# (idw)

### Press release

### Technische Universität Berlin Stefanie Terp

09/29/2021 http://idw-online.de/en/news776529

Cooperation agreements, Research projects Information technology, Traffic / transport transregional, national



## Automated Train Operation: Project Berliner Digitaler Bahnbetrieb with participation of TU Berlin

Over the next 4 years, a consortium of 12 partners will develop and test technologies for automated train operation in the project "Berliner Digitaler Bahnbetrieb" (BerDiBa).

The Daimler Center for Automotive IT Innovations (DCAITI) at TU Berlin is collaborating with the Fraunhofer Institute FOKUS to develop algorithms that enable automated vehicles to detect and recognize their surrounding environment. The Chair of Electronic Measurement and Diagnostic Technology at TU Berlin, in collaboration with the Zuse Institute Berlin, will develop an automated planning tool to schedule train maintenance works.

Automated train operation will open up new possibilities, for which the BerDiBa project is providing a first building block. Digital train operation encompasses three aspects: driverless trains, automatically-scheduled maintenance, and the possibility of remote control for situations in which autonomous driving is not possible, for example due to weather. The aim is to make rail traffic safer and its processes more efficient.

The DCAITI at TU Berlin is working closely with the Smart Mobility business unit of the Fraunhofer Institute FOKUS. The joint research team has many years of experience in teaching automated vehicles to reliably "see" and recognize the environment around them. In the BerDiBa project, researchers will train deep learning algorithms from artificial intelligence using specially-edited videos. This teaches the trains how to use sensors such as radar and lidar – "radar" with laser light – to correctly register their surroundings. They must be able to accurately identify both static objects, such as signaling systems, train tracks and stations, as well as dynamic objects, such as people, animals, vehicles and other trains.

#### Continuous monitoring of the train route

Long-term, continuous monitoring of the train route is of particular importance: Are there branches hanging across the route that could soon fall down? Has a hole suddenly appeared in a fence where animals or children could get onto the tracks? Thus far, train drivers are instructed to pay attention to such things. "This continuous monitoring is something we aren't familiar with from automated road traffic in this way," says Dr. Ilja Radusch, director of the business unit Smart Mobility at Fraunhofer FOKUS and head of DCAITI at TU Berlin. "This presents a whole new set of challenges for these algorithms."

#### Neural networks predict plant growth

Professor Dr. Clemens Gühmann from the Chair of Electronic Measurement and Diagnostic Technology at TU Berlin will also be looking into the so-called railway loading gauge – in other words, the space that must be kept clear of vegetation and other objects. Neural networks will use camera data that will be collected over the seasons to predict the further development of plant growth. This allows efficient planning of when and where to prune.

## (idw)

#### Fewer cancellations and improved punctuality

"We also use deep neural networks to obtain information from sensors on the train about the condition of its components," explains Gühmann. For example, the amount of electricity required by a door's actuator could change over time due to wear and tear. "Based on a multitude of such individual data we estimate when components need to be replaced," Gühmann says. In collaboration with the Zuse Institute Berlin, a planning tool is being developed that automatically and efficiently schedules the train's maintenance works. This not only enables the combination of repair works to save money – it also increases the reliability and thus the punctuality of the trains.

BerDiBa is receiving 7.6 million euros funding from the city of Berlin via the "Pro FIT" financing measure for innovative projects and has a total volume of 13.7 million euros.

The consortium comprises 12 partners from industry and research:

Industry

- acs plus GmbH
- AAI GmbH
- GSP GmbH
- ITQ GmbH
- neurocat GmbH
- Siemens Mobility GmbH (consortium leader)
- Teraki GmbH

Research and science

- DFKI
- Fraunhofer FOKUS and HHI
- TU Berlin
- Zuse Institute Berlin

Further information can be obtained from:

Dr. Ilja Radusch Daimler Center for Automotive Information Technology Innovations (DCAITI) at TU Berlin and Fraunhofer Institute FOKUS Phone: +49 (30) 914 2636- 410 Email: ilja.radusch@dcaiti.com

Prof. Dr.-Ing. Clemens Gühmann Technische Universität Berlin Chair of Electronic Measurement and Diagnostic Technology Phone: +49 (30) 314-29393 Email: clemens.guehmann@tu-berlin.de

Additional information:

Press release of the Berlin Senate, Department for Economy, Energy and Enterprises:

https://www.berlin.de/sen/web/presse/pressemitteilungen/2021/pressemitteilung.1102446.php



idw - Informationsdienst Wissenschaft Nachrichten, Termine, Experten