SEMICON EUROPA OCT 25–27, 2016 GRENOBLE, FRANCE CONNECT

Imaging

J.-L. Jaffard
Director
Red Belt SA, Plan-les-Ouates, Switzerland

Biography

Jean-Luc Jaffard was born in Alès (France) in 1956
He has been graduated from Ecole Supérieure d'Electricité of Paris in 1979.
He started his career 1980 joining Thomson- Semiconductor Bipolar Integrated Circuits Division as Chip Designer for Consumer applications.
In 1987 after the creation of SGS Thomson Microelectronics (merger of Thomson Semiconductor and SGS Microelectronica) he became Video Division - TV Design Manager coordinating the development of the entire product family dedicated to Analog TV and VCR.
From 1996 to 1999 Jean-Luc Jaffard paved the way of Imaging activity at STMicroelectronics managing the first internal projects and being at the forefront of the acquisition and integration of VLSI Vision Limited.
He was then appointed Imaging Division Research Development and Innovation Director managing a large multidisciplinary and multicultural team spreaded around the world. His responsabilities were covering imager technology coordination and image sensors, image processing controllers and camera module development and industrialisation. In 2007 Jean-Luc Jaffard was promoted STMicroelectronics Imaging Division Deputy General Manager and Advanced Technology Director in charge of identifying, selecting, sourcing or developing the breakthrough Imaging Technologies and Applications In 2010 he moved to STMicroelectronics Headquarter to develop a new business line exploiting the wide range of Intellectual Assets. Multiple Licensing agreements have been concluded demonstrating the benefits of such business model
Jean-Luc Jaffard owns multiple patents in semiconductor and Imaging domains and has been invited speaker in many conferences worldwide.
In January 2014 he created the Technology and Innovation branch of Red Belt Conseil, to support High Tech actors like SME, Research Institutes, Start-ups, Analyst, Investors and public authorities
and he has also be appointed SEMICON Europa Imaging conference chairman

Smart Glasses Devices and their Applications in The Industry

K. Sarayeddine
CTO
Optinvent SA, R&D, RENNES, France

Abstract
Smart Glasses devices are attracting large interest in the B to B Business segment for several applications and use cases.
The author will describe first the Smart Glasses device as an Opto-electronic and imaging device and depicts existing display technologies and products that allow Augmented Reality and Hands Free operation. The author will also present Optinvent Optical technology behind the ORA Product line.
The author will then describe the applications that Smart Glasses address, from Medical, Industry, such as Logistic, Maintenance, Remote control, Check list, etc.

Biografie
Recognized expert in worldwide Display industry and leading figure in the field of Microdisplay based projection systems, compact projection systems, and near to eye optics. Chaired several industry consortium such as SID/IDW. Holds more than 20 patents in optics for projection and wearable displays. Inventor of new display systems and disruptive technologies with a vision on the consumer market. Proven experience as a Start-Up CTO driving innovation and multidisciplinary product development. Strong problem solving approach and ability to drive highly skilled development teams to reach challenging company goals.
Hold Phd in Optics from the University of Franche Comté, Besançon, France and a "Diplome d'Ingenieur" from Ecole Supérieur d'Electronique et Electrotechnique; ESIEE, Paris in Semiconductor physics.
Currently CTO and Co-Founder of Optinvent a French Start-up that offer the best technology for see-through video glasses for consumer market

Drivers for Vision based Applications in the Automotive Environment

H. Gotzig
Valeo Master Expert
Valeo Schalter und Sensoren GmbH, EXP, 74321
Bieitigheim, Germany

Abstract
In recent years more and more Vision / Image based Applications are seen in cars. This trend will continue. While in the past image sensor technologie and signal processing enabled only informing systems this is changing. The complexity of the vehicular environment has increased from a world of infrequent low-speed vehicles with low speed manoeuvres and forgiving hazards, to one of dense high-speed transport environments with a diversity of low error-margin behaviours among all road users, car companies, in tandem with national legislators have sought to use advanced driver assistance system (ADAS) technology to enhance the safety and driving experience of vehicle occupants. While a suitable technology toolbox is the basis for functional components, additional Silicon IP and sophisticated assembly technology are drivers for future vision based applications in the automotive environment.

Biografie
1962 Birth
1981 - 1984 Technical high school, Heilbronn
1984 - 1990 Study of Physics University Stuttgart (diploma)
1990 - 1995 Research assistant University Stuttgart / Lisbon
1995 PhD in Physics
1994 - 1997 Distance learning „Medical Physics Technology“
1995 - 1996 Product specialist „Rheologie“ Company Physica
1996 - today Company ITT/Valeo

1996 Design Engineer
1997 Manager Ultrasonic Lab
1999 Nomination Valeo Expert
1999 Manager Ultrasonic Parking Systems
2001 add. Manager Radar Systems
2001 Promotion Valeo Senior Expert
2003 Product Line Director Driving Assistance Technologies
2011 Expertise & RAISE director
2013 Promotion Valeo Master Expert "ADAS Sensors"

1981 - 1994 performance sports "middle distance running"
today Trainer "middle and long distance running"

Title is coming soon

B. Bastide
Marketing Manager
Legrand, Limoges, France

Abstract
The indoor built environment plays a critical role in our overall well-being, due to both the amount of time we spend indoors (90%) and the ability of buildings to positively or negatively influence our health. In fact, a recent US study has demonstrated that the Cognitive function scores were significantly better in Green building conditions compared to the Conventional building. It was suggested that the office workers productivity could undergo more than a 30% increase.
Thus sustainable buildings bring everywhere substantial benefits in comparison to non sustainable building.
The building consumes 40% of the global energy : this constitutes a high exploitation cost, and needs management solutions. According to various studies, the use in buildings of any system with energy management and lighting control with advanced sensors increases their energy performances.
The idea is to find solutions improving both building performance, and the user well-being. Green buildings with advanced sensors provide a dynamic environment that responds to occupants' changing needs and lifestyles.
As information and communication expectations become more sophisticated, networking solutions converge and automate the technologies to improve responsiveness, efficiency, and performance.
To achieve this, all systems (security systems, HVAC, lighting, and other electronic controls must converge in the sustainable buildings) on a single network platform that facilitates users management, space utilization, energy conservation, well-being, and systems improvement.

Biografie
Bernard has more than 30 yrs experiences in selling and marketing in building automation, and is now Marketing Manager at Legrand
For the SBU Building Systems, his major responsibility is to analyze, define and implement the strategic marketing approach (new opportunities, new business models, new value chain,..) applied on Smart Building applications.
He coordinates and stimulates internally the Innovation and technology activity, in coordination with R&D and the corporate department Innovation & System.
He contributes to identify and qualify partnerships, cooperation, acquisitions opportunities.
He is in charge of market intelligence, ad-hoc studies, strategic analysis, and advisory.
He works with the Products manager for next-generation building solutions like New Sensors Generation, Smart home & building automation, connected objects and Internet of things (IoT

Neuromorphic Event-based time oriented vision and Computation: the future of machine vision?

