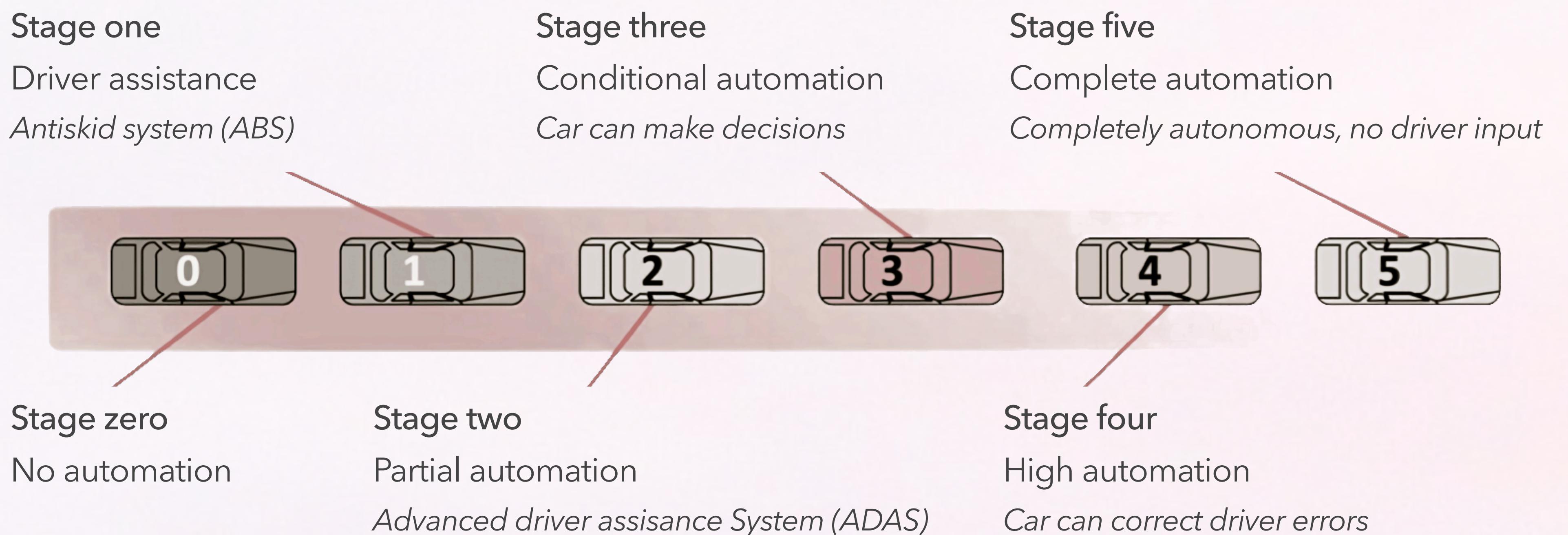


Internet of Things and autonomous driving

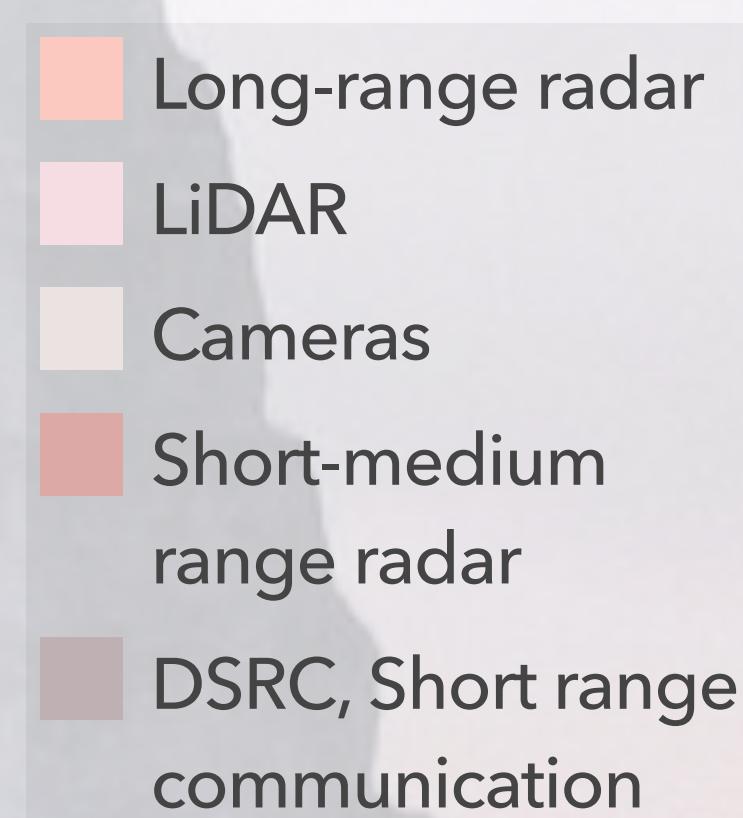
Introduction

Autonomous driving gets better day by day. Through new technology, we already made great strides forward concerning reduction of environmental impact, the viability of alternative fuels and increasing safety on the road. Autonomous driving will be the last puzzle piece to make personal transportation safer and better for the environment¹ through optimization of traffic flow. The Internet of Things, sensors and device intercommunications will make it possible.

