Lernende Systeme

GERMANY'S PLATFORM FOR ARTIFICIAL INTELLIGENCE

Self-Learning Systems in Hostile-to-Life Environments

Report by the Working Group Hostile-to-Life Environment

Executive Summary

Whether exploring terrain that is difficult to access or carrying out rescue operations, the use of Artificial Intelligence (AI) promises to provide helpful solutions in hostile-to-life environments. Mobile robots and assistance systems that adapt to changed situations without needing to be re-programmed can effectively support human beings with activities in hazardous environments. These activities could include fires, disaster control and deep-sea maintenance work, for example. Self-learning systems like these reduce risks for the personnel involved, speed up responses in time-critical situations and plug capability shortfalls in situations where humans are not yet able to respond adequately. In doing so, they deliver valuable social benefits. At the same time, AI-based systems offer huge potential for research and the economy. Thanks to their ability to learn, they make operations in hazardous or poorly accessible environments much more cost-effective than manned missions – or even possible in the first place. There are, however, still a number of technical challenges that need to be met when it comes to deploying self-learning systems in hostile-to-life environments. These include ensuring long-term autonomy and autonomous learning in unknown environments. Another important area involves shaping the interaction and cooperation between autonomous robots or assistance systems and people.

To ensure self-learning systems are reliable, safe and will work entirely in the interest of people in hostile-to-life environments, and to harness their full economic potential, certain prerequisites and parameters need to be put in place.

The Working Group Hostile-to-Life Environments at Plattform Lernende Systeme cites the following development options:

Resolve research questions

- Work on key issues for developing and deploying self-learning systems in hostile-to-life environments

Establish infrastructures

- Create physical infrastructures and training environments for research and development (R&D) so that robotic systems can be used over long deployment times to collect data from their surroundings and use this data to learn
- Create comprehensive data pools and digital infrastructures to standardise learning, testing and evaluation processes for self-learning systems
- Provide reference platforms to offer opportunities for work and share R&D findings

Promote innovation

- Work together in business and research to define standards
- Focus on sustainable and minimally invasive solutions
- Clarify who is responsible when people are working in collaboration with self-learning systems in high-risk scenarios
- Generate trust by ensuring the public be appropriately informed and by leading a public and transparent discussion about the aims, benefits and challenges related to self-learning systems in hostile-to-life environments
- Build more flexibility into the public-sector procurement market so that new markets can be harnessed for the deployment of self-learning systems in hostile-to-life environments

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