R. Benosman
Professor
Université Pierre et Marie Curie, Institut de la Vision, Paris, France

Abstract
There has been significant research over the past two decades in de- veloping new systems for spiking neural computation. The impact of neuromorphic concepts on recent developments in optical sensing, display and artificial vision is presented. State-of-the-art image sensors suffer from severe limitations imposed by their very principle of operation. These sensors acquire the visual information as a series of ’snapshots’ recorded at discrete point in time, hence time-quantized at a predetermined frame rate, resulting in limited temporal resolution, low dynamic range and a high degree of redundancy in the acquired data. Nature suggests a different approach: Biological vision systems are driven and controlled by events happening within the scene in view, and not — like image sensors — by artificially created timing and control signals that have no relation whatsoever to the source of the visual information. Translating the frameless paradigm of biological vision to artificial imaging systems implies that control over the acquisition of visual information is no longer being imposed externally to an array of pixels but the decision making is transferred to the single pixel that handles its own information individually. It is demonstrated that bio-inspired vision systems have the potential to outperform conventional, frame-based vision acquisition and processing systems in many application fields and to establish new benchmarks in terms of redundancy suppression/data compression, dynamic range, temporal resolution and power efficiency to realize advanced functionality like 3D vision, object tracking, motor control, visual feedback loops and even allow us to rethink our current paradigm of computation. The ultimate goal is to develop brain-inspired general purpose computation architectures that can breach the current bottleneck introduced by the von Neumann architecture.

Biografie
Ryad Benosman is a full Professor with University Pierre and Marie Curie, Paris, France, leading the Natural Computation and Neuromorphic Vision Laboratory, Vision Institute, Paris. He received the M.Sc. and Ph.D. degrees in applied mathematics and robotics from University Pierre and Marie Curie in 1994 and 1999, respectively. His work covers neuromorphic visual computation and sensing and event based computation. He is currently involved in the French retina prosthetics project and in the development of retina implants and cofounder of Pixium Vision a french prosthetics company. He also actively works on retina stimulation using optogenetics with Gensight Biologics. He is also a cofounder of Chronocam a company developing Event based cameras and event driven computation systems. He is an expert in complex perception systems, which embraces the conception, design, and use of different vision sensors covering omnidirectional 360 degree wide-field of view cameras, variant scale sensors, and non-central sensors. He is among the pioneers of the domain of omni-directional vision and unusual cameras and still active in this domain. He has been involved in several national and European robotics projects, mainly in the design of artifcial visual loops and sensors. His current research interests include the understanding of the computation operated along the visual systems areas and establishing a link between computational and biological vision. Ryad Benosman has authored more than 100 scientific publications and holds several patents in the area of vision, robotics, event-based sensing and prosthetics. In 2013 he was awarded with the national best French scientific paper by the Journal La Recherche for his work on neuromorphic retinas and their applications to retina stimulation and prosthetics.

Integrated Time-of-Flight technology - a scalable solution for depth sensing

S. Böhmer
Director Product Development
Pmdtechnologies ag, Product Development,
Siegen, Germany

Abstract
In recent years, time-of-flight technology has evolved from simple devices which require additional off chip components like CPLDs, ADCs and microcontrollers into form factor optimized fully integrated SoC solutions. Today, sensor configurations ranging from one single pixel only up to arrays with several hundred of thousand pixels are available with pixel pitches ranging from a few hundred micrometers down to ten micrometers or less. The increasing level of integration and the variety of possible pixel configurations in terms of both size and count, combined with options to additionally tailor a given sensor device to specific system level constrains, make ToF technology a scalable solution for a wide range of applications. This talk will cover quite obvious as well as emerging applications related to depth sensing in the automotive, industrial and consumer markets.

Biografie
Stephan Böhmer graduated in microelectronics from the Technische Universität Dresden in 2005. He obtained his PhD in 2009 from Technische Universität Dresden where he was working on neural network based self-learning image processing algorithms. He joined pmdtechnologies in 2010, designing integrated ToF image sensors. Today he is directing the department of product development.

The direction of CMOS image sensor evolution.

T. Hirayama
Corporate Executive/ President of Device & Material R&D Group
Sony Corporation, Device & Material R&D Group, Atsugi, Japan

Abstract
CMOS image sensor is dominant at an image sensor market in now, however, until early 2000s, CCD was mainly used in video cameras and digital still cameras, because the image quality of CMOS image sensor was inferior to that of CCD. Through development of its improvement technology and utilization of its benefits including original high-speed, low power consumption, and digital output, CMOS image sensor was widely used in smart phones and replaced CCD at an image sensor market in the late 2000s. CMOS image sensor is also extending function taking advantage of stacked structure. In addition to video cameras, digital still cameras and smartphones, use of CMOS image sensor has spread to such areas as security-monitoring, in-vehicles, and medical. In these fields, it is needed to utilize photon information such as infrared light, distance, polarization etc. which weren't used so much for the video cameras and digital still cameras. I will talk about the key point to expand image sensor market and show three future directions the development of image sensors may take.

Biografie
Teruo Hirayama received a bachelor’s degree in Electrical Engineering from Waseda University, Tokyo, Japan in 1981, the same year he joined Sony Corporation. He started in the research division of the semiconductor group, where he worked on SRAM, CMOS LSI and then developed stacked wide band DRAM on LOGIC chip. He joined the image sensor division in 2002 and soon started developing back-illuminated CMOS image sensor and launched it into the market in 2009 and stacked image sensor in 2012. He became senior general manager of the semiconductor technology development division in 2010, and led the development of semiconductor devices. He became senior vice president in June 2013 and he was appointed as president of device and material R&D group on April 1, 2014, and has the responsibility for R&D of displays, batteries and material adding to semiconductor devices.

FUJIFILM’s Color Filter Technology for Image Sensors and beyond

T. Ezoe
Senior R&D Manager
FUJIFILM Corporation, Electronic Materials
Research Laboratories, Shizuoka, Japan

FUJIFILM Electronic Materials

Abstract
Photosensitive color filter materials which can cut the light of targeted wavelengths are today well established as key components of CCD and CMOS image sensors. Such image sensors can be found in standard capturing devices, such as digital cameras and mobile phones as well as in other imaging applications.
In order to materialize superior performance as a micro color filter offering high resolution, low noise, and precise color reproduction, our original photosensitive polymer technology, color materials technology for dyes and pigments with special design capabilities, were integrated along with special dye and pigment dispersion technologies.
Now, we are expanding these color filter materials technologies, which have been cultivated in the image sensor market, to new materials which are useful for much longer wavelength applications such as infrared sensors which will be used for autonomous vehicles, security cameras, and robots for factory automation etc.
This talk will address the fundamental technologies relating to photosensitive color filter materials and future evolution of these technologies.

Biografie
Toshihide Ezoe received his Master of Engineering from Osaka University, Japan in 1990, and joined Fuji Photo Film Corporation in the same year. He worked as a chemical engineer for the development of silver halide photosensitive materials for over 10 years. In 2013, he transferred to Electronic Materials Research Laboratories in the FUJIFILM Corporation, and has responsibility for the development of photosensitive materials for various sensors.

