

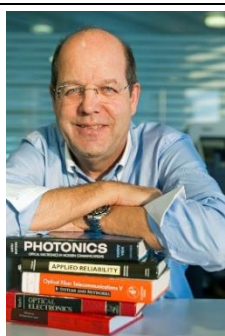
Smart Surveillance Sensors

This workshop is designed to get a glimpse at the market roadmap (market push or pull) for smart sensors and at the technology roadmap (technology push) of smart sensors development.

It is the goal of this workshop to identify the gap between market and technology push and to discuss possibilities to close this gap by Innosuisse matching funding projects.

Tuesday May 24, 2022 at Fachhochschule Graubünden in Chur

Moderators



Dr. Christoph S. Harder

President Swissphotonics, 8832 Wollerau SZ

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Dr. Christoph S. Harder received the ETH Diploma in 1979 and the Master and PhD in EE in 1980 and 1983 from Caltech, Pasadena, USA. He is cofounder of the IBM Zurich Laser Diode Enterprise which pioneered the first 980nm high power pump laser for telecom optical amplifiers and laser diodes for industrial and consumer applications with ultrahigh reliability. He is the recipient of a Fulbright scholarship and the OSA Fellow recognition. Christoph is now heading a consulting company and is cofounder of Swissphotonics and has been its president for the last few years. He has published more than 100 papers and 20 patents and has held a variety of staff and management positions at ETH, Caltech, IBM, Uniphase, JDS Uniphase, Nortel and Bookham and has volunteered on society boards and committees.



Dr. Christian Bosshard

Managing Director Swissphotonics, 4415 Lausen BL

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Dr. Christian Bosshard received his degree in Physics (1986) and his doctorate (1991, Silver medal award) from ETH. From 2001-2021 he was working at CSEM, first as Section Head and then as Vice President and Head Photonics. Since 2013 he is Managing Director of Swissphotonics. Christian is a Fellow of Optica, Board Member of EPIC, and Member of the Board of the University of Basel.

Speakers



Prof. Jürg Kessler

Rector of the University of Applied Sciences of the Grisons, FHGR Chur, 7004 Chur GR

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Jürg Kessler has been president of the UAS of the Grisons since 2003 and is a professor of business management with expertise in strategy development, risk management, crisis management, university management and quality management. He integrates the principles of sustainable development into his field.

Jürg Kessler completed his studies at the ETH Zurich as a graduate surveyor (MSc ETH), then worked for several years in a company as an engineer. With his professional experience he also completed a degree in economics at the University of Zurich as lic. oec. publ. (MA UZH).

Welcome to the University of Applied Sciences of the Grisons FHGR



Prof. Dr. habil Udo Birk

Head Advanced Training Technics, Institut for Photonics and Robotics (IPR) at The University of Applied Sciences of the Grisons FHGR, 7004 Chur GR

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Udo Birk obtained his PhD in 2004 at the University of Heidelberg. As Marie Curie Fellow he developed optical imaging devices at King's College, London, UK and at FORTH, Heraklion, Greece. He worked on tissue imaging and spectroscopy at Roche Diagnostics and at the Medical Laser Center Lübeck and obtained his venia legendi in Experimental Physics from the University of Mainz in 2017. He is lecturer on Image Processing and Artificial Intelligence at University of Applied Sciences of the Grisons.

Smart Surveillance Sensors

Smart Surveillance Sensors allow to detect, identify, and track people and objects. Additionally, such sensors may provide means for human machine interaction. These devices are constantly being redefined and augmented and applied to broad fields ranging from mobile devices to smart homes to smart cities. We review challenges encountered in the application of smart surveillance sensors and illustrate some use cases.



Christian Thöny

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Experienced Chief Executive Officer and Director of Boards with a successful history of working in the industrial automation industry. Skilled in strategic Business Planning, Innovation Management, Industrial automation, Continuous Improvement, Merger & Acquisition, Corporate Governance in a global set-up. Strong business development professional with a Certificate AMP focused in Advanced Management Programme from INSEAD.

