## Young Disruptors

M. Kaiser
CEO
Smart Systems Hub GmbH, Dresden, Germany

**Biography**
Michael is CEO Smart Systems Hub GmbH
The Dresden Smart Systems Hub focusses on the comprehensive integration of hardware, software and connectivity as the foundation of our digital future. These are key success factors for the digital transformation of businesses of all sizes and branches: the intelligent professional and technical integration of users, different devices and business models on a basis of a simply applicable, standardized, safe, globally available and scalable software platform. The Smart Systems Hub - belongs to Germany's Digital Hub Initiative

## Depth View Pro ™ - A high-speed and high-resolution imaging system with up to 20 times extended depth of field

N. Bosmans
CTO
Invenira, Leuven, Belgium

**Abstract**
Invenira and Nedinsco have jointly developed the Depth View Pro™, a disruptive imaging system capable of twenty times increasing the depth of field while maintaining micrometer resolution and operating at high frame rates.

A wide range of applications require a vision system that can image fine details of three-dimensional objects. Existing vision systems fail in capturing these details simultaneously with a high resolution at high speed over a high depth. This is due to a so-called limited depth of field resulting in most parts of the object being out of focus.

Capturing all features over the entire object height typically requires mechanical scanning, which drastically reduces throughput, or the use of multiple cameras, which results in a large and costly imaging system. One alternative is to use a liquid lens, which allows for fast scanning, but still requires multiple frames to capture

the entire depth of field. A light field camera, on the other hand, could capture the entire object in one shot, but is limited in resolution and speed with respect to conventional cameras.

The Depth View Pro™ overcomes all of these issues. The system creates high-resolution images with an extended depth of field at high speed in one shot by combining patent-pending optics and state-of-the-art image processing. The Depth View Pro™ enables full inspection of components with micrometer features with an unmatched throughput. The technology can for example help to drastically reduce the number of defects in products and improve the yield of high-demanding manufacturing processes.

**Biography**
Dr. ir. Niels Bosmans is the CTO and co-founder of Invenira. He has a background in electromechanical engineering and is an expert in optomechatronics. In 2016, Bosmans obtained a PhD at the University of Leuven in Belgium for his work on an ultra-precision position measurement system for machine tools and CMMs. He received multiple awards for his work from the European Society for Precision Engineering and Nanotechnology and the American Society for Precision Engineering. He also developed various advanced optomechatronic systems for companies such as Philips, FEI Company, VCST Industrial Products and Wielandts UPMT. In 2017, Bosmans founded Innovate Precision to support companies in radically enhancing the precision and speed of machines, metrology systems, optical systems and manufacturing processes. Innovate Precision typically develops ground-breaking solutions that increase the precision and productivity by an order of magnitude. Invenira and its disruptive vision technology originate from Bosmans' work at Innovate Precision.

**New approaches in the field of pressure less/ low pressure sintering for large surface area sintering**

B. Rábay
CEO
Nano-Join GmbH, Berlin, Germany

**Abstract**
In this work we will present the newest results in the area of low pressure/ no pressure silver sintering on using solvent free silver sintering pastes. With these new materials sintering with low or no pressure at 250 C results in very dense silver interconnects between electronic components. We present a process were copper to copper surfaces larger than 1.000 mm^2 can be sintered with only 5 MPa, resulting in shear strength above 60 MPa.

**Biography**
Dr. Battist Rabay, CEO and founder of Nano-Join GmbH, a company established in 2015 in Berlin as a spin-off from TU Berlin, has received his PhD at Humboldt Unversität zu Berlin in the field of inorganic chemistry in 2014. Right after, he started Nano-Join with friends from TU Berlin. Since then, Battist Rábay represents Nano-Join and pushes the development of innovative sintering materials with his colleagues to help industry to make their products market ready for the new challenges in the field of efficiency and life-time improvements.

**Shaping the Quantum Future from Europe**

J. Goetz
CEO
IQM Quantum Computers, Espoo, Finland

**Abstract**
Quantum Computing offers revolutionary possibilities for future technologies. Quantum applications include drug development, logistic control, and portfolio optimization in finance. To use quantum computers in the related industries, the size of quantum processors has to increase by roughly one million compared to the current state-of-the-art. Large efforts in this direction are driven by the US and China. To ensure the success of the European quantum ecosystem, we have recently launched IQM, a company to develop scalable quantum processors. Together with European research partners, our goal is to establish Europe as the leading player in commercially viable quantum technologies.