Camera module technologies and trends comprising assembly technologies, testing, and automation

T. Maack
Systems Architect
Jabil Optics Germany GmbH, Jena, Germany

Abstract
Automotive, Security, Consumer – cameras have found their way into many areas. Whether it is technical gadgets like action cameras, drones, Array Cameras, mobile phone cameras, 3D-imaging- and gesture recognition systems; or assistance systems like surveillance cameras, parking assistance, and advanced driver assistance systems (ADAS) – the spectrum of applications is broad and will become even broader in the future.

And with each application there is a different demand on design and manufacturing. For instance, production of a miniaturized camera with high performance but at low cost alone has its challenges. Add ‘in high volumes’ to the list and you start discussing cycle time, yield, and process stability.

Using an existing product as an example this talk will illustrate how camera performance, yield, and cost are linked to assembly technology amongst other factors.
This talk will touch on topics such as: • camera technology challenges • assembly technologies, with focus on Active Alignment • testing and automated test equipment • market trends

Biografie
Thomas Maack started his career at Fraunhofer IOF Jena in 1993 and received his Ph. D. in physics at Friedrich Schiller University Jena. After five years of research in the field of coherent optics, he entered the “Digital Projection” business division of Carl Zeiss Jena, which later merged into Jabil Optics Germany (former Sypro Optics). Jabil is a technology-driven design and manufacturing service provider with headquarters in St. Petersburg, USA. Thomas Maack is part of the product development department focussed on system architecture.

Curving technologies for CMOS image sensors: imaging applications and roadmaps

B. Chambion
research engineer
CEA-LETI, GRENOBLE, France

Abstract
Since few years, there has been an increasing interest and demand in flexible electronics. Standard imaging system consists of an optical module and an image sensor. For wide field of view applications, the flat image after being propagated through the optical system is not flat but curved. This problem is called Petzval Field Curvature Aberration. It is generally fixed by additional complex lenses to flatten the image plane. We propose another approach with a hemispherical curved sensor technology. It allows eliminating FCA at the sensor level and thus makes it possible to simplify the optical system.
First, a brief state of the art on curved detectors will be detailed for different application fields. Then, CEA-LETI curving technologies will be explained to address fixed and tunable curvature packaging applications, included modeling and technical process steps. Characterization of curved sensors prototypes have been performed to understand mechanical and electro-optical bending limits Based on an existing fisheye flat sensor optical design, a curved focal plane can drastically simplify the standard optical system. The benefits of a curved sensor will be summarized into two categories: those related to the optical system and those related to the image quality.

Optical system:
» Miniaturization of optical devices;
» Lenses alignment process simplification;
» Suppression of aspheric lenses;
» Wide field of view enhancement.

Image quality:
» More homogeneous image quality (reduced noise);
» Improved resolution and higher sensitivity;
» Corrected distortion occurring along the image edges.

Finally, curved CMOS image sensor roadmaps and perspectives will be discussed: from a market point of view, application field surveys have been done on mass market applications (mobile, consumer…), photography, automotive… From a technical aspect, a curving technologies roadmap will be proposed, leaded by applications needs, on single chip, collective, and wafer level processes.

Biografie
Bertrand CHAMBION, 29 years old, research engineer at Univ. Grenoble Alpes, CEA-LETI, MINATEC campus. He received the Ph.D. degrees from the “Université de Bordeaux” in 2014. He carries out his research activities in the packaging and assembly team (LPA laboratory) of CEA-LETI. He specifically works on imaging system packaging based on curved or flexible image sensors, and is in charge of innovative packaging for high power pixelated devices. He holds 2 publications in international journals, 5 communications in conferences and 7 patents.

Driving by numbers

R. Bramley
Safety Architect
NVIDIA, GPU Compute Architecture, Santa Clara,
United States

Abstract
Computer vision processing is a key technology for autonomous driving. Raising the bar on performance while imposing strict functional safety criteria in a limited power envelope is a challenging scenario for the semiconductor industry.

As devices grow in performance to enable new functionalities and paradigms such as deep learning, failure rates increase and must be managed. Which trade-offs can be made ?

The paper will consider the state of the art and then look behind the numbers at the progress that must be made from semiconductor resilience to fault tolerant system design.

Biografie
Richard Bramley, PhD is currently safety manager for GPU computing products at NVIDIA based in Santa Clara, California. His background in signal processing and hardware silicon systems architecture has encompassed a wide range of product developments. From the first MPEG2 devices through highly integrated consumer electronics devices to mobile telecom platforms via automotive infotainment and finally to autonomous driving. His current interests revolve around how to meet the requirements of ISO 26262 without sacrificing too much performance and power.

Why image quality KPIs are a must for digital camera tuning

N. Touchard
VP Marketing
DxO Labs, IQE, Boulogne Billancourt, France

Abstract
Optimizing camera image quality (IQ) requires first, finding the best trade-off between lens, sensor and image signal processing (ISP) performances; and then tuning the ISP in consideration all possible use cases of the camera for its market.
In the past few years, the complexity of ISP has been increasing exponentially, leading to a situation where tuning is extremely challenging and can literally take months to reach image quality targets.

To ensure that their ISPs can handle as many sensor and camera applications as possible, chip vendors deliver their image processing pipeline with a huge set of parameters that need to be set according to best trade-offs. The usual approach to reaching best results requires following a lengthy heuristic path, with lots of trials and errors on the way forward. Digital camera makers find themselves facing this tuning challenge while under pressure to continuously reduce time-to-market.

In light of this problem, we have developed a sophisticated camera image quality scoring system. This system comprises a well-defined set of objective and perceptual measurement protocols, to help camera designers optimize the tuning process for achieving best image quality, given sensor and lens limitations.

The paper describes the challenges that camera designers face when tuning. We will then explain how we designed the image quality scoring system, give details about the methodology, and then show the kinds of results that people can achieve, based on real world examples of camera modules available on the market whose architecture incorporates the most powerful image processing chipset for the considered application.

This talk is aimed at camera design teams who want to understand the optimum path forward in achieving their image quality goals by using the most up-to-date tools available. Product planners and R&D managers will also find it useful for understanding the implications of make-or-buy decisions when planning new camera products.

Biografie
Nicolas Touchard is Vice President of Marketing, Image Quality Evaluation at DxO. Nicolas has been with DxO since 2005, leading and contributing to strategic and operational marketing activities across all business lines of the company. Prior to joining DxO, Nicolas spent 15+ years at Kodak managing international R&D and innovation teams, where he initiated and headed the company's worldwide mobile imaging R&D program. He and his team pioneered the mobile imaging field starting in the late 90's, developing technologies for the deployment of new imaging services over mobile phones and networks. He is a graduate of the Institute of Optics in Paris.

Next Generation Human Activity Sensing For Smart Buildings

G. CROZET
VP Sales & Marketing
IRLYNX, Sales & Marketing, Grenoble, France

Abstract
IRLYNX develops and manufactures human activity sensing modules for Smart Cities, Smart Buildings and Smart Homes.

We use thermal infrared technology to deliver advanced data about people activity. In particular, our sensing modules are able to detect presence or absence, count people, evaluate location, assess motion direction, distinguish human from animal and recognize posture.