Products and market trends

"Sensors are the source of all data, hence the origin of monitoring, surveillance and control of a machine or process flow status. IoT is an omnipresent and superimposed task literally for all industrial and service oriented entities and organizations, private or public. But IoT is worth nothing w/o sensors. Countless sensors are built and installed every Year, in conjunction with IoT it will grow towards trillions per Year. Sensors evolve from simple one or two dimensional devices to intelligent three dimensional sensors systems or even to a fusion of multiple sensors. The technical requirements are enormous, since the higher degree of intelligence also requires robustness regarding ambient impacts. But not only the technological demand is high, the social and environmental increased standards and codes gets more and more challenging."



Prof. Dr. Carlo Bach

AI and vision expert at The University of Applied Sciences OST Campus Buchs, 9471 Buchs SG
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Carlo Bach is Professor of Computer Science and Image Processing Head of Machine Vision Competence Area at the Institute of Microtechnology and Photonics at the OST Ostschweizer Fachhochschule Campus Buchs - the former NTB. He deals with tasks of automated visual inspection in industrial environments using 2D and 3D imaging techniques. Classical methods of image processing are used for evaluation, but increasingly also machine learning methods.

Image processing for smart sensors at OST

Not only camera sensors become smaller, faster and cheaper, but also the software toolchain becomes more and more powerful and easier to use. We present recent applications of machine vision systems based on smart sensors and modern software programs like methods from machine learning. We will present challenges and limits of these new methods.



Beat de Coi

Founder, CEO & President of the Board ESPROS Photonics Corporation EPC, 7320 Sargans SG,
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Beat de Coi founded Cedes AG in Landquart in 1986. The company develops optical sensors for elevators, automatic doors and gates. Cedes became the world market leader and employs 400 people worldwide. In 2006, De Coi founded Espros Photonics AG in Sargans. It researched a fundamentally new semiconductor technology for 3D time-of-flight cameras. From the results of this basic research, the company develops camera chips. De Coi was "Entrepreneur of the Year" in 1988 and most innovative entrepreneur in the canton of Graubünden in 1999. In 2004, together with CSEM, he won the "European ICT Grand Prize", worth 200,000 euros. In 2017 he was elected into the SATW De Coi is an electrical engineer HTL, university councilor of HTW Chur and founding member of the Swissmem Photonics expert group and serves on several boards.

3d camera as smart surveillance sensors

Fall detection in nursing homes is a topic which becomes more and more relevant. On the one hand, population gets older so more and more nursing homes are required. On the other hand, less and less well educated caregivers are available. These two contrary trends are asking for automation in nursing homes. Video surveillance is possible, but a lack of privacy is the key issue. 3D cameras fill this gap because they monitor an entire room allowing complete freedom of movement for the residents. As a result, they can detect emergency situations to send an immediate alarm. But, and this is the main argument to do the monitoring with a 3D camera, the system respects the full privacy of the resident.



Dr. Selina Casutt

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Dr. Selina Casutt holds a diploma in physics and a PhD in laser physics, both from ETH Zürich. She started her career in industry with Optotune AG as an application engineer for the integration of tunable lenses. From 2014 to 2021, she worked at FISBA AG as project and team leader for product development of optical systems, mainly optical microsystems for endoscopic applications. In 2021 she joined Swissmem as division manager NTN Innovation Booster Photonics.

NTN Innovation Booster Photonics, Call for radical innovation

The NTN Innovation Booster Photonics (NTN IB-P), powered by Innosuisse, with the leading house Swissmem, aims to boost more radical innovation ideas and helping them getting off the ground. It brings together key players from research, business and society on an innovation topic and stimulates the development and testing of new ideas in interdisciplinary teams. In this presentation, we will discuss the criteria, benefits and concrete example of an NTN IB-P project in addition to the general objectives and activities of the NTN IB-P



Christoph Schlott

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Since 2013 Christoph is working at BBC Bircher Smart Access in several roles in Product Management, Business Development and Strategic Marketing. The company develops tactile and non-tactile sensors for the segments Building Automation, Transportation and Access Products & Services. With the ongoing development of buildings, smart sensors for usage-adapted access control and hygienic access systems became focus of his activities. Prior to his work at BBC Bircher Smart Access he worked in SMEs in the construction industry and the renewable energy sector where he accompanied development projects with Fraunhofer ISE Institute and Bayer MaterialScience. Christoph Schlott studied Economics and Business Administration in Konstanz and Hamburg.

