Transportation safety for self-driving shuttles

The Rhine/Main Regional Transport Association is piloting a novel mobility concept – with AI software from T-Systems

Reference project:

"Computervision, the solution from T-Systems, is enabling us to pilot autonomous, on-demand mobility and helping us to ensure that our passengers feel safe."

Thorsten Möginger, Team Lead, New Mobility, Rhine/Main Regional Transport Association

The Rhine/Main Regional Transport Association (Rhein-Main-Verkehrsverbund, RMV) provides transportation to around 2.5 million passengers every day. It moved an impressive 808 million passengers overall in 2019. With nearly 300 cities and municipalities in the association, RMV covers nearly two-thirds of the German state of Hesse with its transportation services. Regional trains, metro lines, buses, subways, and trams drive more than nine billion passenger kilometers every year – making RMV one of Germany's largest regional transportation associations. It provides environmentally-oriented mobility to people in the greater Frankfurt region and beyond.

Environmental protection aspects, not least the German government's climate targets and the 9-euro ticket, have put public transportation back on the map for many travelers but have also shown where improvements are needed. The decision-makers at RMV are thinking about ways to make mobility more flexible and more customer-centric and to create stronger intermodal connections. Digital components also show potential here.

Specifically, RMV wants to pilot a shuttle service on the outskirts of its served area. Self-driving minibuses with a capacity of six to eight people will be deployed on routes where passenger volumes make it impossible to run conventional buses economically. This autonomous mode of transport saves the costs of drivers.

As the operator of this mobility-on-demand service, RMV is also responsible for monitoring passenger transportation – just like any other mode of transport. While driving personnel performs this duty on buses and trains, a different solution is needed for autonomous means of transport. RMV is piloting a digital solution for this task as part of a proof of concept that was launched in November 2022. Its subsidiary, Rhein-Main-Verkehrsverbund Servicegesellschaft mbH, has teamed up with T-Systems to do so.

At a glance

- New solutions for intermodal transportation
- Use of self-driving minibuses
- Satisfies the required monitoring of transportation safety
- A must: Compliance with data privacy laws
- Computervision from T-Systems as object recognition solution
- AI-based application on a local edge device
- On-board analysis of video data
- Anonymized data is transported to the customer's back-end system
- Dashboard for historical analyses and current status
- Data-protection compliant
- Foundation for business decisions

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Reference in detail

The challenge

Serving main lines in cities and metropolitan regions is only one facet of public transportation. Another facet involves predominantly rural, structurally weak areas where passenger numbers are low – and transportation services have a low frequency as a result. All the same, large regional transport associations also have to think about how areas and zones with low passenger numbers can be connected to the transportation network efficiently and economically. To do so, they are increasingly offering on-demand services such as "call-a-bus" services or shared taxis.

The emergence of the first self-driving buses is giving new impetus to this topic. But will autonomous buses provide a foundation for operating such services economically? And how can RMV, as the responsible organization, sufficiently monitor operations, perform its supervisory duties, and guarantee transportation safety? And how can all of this be done in compliance with legal regulations? After all, RMV also has to comply with applicable data privacy policies.

The solution

In November 2022, RMV launched a pilot project to operate self-driving shuttles on its own premises. The project integrates Computervision, a solution for person recognition. Deutsche Telekom Business Services (DTBS), which has RMV as its customer, established contact with T-Systems, which is implementing the solution.

In essence, it consists of an AI-based application that is installed on a powerful edge hardware device and can be connected with an on-board camera, which can either be already integrated into the bus or installed specifically for this purpose. The solution also features GPS tracking. However, the true intelligence of the solution lies in its pre-trained, AI-based application. Among other things, it is capable of scanning the passenger compartment. It can handle four specific use cases: It recognizes how many people are on the bus, whether they are wearing masks, whether they are standing, and whether a passenger has forgotten a bag.

A potential add-on is a tablet PC or screen that is integrated into the bus. Communications with passengers are implemented depending on the customer's requirements and can be mono- or bi-directional. For example, if a passenger is standing or not wearing a mask, they receive an appropriate message. The tablet PC also serves as an information medium in case unusual traffic situations arise – such as traffic jams or accidents.

The application on board analyzes the data from the object recognition software and transmits it to the customer's backend system. The Open Telekom Cloud, including a dashboard from T-Systems, can also be used as the back-end system. The important factor: While the on-board application records and analyzes videos, no still or moving images are sent to the back-end system. The application only identifies "three persons". This completely anonymized number is added to the dashboard and the stored data.

Customer benefits

The dashboard enables RMV to guarantee safety on the shuttle and to determine capacity utilization. Based on the data from the six-month proof of concept trial, RMV will be able to make sound business decisions on the wider deployment of the shuttles. At the same time, RMV has gained a solution that will also guarantee transportation safety in self-driving vehicles. In doing so, it is meeting its legal obligations as a transportation operator – completely compliant with data privacy laws since no personal information is transmitted.