IRLYNX all-in-one sensing modules include optical lens, pyroelectric sensor, microcontroller and dedicated firmware. They deliver already processed data and are ready for integration into end-user products (intelligent sensors, smart lights, connected objects...).

IRLYNX products enable an increase in comfort, energy savings, enhance home security and assist elderly people in their day-to-day living.

A disruptive technology

IRLYNX designed a passive infrared detection array that uses the heat that any human is emitting and transform it into electric signals.

To do so, we acquired an exclusive, all markets license of a specific infrared technology based on CMOS, and that has already been industrialized for thermal fingerprint sensors. This technology is compatible with mass-market and allows very low cost, hence shifting a paradigm in the IR sensors market.

Another innovation is our module approach: we combined our unique thermal technology with radically new IR optics, along with state-of-the-art embedded algorithms. This module approach brings several advantages:
- The product is plug & play. One only needs to put it into a casing and to add a power supply and communication module to build an end-user product.
- The IR signal is processed directly inside the module, allowing real-time data processing, low power consumption, along with guaranteeing people's privacy.

Conclusion

IRLYNX’s sensing modules offer an unparalleled price-performance ratio, delivering the right level of advanced human activities information for the best, affordable and consumer market compatible cost.

Biografie
Guillaume CROZET
VP Sales & Marketing

Graduated from the EDHEC Business School, 15 years of experience in the technology and software markets
Joined IRLYNX in January 2016 to accelerate business development and accompany IRLYNX’s

customers in their product launches

Previously worked for: Lucent Technologies, Orange, Eloquant

How to build an "Optic" e-nose

T. Rousselle
CEO
Aryballe Technologies, Grenoble, France

Abstract
Because of the specific "chemical" nature of gas, most sensors including electronic noses have been developed based on electrochemical technologies. Among the few optic technics which can be applied to the detection of volatile compounds, one of them may revolutionize the analysis of odors. The capacity to precisely detect and qualify odorant molecules is highly expected in different industrial markets. For examples there is a strong need in the environment field for the analysis of olfactory pollution, but also in the food, flavour, fragrance and cosmetic markets to better analysis the products' sensorial quality.

Surface Plasmon Resonance has been evaluated for its ability to analyse gas more than 40 years ago but was at the time not further developed. Very recently a scientific team of the CEA in Grenoble and a start-up decided to resuscitate this technology by combining it with the use of specific biochemical sensors to develop the first universal and portable electronic nose.

Biografie
Tristan Rousselle holds a Ph.D. in cell biology from the University Joseph Fourier in Grenoble. He did part of his post graduated studies in Sussex University (Brighton-UK) and La Jolla Institute for Allergy and Immunology (San Diebo-CA) He co-founded in 2000 the company Protein'eXpert now called PX'Therapeutics. This biotechnology company is specialized in the engineering, pre-clinical and clinical development of therapeutic proteins. In 2011 PX'Therapeutics had more than 60 employees in Grenoble and Lyon and was realizing nearly 50% of its Turn Over outside Europe.
In July 2013, a few months after the Acquisition of PX Therapeutics by the "Laboratoire Aguettant" Tristan decided to launch a new venture with a lead innovative project in the field of Biosensors named "Aryballe". He confounded the company with Delphine Pau, Thierry Livache, Sam Guilaumé and Sissel Tolaas in March 2014. Since then Tristan holds the position of CEO at Aryballe Technologies SA which main objective is to develop the first universal and portable electronic Nose. In July 2016 the company raised 3 M € with investors and industrial partners. The first products are expected to be launched at the beginning of the year 2017

Introducing vivaMOS - a CMOS image sensor spin-out from Rutherford Appleton Laboratory (RAL)

D. Cathie
CEO
vivaMOS Ltd, Southampton, United Kingdom

Abstract
vivaMOS is a recent technology start-up from the Rutherford Appleton Laboratory in the Science and Technology Facilities Council (STFC), a world-leading multi-disciplinary R&D organisation.

vivaMOS's focus is on the commercialisation of the wafer-scale CMOS image sensors from STFC, originally developed for X-ray detection.

The presentation will provide a short overview of how vivaMOS is innovating wafer-scale CMOS image sensors, addressing some of the issues that current technologies are unlikely to be able to overcome long-term. It will also review the market today and the current state-of-play for their business.

Biografie
Dan Cathie is an experienced professional within the semiconductor industry, having worked in many different parts of the semiconductor supply chain. His career started at Philips Semiconductors (now NXP) in Southampton as an IC designer, then took him to work within one of the wafer fabs in East Fishkill, NY (USA), and eventually to the vertically integrated business line in Stockport near Manchester (UK), a leader in PowerMOS devices. More recently he acted as Managing Director for a Quartz glass fabrication business in Manchester, a key supplier to the semiconductor industry.

Dan was appointed CEO for vivaMOS in July 2015. He lives in Stockport with his wife and their 5 children. He is passionate about how technology is continually changing the world we live in, and enjoys seeking to exploit the blurring of boundaries between fields in order to bring new innovative products to market.

Enhanced features of camera modules using ultrasonic ceramic motors

J.-M. Meyer
CEO
miniswys SA, Biel / Bienne, Switzerland

Abstract
miniswys is a technology provider of specific and patented cost effective ultrasonic ceramic micro motor, optimized for mid to high mass production applications.
miniswys provides custom solutions for OEM applications in highly challenging B2B markets.

The miniswys motors are very well adapted for high-speed applications with a large bandwidth for application as :
- autofocus for telecommunication system (camera module)
- optical image stabilization system for telecommunication and automotive
- zoom applications
- dual camera

Compared to other technology providers, the miniswys ultrasonic ceramic motors have an extremely simple structure and have some excellent key features, like very long stroke, a very small current consumption (constant over the full stroke) and high-speed. The miniswys ultrasonic ceramic motors are manufactured only using existing and mature technologies, such as stamping or injection molding.

The benefits for applications like camera modules are mainly :
- high speed focusing
- no temperature increase thanks to extremely low current consumption
- high stroke allowing small focal distance (macro function)

The business model is based on selling licenses to manufacturing companies. The technology transfer and the support for the process engineering are part of the activities provided by miniswys to its partners.

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August 2016

Biografie
JEAN-MICHEL MEYER
Executive Management, International Sales B2B (OEM), Quality Management
CH 2504 Biel-Bienne - Switzerland • jmme@prodym.com
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EXECUTIVE-LEVEL SALES&MARKETING AND OPERATIONS
An executive-level sales and marketing expert with nearly 20 years experience in development, process engineering and production of mechatronic systems (medical device and implantable

products, automotive, textile, HVAC, optics and mobile hydraulics) integrating motion control units. Specializations include Lean Manufacturing, 6 Sigma, Key Account Management, Benchmarking and Risk Management, and a strong knowledge of ISO 9001, 13485, 14001 and 16949 quality standards.