**Biography**
I received my PhD on superconducting quantum circuits in 2017 from Walther-Meissner-Institute and TU Munich and continued as a Postdoc in Helsinki at Aalto University. Helsinki is a great hub for quantum technology, which allowed me to receive a Marie Curie Fellowship from the European Union. At Aalto, I have been involved in the local Quantum Computer Project, where several research groups and the State Research Center VTT are co-developing a quantum processor. Based on these efforts and together with three co-founders, I have been spinning off a company, IQM Finland Oy. Since February 2019, I am the CEO of IQM and we are now expanding our operations on the research campus in Espoo (Helsinki area). IQM's goal is to develop the superconducting quantum processors for large-scale quantum computers.

**Transforming Spectroscopy from the lab into mass market applications with SENORICS disruptive photodetector technology**

R. Timmreck
CEO
SENORICS GmbH, Dresden, Germany

**Abstract**
**SENORICS** is a start-up originating from the University of Technology Dresden commercializing an optical sensor solution for near-infrared (NIR) spectroscopy based on organic electronics. This proprietary technology allows small, robust, wavelength selective and fully customizable detectors enabling NIR-spectroscopy on a chip level. Thus, SENORICS can deliver unique solutions for a multitude of measurement and detection problems in industrial applications. Examples are determining ingredients or compositions of raw materials, consumables or end products in the food, chemistry, packaging or automotive industry and many other branches.
Moreover, SENORICS technology is enabling the design of new small and mobile mass market devices for consumers including NIR-spectroscopy chips for smartphones.

**Biography**
Dr. Ronny Timmreck received his diploma degree in physics from the University of Technology Dresden, Germany and his PhD for a work on organic solar cells in the group of Prof. Karl Leo renowned for the organic electronics start-ups Novaled and Heliatek. Ronny founded his first start-up at the age of 23 and developed this company to a leader in its branch. In 2016 he took the lead in the start-up project SENORICS. Since the foundation of SENORICS in 2017 he is CEO.

**Biotechnology meets Industry - Today: Overheating Alert Solution**

H. Adamski
CEO
4GENE GmbH, Freising, Germany

**Abstract**
4GENE´s innovative, biotechnological process allows for the production of a new form of sugar-bound odors (namely glucosides) as they naturally occur in crop plants. They can be released from their bound form by different triggers, such as heat. The possibility to realease a previously bound and non-volatile odor due to heat means, that the odor can be used as a warning signal in technical applications.
When placed onto technical devices like cables, tubing or printed circuits in the form of small labels as a carrier for the bound odor, they become pyrolysed in case of overheating and the released odor signature acts as the warning signal for overheating (>80–130°C) – the odor is “turned on”. When temperature isn’t in the critical zone, the odor is likewise “turned off”.
For this warning signal application, an odor that is uncommon in the surrounding of a technical installation but not awkward should be selected, and the odor should be removable by air conditioning. 4GENE offers 4 different odors or a mix of those for such use.
The major benefit of our solution is that you will be given enough lead time before something actually happens (e.g. fire) to shut down the machine or the device in question. This enables you to not only prevent the fire from starting but also it prevents financial damage and a shutdown of the damaged machine. Further more it helps to protect yourself, your family or in a corporate environment protect your employees.
Compared to traditional solutions, the 4GENE flavor-on-demand technology does not use any hardware and therefore cannot fail. There is no equivalent or comparable solution available on the market today.
4GENE does not produce any pollution and we use green energy whenever possible during production.

**Biography**
Heimo Adamski

*State-certified Business Information Manager with over 35 years of experience in international sales & marketing in corporations and start-ups.*

**3D electronic packaging for IoT devices – from prototype to series production**

T. Tiedje
Research Associate
TU Dresden IAVT, Faculty of Electrical and Computer Engineering, Electronics Packaging Laboratory, Dresden, Germany

KONEKT

**Abstract**
Rethinking electronic manufacturing - why do electronic components always have to be soldered onto a printed circuit board? Is it not possible to omit the printed circuit board at all and integrate the components directly into a single chip package instead? This was the question asked by Prof. Bock's team of four researchers at the Electronic packaging lab of the TU Dresden. The result is a manufacturing approach that saves around half of the process and design steps. Thereby, today's and tomorrow's challenges such as high-frequency transmission, cooling and miniaturization can be managed. The technology is called "connecting embedded components as a technological solution" – shortly KONEKT in German. The team around KONEKT raised the EXIST research transfer funding of the BMWi. This enables the production of adaptively manufactured 3D assemblies on large and competitive dimensions. The KONEKT-technology revolutionizes the electronic assembly by using 3D manufacturing and realizing high-frequency interconnects. It combines the possibility of producing individual packages of rapid prototyping and manufacturing at a large scale. Simplified processes facilitate fast and automated production of various assemblies. Therefore, energy, process and material costs will be reduced. Now, small and medium-sized companies have the opportunity to establish new business fields by ordering individual electronic packages without high set-up costs. During the EXIST-project the KONEKT team will establish a company, which will offer 'packaging-as-a-service'.Tobias Tiedje (KONEKT project manager): "With KONEKT a wide variety of products can be realized, starting from 3D-sensor systems as prototype up to RFIDs and high-frequency assemblies in series manufacturing for the Internet of Things (IoT). The clients will have much more possibilities in designing their product without limiting their creativity and innovation."