Advantages of 3D object-recognition in automatic access-systems

Operational efficiency, sustainability and modern space management are key drivers of building automation. As an essential element of people and vehicle flow applications automatic access systems serve multiple purposes in this context. Smart sensors are required to fully leverage their potential and to meet the challenges arising from global trends and social change.



Dr. Oliver Saurer

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Olivier Saurer has obtained his PhD from the Computer Science Department at ETH Zurich under the supervision of Prof. Marc Pollefeys. After graduation in 2016 he co-founded Astrivis, a company which specialises in real-time photogrammetry for off the shelf hand-held devices.

Mobile 3D Reconstruction

I'll present a complete on-device 3D reconstruction pipeline for mobile monocular hand-held devices, which generates dense 3D models while simultaneously supplying the user with realtime interactive feedback. The method fills a gap in current cloud-based mobile reconstruction services as it ensures at capture time that the acquired images fulfill desired quality and completeness criteria. We demonstrate the performance of the reconstruction pipeline on multiple challenging scenes of different size and depth variability and compare reconstruction accuracy to high-end 3D scanners.



Dr. Andrea Dunbar

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Andrea Dunbar studied physics at St. Andrews University, obtained her PhD at Trinity College, Dublin before joining the EPFL Institute of Quantum Electronics. In 2007 she joined CSEM, where today she leads the Edge AI & Vision group which works on machine learning, intelligent vision systems including machine vision and multispectral systems. Their active research is on ultra-low power systems including low power imagers and hierarchical computing for IoT applications. She is a reviewer for IEEE, an active advisor on two start-ups and lectures on digitalization at EPFL

Real Time Pilot Eye Gaze Tracking in Cockpits

In this work we present an intelligent vision system, which allows real-time human-machine interaction in cockpits increasing efficiency and reducing pilot's workload. Adapted hardware, use of state-of-the-art computer vision techniques and machine learning algorithms in eye gaze and gesture recognition allow a smooth, and accurate real-time feedback system. The system's performance can give real-time, 3D-face reconstruction, 3D-head pose estimation, eye gaze tracking with < 1 degree accuracy, eye-feature extraction (pupil, iris, and corneal curvature center). The system was developed with aviation experts from ETHZ, SERMA and SWISS AIRLINES within an EU-CleanSky project: PEGGASUS.



Claude Florin

CEO and founder of Fastree3D SA, 1024 Ecublens VD

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Claude Florin pioneered fast read-out sensors for motion detection, leveraging EPFL's photon detection technology. He brings 25 years of complementary experience in the field of image and video processing for biomedical engineering and communication applications. In his career, he launched a 3D medical imaging joint venture between HP Labs and Philips Healthcare. He also deployed embedded signal processing and video coding in the world's largest mobile networks. Claude Florin has been a co-founder of three start-ups and managed angel investments in a dozen others. He holds an MSc. from EPFL, and management education from MIT Sloan.

Software-defined Flash LiDAR on a chip

We present software-defined LiDAR benefits to multiple applications. Our implementation is based on CMOS SPAD arrays and VCSEL flash illumination and provides outdoor near-range sensing. The approach improves background light mitigation, interference suppression and optimizes illumination power. The evolution towards wafer-bonded stacked CMOS circuits increases performance and will enable edge-computing smart sensors. Our evaluation kit allows developers and researchers to prototype future smart sensing features and applications.



Ursin Solèr

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Ursin Solèr studied physics and received his master's degree in the field of particle physics after graduating from the ETH. He then spent 4 years by gathering experience in several research groups, apprentice training and as teacher in vocational school. He started at the FH Graubünden in In 2018 as scientific assistant. Since 2022 he is a lecturer for Photonics.

Advantages of 3D object-recognition in automatic access-systems

Introduction to eye safety assessments according to DIN EN 60825 and 62471. We will focus on the application of these standards to various typical products containing emission and illumination from laser and LED as well as some of technical aspects regarding the measurements involved.