PROFESSIONAL HISTORY

MINISWYS SA BIEL-BIENNE, SWITZERLAND
CEO, 2013-present
Miniswys SA is a technology provider, active in proprietary piezomotor technologies with unique and cost effective solutions, providing custom oriented solutions for OEM product in highly challenging B2B markets, such as automotive, mobile telecommunication and automation.

PRODYM SOLUTIONS SA / AG , BIEL-BIENNE, SWITZERLAND
Managing Director and Owner, 2012-present
Prodym Solutions is a company specialized on the B2B market of high technological products providing state of the art best practices from the automotive and medical device fields :
- Executive coaching
- Coaching for ISO quality Management certification (ISO 9001, ISO 13485, ISO TS 16949 and EN 9100)
- Additive Manufacturing Solutions

FAULHABER GROUP BIEL-BIENNE, SWITZERLAND
Chief Operating Officer / Business Development Director 2007-2012
- Direct sales and marketing of Mechatronic Systems.
- Manage a team responsible for the design , the quality management and the manufacturing of micro mechatronic systems used in implantable medical device systems (classe III device) and optic industries
- Create unique, customized technological solutions for the defense, optics, and electronics industry using high precision mechanical components, electrical motor, gearhead and electronic driver technology.

SONCEBOZ, SA SONCEBOZ, SWITZERLAND
Business Unit Manager, 2001-2007
- Managed a global business unit of 120 staff, that conceived, developed, and produced mechatronic (motion control) systems for medical and automotive industries.
- Oversaw all operations of the division including value chain, strategy, R&D, innovation, purchasing, product management, production, marketing, sales, logistics, HR, quality systems , risk management, and finances.

SONCEBOZ, SA SONCEBOZ, SWITZERLAND
Product Manager, 1995-2001
- Achieved double-digit growth of turnover in sales of mechatronics systems in the French, English, American, and Italian markets.

SONCEBOZ, SA SONCEBOZ, SWITZERLAND
Head of Electrical Motor R&D Development, 1992-1995
- Developed electrical motors (stepping, BLDC, and torque motors)
- Delivered professional development, performance reviews, and staff support in a fast-paced development environment.

EDUCATION

Ecole d'ingénieur Neuchâtel (1978-1984)
CRPM LAUSANNE LAUSANNE, SWITZERLAND
Executive Masters of Business Administration (EMBA) 2007

LANGUAGES

FRENCH, ITALIAN, ENGLISH, GERMAN

M. Verhoeven
TBA
Aspect Systems, Dresden, Germany

Biography
Marcus is Co-Founder and Managing Director of aSpect Systems.
aSpect is a vendor for image sensor test services (wafer- & final test), test- and illumination equipment, prototype package- and camera development, as well as production equipment for lens adjustment.

Marcus started his professional career as a lab assistant in 1987 at Spectro Analytical Instruments, a vendor for optical spectrometers. He studied physics at the University of Wuppertal. From 1998 he headed for five years the semiconductor test floor of Silicon Vision. In 2003 Marcus founded together with Philipp Gottesleben aSpect Systems GmbH.

Design strategies for low cost infrared cameras

G. DRUART
Research Scientist
ONERA, DOTA, Palaiseau, France

Abstract
Today huge efforts are made in the research and industrial areas to design compact and cheap uncooled infrared optical systems for low-cost imagery applications. In the past, infrared cameras were too expensive to be widespread. But thanks to the recent advances in microelectronics, the cost of some infrared devices is expected to be reduced and new types of markets to be addressed. A recent report written by Yole Développement in 2015 mentioned 30% growth in uncooled infrared imaging market driven by three rapidly expanding commercial markets: thermography, automotive and surveillance. They identified several low-cost and low-resolution sensors: pyroelectric detectors, thermopiles, and microbolometers. In the field of microbolometers, their prices are cut by reducing the size of the pixels, the size of their format and by using wafer level technologies. The price of the electronics is reduced by using ASIC technologies. Now, the budget of the optical part in the price of the whole camera is not anymore negligible compared to the price of the detector and frugal innovation in the optical design is now required to cut the price of the lens: limit the number of optics, make the optics compatible to replication process, either molding of photolithography, explore low cost materials, some being absorbent in the long infrared bandwidth at important thicknesses (chalcogenide, silicon, polyethylene). In this presentation, we will recall some current strategies for designing low cost optics and we will revisit the Fresnel lens to design a thin infrared optic for an expected cheap broadband microimager. Up to now, Fresnel lenses have not been used for broadband imagery applications because of their disastrous chromatic properties. However, we show that working in a high diffraction order can significantly reduce chromatism. A prototype has been made and the performance of our camera will be discussed.

Biografie
Guillaume DRUART, Ph. D. since 2009 and research scientist at ONERA in optical design.
In particular, he's working on new designs for micro-cameras in the infrared spectral range. His field interests are non conventional optical designs, diffractive optics, multichannel designs, co-design with image processing and multispectral imagery.

Is there anything beyond? Terahertz imaging: potential and perspectives

M. Perenzoni
Senior Researcher
FBK, Trento, Italy

Abstract
Imaging has been extensively pursued across almost the whole electromagnetic spectrum: from x-rays to UV, visible to infrared, microwaves to millimeter waves. Interestingly enough, however, there is a region ranging in the terahertz (THz) frequencies where still imaging technologies are lagging, despite being a wavelength range of undoubtedly high potential.
At frequencies from 100GHz up to 10THz, the electromagnetic radiation has interesting penetration properties, it is not ionizing, it causes several molecules to resonate, and so on. A potential like this can enable a number of applications in the security, biomedical, and industrial fields.
In this talk, challenges in the THz waves generation, detection and realization of integrated THz imaging systems will be addressed and current state-of-the-art in THz technologies will be reviewed. A specific focus will be given to THz imaging technologies enabled by mainstream CMOS processes, as well as a perspective on future emerging devices employing graphene-based detectors.

Biografie
Matteo Perenzoni studied Electronics Engineering at the University of Padova, Italy, until 2002. Since January 2004, he has been with the Center for Materials and Microsystems of the Fondazione Bruno Kessler (FBK-CMM), Trento, Italy, as a Researcher working in the Integrated Radiation and Image Sensors (IRIS) research unit. He has been collaborating on teaching courses of electronics and sensors for the NanoMicro Master, Trento, from 2006 to 2010. In 2011, he has been director of the bi-annual Optoelectronics and Photonics Winter School coorganized with the University of Trento. During 2014, he has been visiting research scientist in the THz Sensing Group in the Technical University of Delft. He is member of the technical program committee of the European Solid-State Circuit Conference (ESSCIRC) since 2015. Within the IRIS research unit he is responsible of the multispectral and terahertz research line.

Democratization of optical spectroscopy for material analysis

D. Goldring
CTO
Consumer Physics Inc., Herzliya, Israel

Abstract
Optical spectroscopy is a widely used tool for material analysis. Starting from food to pharmaceuticals, plastics, oil and many more can be analyzed by optical spectrometers providing people with valuable information. Traditionally, optical spectrometers were bulky and expensive, used mainly in laboratories by professionals. In the last years, gradually, we are witnessing a process of democratization of optical spectroscopy. Leveraging low cost hardware, advanced algorithms and highly available software infrastructure, optical spectrometers are now becoming a widely spread in the “field” opening many new opportunities for existing and new users of optical spectroscopy.
In this talk we shall review some aspects and implication of this democratization process. Particularly, novel enabling technologies (spectrometers) and potential applications.