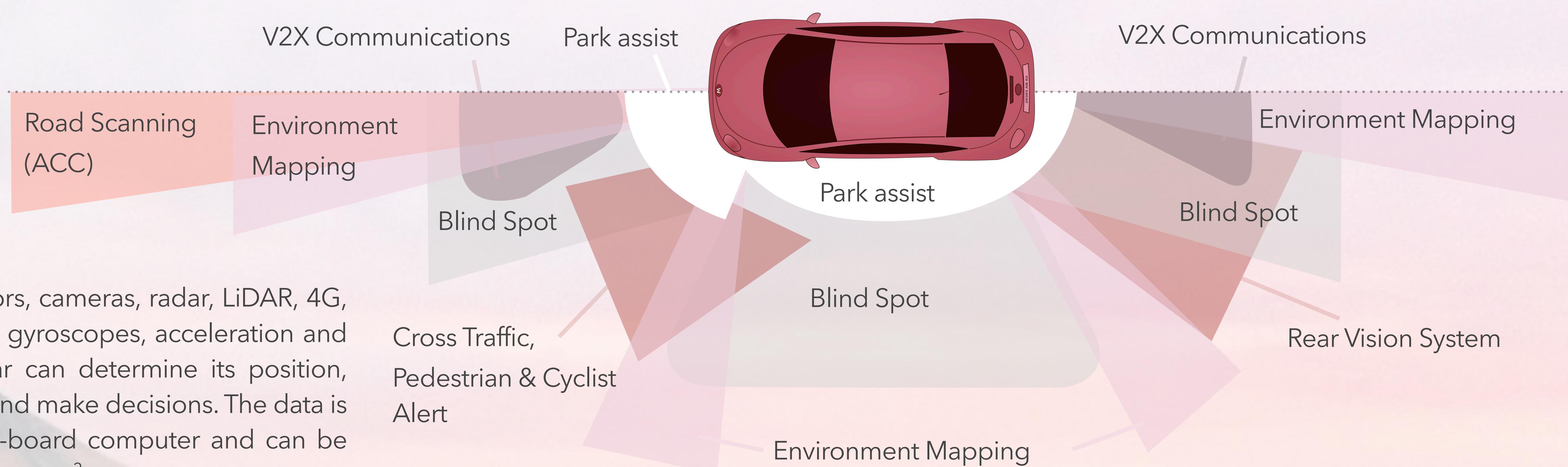
Stages of automation²



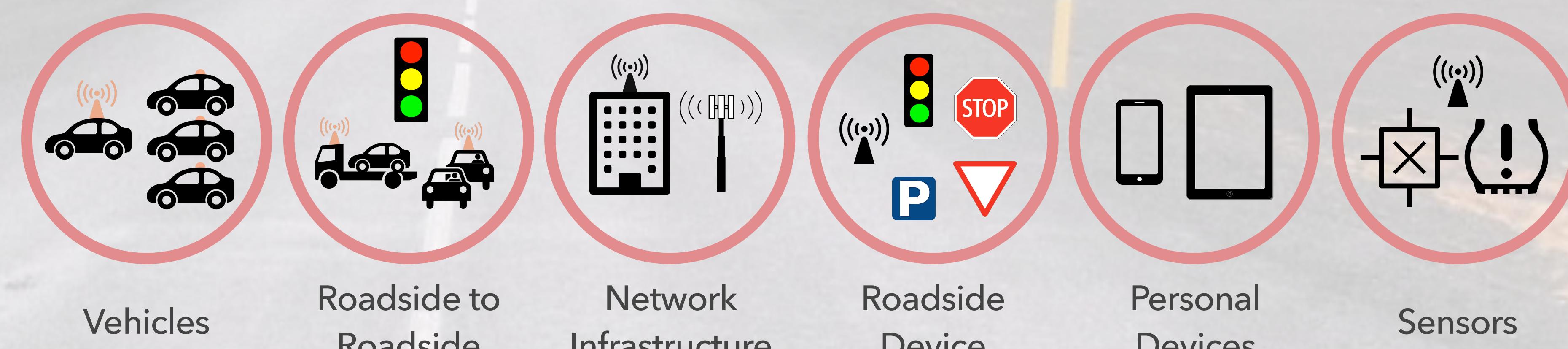
Safety systems in an autonomous vehicle



Using ultrasonic sensors, cameras, radar, LiDAR, 4G, Bluetooth, Wi-Fi, GPS, gyroscopes, acceleration and speed meters, the car can determine its position, scan its environment and make decisions. The data is calculated with an on-board computer and can be communicated to other cars.³



Communication through Internet of Things



Communication between many various devices is made possible through Internet of Things. The IoT is composed of a worldwide internet infrastructure, databases and cloud services. This network acts like a swarm intelligence and helps autonomous vehicles navigate, prevent accidents and analyze the traffic situation. Even installations like traffic lights can communicate directly with the vehicles.

Another big advantage is intercommunication between built-in sensors of autonomous vehicles. Together with artificial intelligence- and machine-learning-driven algorithms and advancements in software and hardware technologies⁴, autonomous vehicles will become better in the future and eventually will be able to navigate even without a network.

Discussion

Even though many people are sceptical of artificial intelligence and are concerned about cyber security, vehicle automation will certainly improve many issues with personal transportation. There are still big hurdles to conquer. One problem is human decision-making: Even the most advanced software and hardware can't reliably predict human drivers. accidents are still bound to happen in the future. There is also a potential for coding errors⁵, radar interference and bad weather conditions. The liability of accidents is also yet unclear⁶.

