



# RELIABLE 5G SOLUTIONS FOR APPLICATIONS OF THE FUTURE

5G competencies and technology portfolio



# 5G WIRELESS TECHNOLOGY FROM AUSTRIA

## 5G research focus at the AIT Austrian Institute of Technology

The profound digitization and the associated comprehensive networking of all devices (IoT) in the most diverse fields of application represent an innovation dynamic for all areas of our life. Above all, the mobility and flexibility of the various areas of application call for a new powerful, reliable and safe wireless technology. The multitude of applications for all of us, Industry 4.0, Smart Cities, autonomous driving, etc. are based on new 5G mobile technology.

In Austria, the AIT Austrian Institute of Technology has established a comprehensive 5G research focus in recent years and has gained an international reputation in this field. Working closely with internationally renowned industrial and scientific partners from Austria, Europe and the US, AIT is creating a critical mass of technology competence in Austria to develop

state-of-the-art 5G technologies and new applications. These include connected autonomous vehicles which need to rapidly react to their surroundings, and smart-home systems (Internet of Things) as well as sensor networks for future digital factories and for robots which must work safely with humans, as well as intelligent indoor localization solutions.

### Applied research excellence for the international industry

- Intelligent multi-antenna systems and mmWave technologies for reliable vehicle communication
- Mobile communication solutions for flexible production lines in the production of the future (Industry 4.0)
- Wireless location systems for indoor use



## SAFE AUTONOMOUS ROAD TRAFFIC

Networked autonomous vehicles will need to exchange and combine a whole range of sensor information (radar, optical etc.), kinematic data and manoeuvre information in order to cooperate and reach collaborative decisions in difficult traffic situations. In doing so, they themselves become a significant element in the Internet of Things (IoT). However, this relies on extremely reliable wireless communications with minimal latency times. Cooperation between vehicles helps improve traffic safety and moves us closer to the goal of accident-free road traffic. AIT has extensive high-tech expertise in the field of intelligent antennae and wireless communication in challenging dynamic settings.

To give an example, in this context the AIT, together with NOKIA and AVL, is developing key 5G-based multiple-antenna systems to ensure reliable communication even at higher vehicle speeds. The research is carried out in the MARCONI project which is financed within the scope of the 'IKT der Zukunft' programme of the Austrian Research Promotion Agency (FFG)

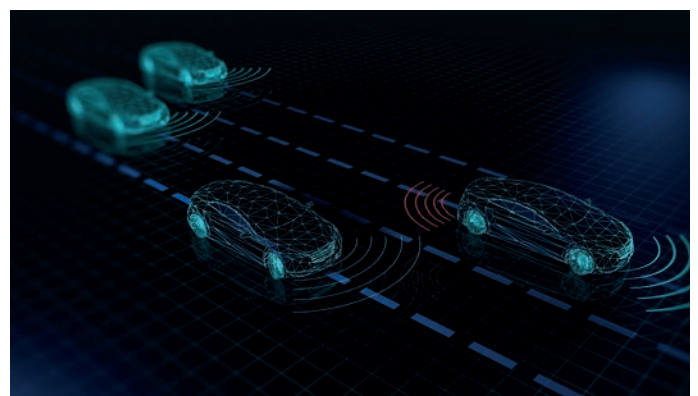
funded by the Federal Ministry for Transport, Innovation and Technology (bmvit).

## INTERNATIONAL RESEARCH COOPERATION

5G, the fifth generation of mobile networks, will be a real technological revolution and is subject of intensive research and development efforts around the world. By exploiting the newly available frequency bands above 28GHz, future 5G technology will achieve data transfer rates up to 100 times faster (up to 10,000 MBit/s) than current mobile radio standards. This will enable entirely new applications, one of which will be to help autonomous cars improve functionality, thereby reducing accidents and combating environmental damage.

To contribute to this goal, AIT has teamed up with research collaborators at the TU Wien, Brno University of Technology and the University of Southern California's Viterbi School of Engineering for a joint research project on radio wireless wave propagation in new frequency bands, measurement technologies and advanced estimation algorithms. This work into understanding propagation channels is a key prerequisite to improving communication between vehicles for road safety and autonomous driving to achieve the goal of zero accidents.

The international research collaboration allows us to combine the resources of all institutions for empirical experiments and for data evaluation, forming a critical mass for obtaining new breakthrough results.



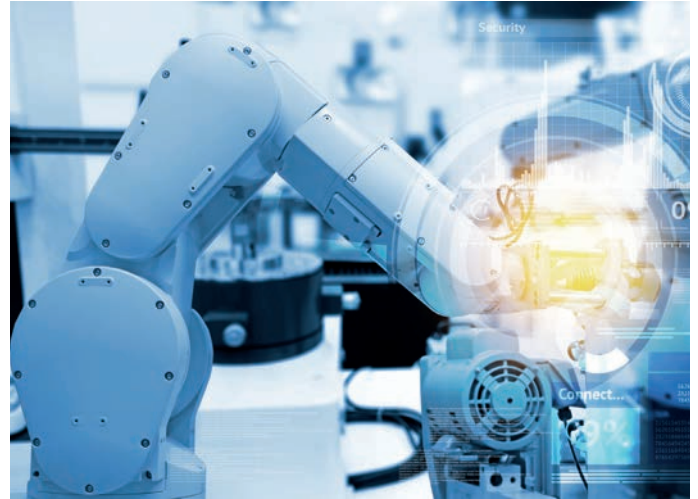
## MOBILE 5G COMMUNICATION SYSTEMS FOR THE PRODUCTION OF THE FUTURE

In the era of Industry 4.0, industrial production lines demand fast, reliable and, most importantly, mobile communication systems so that robots, for example, can work safely and effectively alongside people in the future. However, current production systems are severely restricted by the fixed wiring of their control systems. In order to achieve a high level of reliability and adaptability, future flexible production systems require new wireless transmission methods with shorter reaction (latency) times. Replacing cable connections with highly reliable wireless communication systems such as 5G would significantly increase the scope of reconfiguration in production facilities. This would pave the way for completely new and extremely efficient production processes.

AIT is now developing so-called low-latency key technologies together with Siemens Austria to enable reliable wireless control of production machines and robots in the future. The research is carried out in the UNWIRE project which is financed within the scope of the 'Produktion der Zukunft' programme of the Austrian Research Promotion Agency (FFG) funded by the Federal Ministry for Transport, Innovation and Technology (bmvit).

## LOCATING OBJECTS INDOORS

5G holds great potential for a wide variety of applications. In the future, objects in buildings will be able to be precisely and reliably located using 5G wireless technology, as GPS reception is technically not possible indoors. In this context, the AIT experts, in close cooperation with the indoo.rs GmbH and the German Heidelberg Mobil International GmbH, are developing state-of-the-art localization technologies for the reliable localization of indoor objects. The research focus here is on the modeling of radio wave propagation based on building floor plans with the aim of realizing an automated prediction of the strength of the radio signal and thus the precise and rapid location of objects. The development work is carried out within the framework of the European "eurostars" project "AGENT".



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