

Interview: Ingolf Heil and Dr. Hans-Thomas Nürnberg on AI methods as needs-based applications

## Optimization through Self-Learning Software

We are seeing more and more frequently that artificial intelligence (AI) is encroaching into almost all areas of life. In an interview with Production Manager, Head of Software Development for PSI Logistics GmbH Ingolf Heil and Head of Engineering for PSI Logistics GmbH Hans-Thomas Nürnberg explain which AI methods PSI uses to transfer technology in the form of needs-based applications, and which role the technology transfer plays as part of this process within the Group.

**Mr. Heil, why has PSI Logistics pursued the theme of AI in product development so vigorously in recent years?**

Mr. Heil: It stood out for us as a logical consequence of the technological developments of the past decade. AI in itself is nothing new. The term was introduced more than 60 years ago, and since then its definition has become more concise in line with technical achievements.

Thanks to rapid developments in memory capacity and processor speeds, as well as in areas such as sensors and imaging, there are now technical possibilities for exploiting the potential of AI. It is important to make the relevant current options resulting from technological developments available in order to develop potential for optimization. Against this background, the PSI Group built up the relevant expertise at an early stage and pooled this expertise in a cross-sector community.

**What effect does this have on product development?**

Mr. Heil: For the PSI Group, it involves building our long-standing expertise in the field of AI methods and processes such as fuzzy logic or deep learning into the product develop-

ment carried out by group subsidiaries. The joint development platform that the specialized subsidiaries work on supports the cross-sector transfer of technology as part of this process.

**In this context, what is the significance of developments in sensor technology, imaging and robotics when it comes to software development?**

Mr. Heil: Computer science generally forms the basis for the coordinated management of machines and processes. With continuing automation and digitization, it needs to tackle additional tasks in terms of intelligent information processing, for example. As part of this process, computer science to an extent pools parallel and interdisciplinary developments across various technologies. Autonomous, self-driving vehicles on the road or in the warehouse, for example, do not know how to behave from capturing their environment alone. The information must be processed and implemented via control commands. The software takes care of all that.

**So does this mean that AI describes control software processes?**

Mr. Heil: This is only true to a certain extent. AI far exceeds this and is considerably more complex. It aims for an



Ingolf Heil.



Dr. Hans-Thomas Nürnberg.

adaptive software processes whereby the system independently learns to store information as empirical values, to process new and unknown data, and to make autonomous decisions. Establishing AI systems of this kind requires sophisticated programming. The first essential step is to teach, define, form clusters of and read patterns, characteristics and the corresponding responses for the operational applications.

## How do you imagine this working in practice?

Dr. Nuremberg: PSI Logistics has already implemented a system of this kind for the baggage conveyor system at Hamburg Airport. It demonstrates a combination of imaging, image processing and specific software processes or AI methods such as deep learning, and the integration of neural networks, which already form an integral part of the PSI Group's products.

## Can you give us a specific example?

Dr. Nuremberg: PSI Logistics has been working with its sister company PSI FLS Fuzzy Logik & Neuro Systeme GmbH to develop a neural network for automatic identification, documentation and tracing using surveillance camera systems, CCTV (Closed Circuit Television).

The PSIAirport/CCTV video surveillance module is able to identify pieces of luggage individually through imaging alone without additional scanners being necessary, and can control and document the luggage's journey along the conveyor systems. It also detects any damage to the pieces of luggage, automatically reports corresponding changes and helps with root cause analysis.

## How does software learn to detect damage?

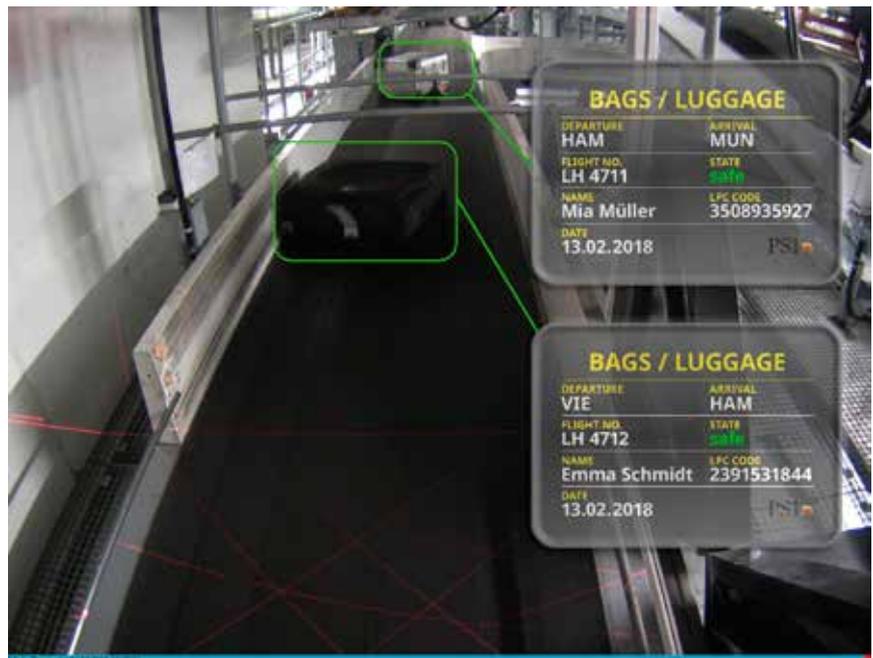
Dr. Nuremberg: As far as deep learning is concerned, we have the neural network at our disposal. This comprises special algorithms, initially consisting of more than 2000 images of pieces of luggage in different locations, "fed" from different perspectives. On this basis, the software "de-

fects" all other variants of baggage and individual characteristics.

At the baggage conveyor system, 200 high-resolution, ultra-HD cameras don't just capture each piece of luggage individually. The high resolution can even read the barcode at a higher read rate than with conventional scanners. The software links the images of the individual pieces of luggage across the entire conveyor belt to the barcode information and controls the flow of material. The advantages of this are that there is no longer a need for scanner technology, the error rate decreases and the need for resources for reworking—which for

applications beyond the airport. Is this a possibility?

Heil: We are already working on solutions for completely different packages with a view to integrating voice-based applications. The outlay invested in deep learning can already be justified in terms of container recognition and supporting applications for quality assurance. We are currently exploring more options for applications for multi-criteria optimization of logistics networks. The potential for optimization as a result of integrating AI is far from exhausted where software development



*PSIAirport/CCTV uses imaging alone to identify individual pieces of luggage.*

conventional processes relate to up to 10% of the baggage volume—is no longer a concern. The service level increases and baggage handling as well as the condition of the case can be seamlessly documented and archived.

**This also sounds like it could be significant in terms of intralogistics ap-**

is concerned. It is still an exciting prospect. 🌀

PSI Logistics GmbH  
Phillip Korzinetzki  
Marketing Manager  
Phone: +49 231 17633-280  
p.korzinetzki@psilogistics.de  
www.psilogistics.de