Another issue is anonymity and mass surveillance. We will need to make sure all data saved in the cloud are anonymized. Only that way our online privacy can be upheld.

Sources and literature

- [1] United Nations (2020): United Nations Sustainable Development, 17 Goals to Transform Our World. URL: <https://www.un.org/sustainabledevelopment/infrastructure-industrialization/> [Visited on 29.05.2020]
- [2] Synopsis (2020): The 6 Levels of Vehicle Autonomy Explained. URL: <https://www.synopsys.com/automotive/autonomous-driving-levels.html> [Visited on 21.05.2020]

- [2] Ercan, Serdar (2019): IoT and Smart Autonomous Cars. #EasyMobiliser. (27.03.2019)
URL: <https://blog.hslu.ch/majorobm/2019/03/27/iot-smart-autonomous-cars-easymobiliser/> [Visited on 21.05.2020]
- [3] Kahyam, Hamid et al. (2020): Artificial Intelligence and Internet of Things for Autonomous Vehicles. In: Dai, Liming / Jazar, Reza N. (Hrsg.): Nonlinear Approaches in Engineering Applications. New-York: Springer-Verlag. 39-68.
URL: https://www.researchgate.net/publication/335021813_Artificial_Intelligence_and_Internet_of_Things_for_Autonomous_Vehicles [Visited on 21.05.2020]

- [4] Causevic, Dino (2017): How Machine Learning Can Enhance Cybersecurity for Autonomous Cars. URL: <https://www.toptal.com/insights/innovation/how-machine-learning-can-enhance-cybersecurity-for-autonomous-cars> [Visited on 24.05.2020]
- [5] Gupta, Anil (2017): Five challenges in designing a fully autonomous system for driverless cars. (21.08.2017)
URL: <https://iiot-world.com/artificial-intelligence/five-challenges-in-designing-a-fully-autonomous-system-for-driverless-cars/> [Visited on 21.05.2020]

- [6] Oka, Dennis Kengo (2019): Securing the Modern Vehicle. A Study of Automotive Industry Cybersecurity Practices. URL: https://www.sae.org/binaries/content/assets/crm/content/topics/cybersecurity/securing_the_modern_vehicle.pdf [Visited on 21.05.2020]