods 20% faster thanks to IoT analytics [2];

2) Russian Railways: The introduction of “Automated Infrastructure Diagnostics” has enabled a shift to condition-based rather than schedule-based service;

3) Union Pacific Railroad. Union Pacific has implemented a railcar access control system that uses RFID tags to control access to railcars and monitor their opening and closing.

4) CSX Transportation. CSX has implemented a train and car tracking system that uses GPS trackers to track the real-time location of its trains and cars.

However, in addition to the advantages mentioned above, there are challenges to implementation, these include:

1) Data security: The vulnerability of IoT devices to cyberattacks requires enhanced security;

2) Standardisation: The lack of universal documents for digital freight accounting slows down processes [3].

In conclusion it should be pointed out that IoT continues to change the industry, making it more predictable and customer-centric that provide a profound basis for future developments and applications.

References

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