Biografie
Damian Goldring is co-founder, CTO and VP of R&D at Consumer Physics (CP) since its inception. Prior to starting CP at 2011, Damian served for six years as project manager in the Israeli air force running several multi-disciplinary projects. Damian also served as director of project management in Tessera Inc, bringing new optics and signal processing products to cell phone cameras.
Damian holds a BSC in EE from the Technion institute in Israel (1997) and MSC & PhD degrees in EE from Tel-Aviv university (2004, 2009). Damian is the author of more than 20 peer-reviewed papers and patents in the field of optics.

A compact, 4 channels fluorescence imaging acquisition system with no moving parts for molecular biology applications.

M. Bianchessi
R&I Manager
STMicroelectronics, AST, Agrate Brianza, Italy

Abstract
One of the major drawbacks towards the large scale adoption of Lab on Chip, as a common diagnostic tool, is the requirement of bulky instrument for their operation that overrides the benefit of portability provided by the small dimension of the devices.
Specifically, most of the current LoC rely on reactions that produce as output a fluorescence change, hence requiring a fluorescence microscope to measure the final result.
Traditional fluorescence detectors use sets of matched dichroic filters to select the optical bands for excitation and emission from a white light lamp to a highly sensible sensor. When several molecules need to be probed at the same time, those filters are mounted on precise mechanical guides. This makes the system very delicate and not suitable for application on the field.
In this paper, a nouvelle architecture to implement a multichannel fluorescence imaging system is described. By mutuating the technologies and components developed in the past decade for mobile phones imaging subsystem a 4 independent optical channel fluorescence imaging system has been developed. Its compactness and ruggedness make it ideal for portability, while the low-cost BoM and the easy manufacturing technology allow high volume applications.
Despite the low cost, the performances are not sacrificed and, thanks to the particular architecture, specific post-processing is done in order to improve channel separation, accuracy and dynamic range.

Biografie
Marco Bianchessi received the degree in Electronic engineering at “Politecnico di Milano” in 1993. He joined STMicroelectronics where, from 1994 to 1998, has been the system engineer in the team that introduced the first family of digital audio devices in STM, developing A/D D/A converters, dedicated DSP and digital audio interfaces. In 1998 he took the responsibility of the development of the Bluetooth system and since then he became the official representative of STM in the Bluetooth SIG. Among other task he actively contributed to the definition of the Bluetooth 2.0 standard. Since 2004, his activities broaden, covering also application of MEMS sensors and Biomedical applications. He is currently leader of an R&D team, located in Milan and Lecce, with competences in system architectures, SW development, HW design, Optics and microfluidic. His main target is the development of innovative platforms, based on biochemical MEMS, to implement tests of DNA and other biological molecules. He is co-authors of several papers published on scientific journals and owner of more than ten patents in the fields of signal processing and microelectronics.

Innovation in imaging on sensors, spectral filters, software and vision systems

M. Willems
business director
imec, leuven, Belgium

Abstract
Connected sensing technologies and heterogeneous communication networks will transform our communication devices, personal gear, cars, homes, appliances, building and city infrastructures into even smarter systems. Systems that adapt to our personal needs by sensing and interpreting the environment in which they operate, through their own sensor information as well as cloud connectivity. This brings huge opportunities for innovation, for designing new applications and even creating whole new markets.
At imec and the Holst Centre, we create the building blocks for the IoE of tomorrow. On the one hand these are ultrasensitive, compact and energy-efficient sensor modules, e.g. image sensors, chemical sensors, and body monitoring sensors. But we also work on the communication: multistandard radio chips, integrated solutions, 60GHz high-datarate communication, and even on-chip optical solutions to help manage the enormous quantity of data in the cloud. We have also developed a thin-film technology that allows the realization of NFC, RF-ID, and a multitude of other electronic functions, in a low cost way and with very thin and flexible form factors. Using this technology, electronic circuits and devices can be made and integrated in a way that they ‘disappear’ in the environment, enabling ‘electronics everywhere’.
In the imaging space, we are working on novel TDI approaches based on CCD pixels within CMOS technology, we are also working on hyperspectral image sensors and we are doing work on ultrasound and radar imaging and start to combine these image modalities in sensor fusion projects. This talk will address the different technologies we are working on and give an overview of the results we have reached so far.

Biografie
Maarten Willems is Business Director at imec. He received the M.S. Degree in Electrotechnical Engineering in 1993 and subsequently the M.S. Degree in Artificial Intelligence in 1994 and an MBA, from the K.U.Leuven. After a career as a solution design engineer at Alcatel Bell, director of engineering at Keyware Technologies, and VP Professional services at GlobalSign, Maarten co-founded Hypertrust in 2000, an internet security service company. In 2005, Maarten joined imec as Market Intelligence group leader. Since 2008, Maarten holds his current position as Business Director in the Smart Systems segments focusing on business development and sales of new sensor technology development and product marketing in the domains of imaging, wireless, healthcare, wearables and power electronics solutions.

M. Rossi
Chief Innovation Officer
Heptagon Advanced MicroOptics, Rueschlikon, Switzerland

Biography
Formerly head of CSEM Zurich Replicated Micro-Optical Elements, Markus became CTO of Heptagon after CSEM’s microoptics division was acquired by Heptagon in 2000. He is an expert on design and fabrication of diffractive and refractive micro-optic components as well as miniature optoelectronic sensing systems. Markus holds a Ph.D. from the University of

Neuchatel, Switzerland and a master’s degree in physics from ETH Zurich.

Analogue and Digital Pixels for Time Resolved SPAD Sensors

R. Henderson
Professor
University of Edinburgh, Institute of Micro and Nano Systems, Edinburgh, United Kingdom

Abstract
This presentation will review progress in CMOS single photon avalanche diode sensors towards achieving high fill-factor, array resolution and picosecond timing performance. Recently proposed analogue and digital pixel structures will be compared. Examples of these pixel circuits will be given in applications such as Positron Emission Tomography, time of flight ranging and low light microscopy. The performance trends of CMOS SPAD detectors will also be highlighted. Prospects of applying advanced CMOS image sensor manufacturing technology to future SPAD arrays will be discussed.

Biografie
Robert Henderson is a Professor in the School of Engineering at the University of Edinburgh. He obtained his PhD in 1990 from the University of Glasgow. From 1991, he was a research engineer at the Swiss Centre for Microelectronics, Neuchatel, Switzerland. In 1996, he was appointed senior VLSI engineer at VLSI Vision Ltd, Edinburgh, UK where he worked on the world’s first single chip video camera. From 2000, as principal VLSI engineer in STMicroelectronics Imaging Division he developed image sensors for mobile phone applications. He joined Edinburgh University in 2005, designing the first SPAD image sensors in nanometer CMOS technologies in MegaFrame and SPADnet EU projects. In 2014, he was awarded a prestigious ERC advanced fellowship. He is the author of 145 papers and holds 20 patents.

