Artificial intelligence and robotics – the powerhouses of everyday life

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On the verge of a breakthrough

We are in the middle of a great change in which research in AI and robotics focusing on technological research and development with its applied results have become available to everyone with generative AI applications. Artificial intelligence is nothing new in our daily lives in the operation and use of various applications, services, and devices. Robotics has long been used in industrial environments and increasingly in hospitals, for example. In our everyday life, robot vacuum cleaners and lawnmowers are familiar to most of us. AI is increasingly used in robotics in various ways, whether the question is about autonomous moving vehicles in mining areas, warehouses, or on the streets, or software robotics already applied in many fields. The distinction between robotics and artificial intelligence is blurred – not mutually exclusive, but rather mutually supportive and beneficial.

My own career began with the study of the prevention of collisions of autonomous machines about thirty years ago. Among other things, my studies in the university had included signal processing, image recognition and, during an advanced course, neural networks as a new theme. We studied how an autonomously moving machine could use ultrasonic sensors to identify and avoid obstacles in its environment. Among other things, a wheelchair was used as a research platform, with a sensor group attached to it. We even built ultrasonic sensors ourselves and developed and tested collision avoidance algorithms, both through simulations and in the actual environments. Today, various anti-collision and sensor solutions can be purchased ready-made. At the time, 30 years ago, when we were researching the topic in our research group, we could not anticipate this moment, and especially not that artificial intelligence could be used by anyone in their everyday life, studies, or work.

Lapland University of Applied Sciences develops the use of artificial intelligence and robotics

The Lapland University of Applied Sciences is currently running and preparing several RDI projects, as well as other activities related to the themes and use of artificial intelligence and robotics. An artificial intelligence and robotics research programme focusing on health and wellbeing is being prepared. Robocoast EDIH is a digital innovation hub consisting of 15 higher education institutions that aims to promote the competitiveness of SMEs in each province by supporting the adoption of digital technologies, including robotics and artificial intelligence. The Arctic RoboWelfare project with the University of Lapland strengthens the creation of ideas, the identification of applications, and the data-based utilisation of robotics in the Lapland area, and produces new information through various experiments for the developmet of welfare services. There are also project planning ongoing related to robotics in the area of tourism, for example.

Simulations, the creation and exploitation of synthetic data, and virtual reality and digital twins are important in the development, teaching, and testing of artificial intelligence or machine learning applications, as well as autonomous machines. The EU-funded ROADVIEW project aims to create a testing environment for autonomous vehicles suitable for challenging weather conditions using digital twins and synthetic data. The AGRARSENSE project will also develop a digital twin of a forest machine and simulate sensors to generate data from a forest environment for the training and development of artificial intelligence. Simulation is, in fact, an interesting way to produce synthetic data as well as to train and test artificial intelligence, robots or autonomous vehicles first in different simulated situations and environments – almost limitlessly and with an unlimited number of scenarios that could be generated by artificial intelligence.

In projects that have already been completed, digital twins and simulated environments have been developed for the mining industry (CHARM) and for the needs of education in the health care sector, reindeer husbandry and maintenance sector (Culture Expert, Poropeda, DUKE). The Lapland Robotics project has developed autonomous mobile robots for Arctic conditions, using artificial intelligence and developing digital twins. Machine learning has been developed in the Berry Machine project, in which photos are used to identify and predict berry yields instead of manual counting. These are just a few examples of ongoing and completed projects related to artificial intelligence and robotics at Lapland UAS.

In addition, with the application of generative artificial intelligence becoming part of everyday life, artificial intelligence is applied in studying, teaching, and the planning and evaluation of teaching and learning, as well as in other jobs and work tasks at the Lapland University of Applied Sciences. The use and application of artificial intelligence will be one of the necessary work skills for those who already are in the working life, and for students alike. Artificial intelligence, and generative artificial intelligence in particular, can contribute to equality in learning and working life through the support provided by technology, by supporting students with various learning difficulties, for example. On the other hand, we are facing new challenges and opportunities in how learning and the development of skills, thinking and application skills, as well as the evaluation of learning, will take place in this new era.

From the ethics of AI and robotics to the opportunities and challenges of their application

With its agile RDI and service operations, Lapland UAS plays a key role in supporting the region's business life in the disruptive opportunities of artificial intelligence and robotics as well as in solving the related challenges. In addition, the Lapland University of Applied Sciences also plays a key role as an educator. To complement concrete skills in the use and application of AI and robotics, we need to learn ourselves and teach our students responsible and ethical development, utilisation, and impact assessment of AI and robotics. The perspectives may include social, environmental and economic aspects. Ethical aspects also arise from the perspectives of the lifecycle of the data used by AI and robotics, with respect to data collection, use and storage, analysis and visualization, sharing in data ecosystems, and the archiving and destroying of data. RDI activities and its results increase our knowledge and understanding of everything related to the development and application of artificial intelligence and robotics. We can share this knowledge not only from the economic and environmental perspective, but also from the point of view of societal impact and other impacts, and involve students in creating this understanding and skills.

The articles in this theme issue of the Lumen magazine focusing on artificial intelligence and robotics discuss the theme with a multidisciplinary approach and from different perspectives. As an invited columnist, Senior Specialist Marko Latvanen from the Digital and Population

Data Services Agency offers an insightful opinion of the relationship and roles of artificial intelligence and human beings in his column <u>Artificial intelligence and illusions of humanity</u>. Latvanen is a popular guest lecturer for the Ethics and Responsibility in Knowledge Management course within the Expert in Knowledge Management master programme at Lapland University of Applied Sciences. His lecture on AI ethics always creates a lively discussion.

The theme articles illustrate the possibilities and challenges related to artificial intelligence and robotics in three application areas: tourism, law and business economy. In addition, identifying applications for smart and energy-efficient solutions related Lapland from the perspective of sustainability and circular economy is discussed, as well as the opportunities and challenges of using reindeer location information, highlighting the importance of the data ecosystems. -The push of artificial intelligence in teaching and the development of education is also brought up in the articles and opinions, as well as in providing guidelines and examples for using generative AI. Other articles and contributions deal with, among other things, learning, student guidance, and circular economy. The conversation with ChatGPT in the Hubotti 2.0 piece lightens the theme issue with its humorous touch.