**Biography**
Tobias Tiedje holds a degree in Electrical Engineering from TU Dresden. He held positions at the Electronics Packaging Laboratory at TU Dresden, including team lead of the junior research group „Communication infrastructure for atto networks in 3D chipstacks (Atto3D)". Since May 2019 he leads the KONEKT project.

Friedrich Hanzsch holds a BSc. in Accounting and Finance, MSc. in Resource Economics from Technische Universität Bergakademie Freiberg. He worked at DAS Environmental Experts GmbH as employee in Quality Management and joined KONEKT project in May 2019 as CMO.

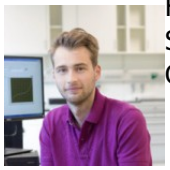
# A disruptive workflow for planning, monitoring and improving automated material handling systems

M. Erler
FlowLogiX GmbH, Dresden, Germany

**Abstract**
Automated material handling systems (AMHS) are the future of intralogistics. Due to rising staff costs – especially in high-wage countries – the only way to stay competitive is to fully automate handling of materials inside the production. With increasing spread and size of such systems (e.g. AGV or OHT) the complexity on planning, monitoring and improving rises exponential.
Main reason therefore is that each task is performed with a separate software although they actually share a lot of information. This leads to exploding affords on modelling, searching and data handling. As a result, some very useful tools like simulation studies become so expensive that they are rarely used.
FlowLogiX Maintenance and Monitoring Suite (MMS) is a single browser-based application combining all tools needed to plan, monitor and optimize an AMHS. This enables completely new workflows. There is no more need to setup an internal simulation-project just figure out, whether the AMHS has enough capacity to handle the closed track due to maintenance next week. With just a few clicks inside the same application the result is available within seconds and presented in an understandable manner.
Organizational and human boundaries between areas of work disappear and become small tasks in a single efficient workflow.

**Biography**
Martin Erler is passionate about sophisticated planning software and how it can support efficient workflows in companies. Martin started his career at Technische Universität Dresden in 2010 with researches on planning processes and techniques for cutting technology. He developed a method for fully automated estimation of roughing times based on CAD-Data. In 2015 he changed his field of research to intralogistics – especially automated material handling systems. He believes that those big systems are the future of intralogistics. As result of a software project for a big semiconductor manufacturer he decided to concentrate his experiences about good planning and put it into one software every company can buy. Today Martin is CEO and co-founder of FlowLogiX GmbH.

**Brain efficient networks**



K.-U. Demasius
Semron Demasius Kirschen GbR, Dresden, Germany

**Abstract**
Today's potential of AI applications is limited by hardware efficiency. With SEMRON´s patented new device design SEMRON will create world's most efficient AI chip.

The use of Artificial Intelligence (AI) is restricted by energy and bandwidth. One might think about smartphones, IoT nets or latency in autonomous driving. Furthermore safety aspects are of critical importance. Edge computing may prevent a centralized net from DDoS attacks.

Today almost all of the energy is used to transfer data within the chip or memory access. With a new hardware design SEMRON overcome these issues. Its analogue approach uses in-memory computation and avoids data transfer to an external memory.
Of course SEMRON will not produce these chips by itself but fabless focusing on IP. The team will integrate their CMOS compatible technology on a chip and support customer usage by an own software tool chain, utilizing an open source cross-platform compiler. The customer is able to use their common front-end tool (e.g. TensorFlow 2.0) without manual adaption.
Market segments which will extremely profit from this new chip are numerous. Examples are new generations of smartphones protecting their data by keeping them in the device while running AI applications or larger IoT nets with limited bandwidth and better self-learning capacity on the edge. Level-5 self-driving cars require AI engines with enhanced energy efficiency.
Join the next generation of AI Chips.

**Biography**
Kai-Uwe Demasius – born 1991 in Johannesburg, South Africa – got in touch with microelectronics early in his life: during the "Invent a Chip" competition he already designed a digital microchip as a teenager followed by a patent on an electrostatic sensor. He then studied electrical engineering at Dresden University of Technology from 2011 to 2016 with specialization in Micro- and Nanoelectronics. In 2014 Kai-Uwe did an internship at IBM Almaden Research Center in San José, USA, which led to a publication in *Nature Communications*. He got the top student award "Enno Heidebroeck Urkunde" from TU Dresden. From 2016 till now he worked at Max Planck Institute of Microstructure Physics to obtain his PhD.
The work presented here was part of his and his cofounders (Aron Kirschen) diploma thesis and Kai-Uwe´s PhD.