Neural Networks for Industry 4.0 : Analytics at the edge of the network

P. LAMBINET
CEO
Cogito Instruments SA, GENEVE, Switzerland

Abstract
Today's most publicized applications of Neural Networks are handled in the Cloud, using software accelerated on extremely powerful CPU+GPU combinations.
At the same time, less visible deployments are happening in embedded applications where pure hardware neural networks implementations demonstrate superior performance/power ratios, especially for machine vision.

Cogito Instruments has decided to focus on such embedded applications for the industrial markets, bringing intelligence to a wide range of machines.

Embedded intelligence is not about connectivity, it is about being able to interpret sensor data and make decisions locally thanks to efficient recognition of memorized patterns.

Cogito products benefit from the National Instruments LabVIEW environment to capture and format data and leverage General Vision's NeuroMem technology to learn and analyse this data. This is particularly true for Machine Vision which is the most challenging analytics application.

The presentation will cover a few application example and outline the benefit of this approach vs alternative technologies. It will also list the key characteristics of efficient machine learning and pattern recognition and will compare the different possible implementations.

Biografie
Philippe LAMBINET is a former Executive Vice President at STMicroelectronics where he was the company's Chief Strategy Officer as well as the General Manager of the Digital Sector. Prior to ST, he was CEO of Advanced Digital Broadcast, a leader in Digital Television interactive platforms. After leaving ST, Philippe has been helping entrepreneurs create and develop technology companies and has himself created startups. His latest endeavour is Cogito Instruments which brings advanced neural network computing capability to Smart Machines for IoT and Industry 4.0 applications.

Event-Driven Sensing and Processing for Vision

B. Linares-Barranco
Reseacher
CSIC, Instituto de Microelectronica de Sevilla,
Sevilla, Spain

Abstract
Event-driven sensors are a new disruptive way of sensing visual scenes much in the same way biology does:
biological eyes do not take sequences of snapshots, but each "pixel" in the retina sends a nervous spike to the cortex
whenever there is meaningful information found by this pixel (motion, change of light, ...). In event-driven sensors, each
pixel sends its address (x-y coordinate, or a pixel ID) whenever it computes something meaningful, generally a given change
in relative light. Each pixel sends out its event with sub-micro-second resolution. This way, when something meaningful
is happening (represented by a few hundreds of events), the information is out of the sensor within some micro-second delay,
ready to be post-processed by related event-driven hardware. This way, it is possible to build event-driven coordinated sensing and processing systems capable of performing sensing-and-recognition with overall millisecond (or fractions of ms) latencies.
Unfortunately, these new sensors have their own drawbacks, such as larger pixel sizes and consequently lower resolutions.
In this talk we present a summary of event-driven vision sensor working principles with prototype examples, together with post-processing capabilities for recognition tasks.

Biografie
Bernabé Linares-Barranco received the B. S. degree in electronic physics in June 1986 and the M. S. degree in microelectronics in September 1987, both from the University of Seville , Sevilla , Spain . From September 1988 until August 1991 he was a Graduate Student at the Dept. of Electrical Engineering of Texas A&M University. He received a first Ph.D. degree in high-frequency OTA-C oscillator design in June 1990 from the University of Seville, Spain, and a second Ph.D deegree in analog neural network design in December 1991 from Texas A&M University , College-Station, USA.
Since June 1991, he has been a Tenured Scientist at the National Microelectronics Center , (IMSE-CNM-CSIC) Sevilla , Spain . From September 1996 to August 1997, he was on sabbatical stay at the Department of Electrical and Computer Engineering of the Johns Hopkins University . During Spring 2002 he was Visiting Associate Professor at the Electrical Engineering Department of Texas A&M University , College-Station, USA. In January 2003 he was promoted to Tenured Researcher, and in January 2004 to Full Professor.
He has been involved with circuit design for telecommunication circuits, VLSI emulators of biological neurons, VLSI neural based pattern recognition systems, hearing aids, precision circuit design for instrumentation equipment, bio-inspired VLSI vision processing systems, and VLSI transistor mismatch parameters characterization.
Dr. Linares-Barranco was corecipient of the 1997 IEEE Transactions on VLSI Systems Best Paper Award for the paper "A Real-Time Clustering Microchip Neural Engine", and of the 2000 IEEE Transactions on Circuits and Systems Darlington Award for the paper "A General Translinear Principle for Subthreshold MOS Transistors". He organized the 1995 Nips Post-Conference Workshop "Neural Hardware Engineering ". From July 1997 until June 1999 he has been Associate Editor of the IEEE Transactions on Circuits and Systems Part II , and from January 1998 until December 2009 he was also Associate Editor for IEEE Transactions on Neural Networks . Since April 2010 he is Associate Editor for the new journal "Frontiers in

Neuromorphic Engineering", as part of the open access "Frontiers in Neuroscience" journal series (http://www.frontiersin.org/).
He is co-author of the book "Adaptive Resonance Theory Microchips ". He was Chief Guest Editor of the IEEE Transactions on Neural Networks Special Issue on 'Hardware Neural Networks Implementations '. He is an IEEE Fellow since January 2010, and co-founder of Chronocam Ltd (www.chronocam.com).

PRE-PROCESSING OF IMAGER DATA FOR 3D TOF IMAGING

B. De Coi
CEO
ESPROS Photonics AG, Executive Management,
Sargans, Switzerland

Abstract
3D TOF imaging is is one of the preferred technologies for the Internet of Things (IoT), Industry 4.0 and Autonomous Driving Assistance Systems (ADAS). It generates a 3D representation of the environment. Or shall we better say, should provide a 3D representation? 2D imaging is nowadays a technology which is widely mastered. Many engineers all over the world are able to deal with imager chips, lenses, imaging processing and the like. However, 3D TOF imaging offers not only the 3rd dimension of the scenery. It also comes along with many new challenges for the system designers and system integrators. The massive deployment of 2D color cameras started about ten years ago only with the introduction of the smart phone. But the history of digital imaging goes back into the seventies of the last century. It took 40 years from it's birth to become something standard not just for the endusers but also for the design engineer. The technology is mastered. However, if we compare the maturity of 3D TOF imaging with 2D imaging, we are maybe one quarter only on the whole way to perfectness. Many technological innovations compete with each other to become the standard. This paper addresses the challenges involved by using continuous wave modulated TOF (cwTOF). One of a preferred technologies for 3D TOF.

Biografie
Beat De Coi is the founder of the CEDES Group, established in 1986. The company designs and manufactures optoelectronic devices, e.g. elevator light curtains. De Coi sold CEDES in the year 2016, after 30 years successful business development from a garage company to an international group of companies, to the Swedish ASSA ABLOY Group. In autumn 2006, De Coi founded the company ESPROS Photonics Corporation in Switzerland. ESPROS does fundamental semiconductor research and development and manufactures high performance imagers. In 1998, De Coi became Entrepreneur of the Year in Switzerland. In 1999, he was awarded as the most innovative entrepreneur in the Canton Graubunden. In 2004, he won the «European ICT-Grand Prize», which is the most distinguished prize for innovative products and services in the field of ICT because of his pioneering research in the field of time-of-flight cameras. De Coi was nominated with ESPROS for the 2015 Prism Award, the most prestigious award in the photonics industry. De Coi helds an engineering degree in electronics and is member of the board of the University of Applied Sciences in Chur, member of IEEE, IAEE and member of the committee of the Swissmem Photonics Group.

A scientific HDR Multi-spectral imaging platform

B. Dupont
Business Development
Pyxalis, Moirans, France

Abstract
In many fields of applications, noise floor has been the key parameter to choose or develop a new instrument. Especially in astronomy, medical, and space application, the look for the lowest possible noise floor led to the development of interesting technologies. However low noise detector have usually a limited dynamic range, unacceptable in the context of multispectral imaging where the contrast between band can be very high. In this paper we present a new scienctific detector, HDPYX dedicated to high contrast imaging applications, such as, for instance, hyper spectral or multi-spectral applications and we will present applications of this detector in those fields.

Biografie
Benoit Dupont received his PhD in physics from the University of Paris-Sud in 2008 and an IC design engineering degree from PolyTech Montpellier in 2002. He worked as digital system engineer and cmos image sensor designer at FillFactory until 2005. He made his PhD research in partnership with the LETI and ULIS in Grenoble, France, in the field of readout circuits for bolometer infrared image sensors. He was design leader and business developer at Caeleste until 2015 when he joined Pyxalis as head of Business Development.

B. Mourey
CTO of CEA-LETI
CEA / Leti, grenoble, France

Biography
Bruno Mourey

Graduate from Ecole Supérieure de Physique et Chimie (Paris) and PhD in Electronic and Instrumentation (Université de Paris VI).
Bruno Mourey had different positions in relation with display applications from research to manufacturing in the Thomson group. He was Managing Director of Thomson LCDs for more than 10 years.

He joined CEA-Leti in 2003 as Program manager for multimedia applications (display, optical recording….)

In 2006 He was in charge of the start of a 200mm technological platform for Microsystems applications

From 2009 to 2014 He was Vice president, managing Mems division followed by Photonics division

Since 2015 he is CTO of CEA-Leti

Optimization of CMOS image sensor utilizing Variable Temporal Multi-Sampling Partial Transfer Technique to Achieve Full-frame High Dynamic Range with Superior Low Light and Stop Motion Capability

S. Kabir
Systems Engineer, Imaging Division
Rambus, Emerging Solutions, Sunnyvale, United States

Abstract
With the ever scaling trend of pixel in the CMOS Image Sensor (CIS) industry, the challenge of overcoming limited Full Well Capacity remains to achieve adequate Dynamic Range in various industry applications. For consumers, the challenge remains to match the dynamic range of the human eye in capturing high dynamic range motion video. For automotive and industrial applications, high dynamic range is a must to ensure all details are captured in both high light and low light with good signal to noise ratio.

Traditionally, multi-exposure capture, in varying exposure time, is implemented to achieve wide dynamic range. This can lead to problems with motion artifacts as well as poor low light signal to noise ratio.

Variable Temporal multi-sampling with up to four sub-frame exposures combined with partial transfer has been proposed to address low light sensitivity and yield superior stop-motion performance.

However, there hasn’t been a method that combines all these beneficial aspects together to offer best of all technologies proposed in the past.

We report on a threshold based method that predicts the result of a short sub-frame partial charge transfer between the transfer gate to the floating diffusion in a standard four-transistor (4T) pixel, CMOS Image sensor (CIS) in a variable temporal multi-sampled imaging system to achieve improvement in low light signal to noise ratio by up to 21dB, enable stop motion capability without compromising Dynamic Range performance.

The model is verified in silicon using TSMC 65nm 1.1um pixel technology 1MP test chip array. We demonstrate side by side comparison of Dynamic Range and Low Light Signal to Noise Ratio between partial transfer technique against the traditional full transfer technique of a variable temporal multi-sampled high dynamic range system.

Biografie
Salman Kabir is currently part of the Emerging Solution Division of Rambus, California working on Binary Pixel Technology and Lensless Smart Sensors. He has been working in the Imaging division for over 5 years, working mostly with image sensors used for consumer applications. Prior to Rambus, Salman was a Pixel Design and Characterization Engineer at ON Semiconductor, formerly Aptina. Salman Kabir has received his Masters of Applied Sciences from the University of Waterloo, Canada and his Bachelors of Applied Sciences with honors, from the University of Toronto, Canada both in Electrical and Computer Engineering.

Zero delay Focus with poLight TLens

J. Dumarest
System Principal Engineer
poLight, R&D, Lyon, France

Abstract
poLight first product, the TLens Silver, is not just a replacement of traditional VCM technology for Auto Focus, it enables a range of totally new experiences, use cases and ways to build innovation and hence strengthen the differentiation for mobile phone maker.

Indeed, thanks to the extreme focus speed, the poLight technology enables instant focus that will dramatically enhance the user experience, enabling image capture of events always in focus in almost any conditions. poLight will present its innovative way of implementing the technology that will enable always sharp image without the need of running traditional autofocus algorithm or using specific distance measurement system.

Beside the unique capabilities of the TLens (the Tuneable Lens) such as: extremely quick autofocus, Constant field of view, High optical axis stability, extremely low power consumption that can enable instant image acquisition always in focus, the TLens is a key enabler for Multicamera solution. Due to its small footprint the cameras can be placed close together (good for high resolution, extended dynamic range, optical zoom etc), the constant field of view and high optical axis stability (improve image stitching/bracketing computation process) and no electromagnetic cross talk between cameras and surrounding electronics like loudspeakers, antennas etc. which in turn reduce implementation & calibration cost.

Biografie
The author has more than 30 years’ experience in image processing. From Computer Graphics at Getris Images, to STmicroelectronics: Image compression (MPEG decoder for Set top box) division, then architect for Mobile platform and Imaging division before joining poLight 4 years ago. Jacques has a deep knowledge of imaging technology and mobile ecosystem. He is in charge of Software and System development in poLight R&D team

CMOS Image Sensor Scaling Enabled by Direct Bond Technology

K. Cook
Director of Business Development
Invensas, 3D, Raleigh, United States

Abstract
CMOS image sensors (CIS) have experienced substantial growth over the last 20 years due to the ability of their fabrication technology to scale. Although much of this growth has come from traditional node scaling, pixel sensitivity has required the implementation of a new volume manufacturable fabrication technology to support further image sensor scaling. These requirements have been met with a direct bond technology that has enabled multiple generations of 3D image sensor manufacturing and lucrative commercial success for its adopters. The first generation used a low distortion insulating direct bond of a front side CMOS wafer to a silicon handle wafer. This enabled backside illuminated pixels which improved light absorption and facilitated pixel scaling below 1.75um. The second generation also used a low distortion insulating direct bond of a front side CMOS wafer to another CMOS wafer front side in addition to TSVs exterior to the pixel array to interconnect the stacked CMOS. This stacking enabled a substantial improvement in die size, process and CMOS cost, and pixel heating by introducing a vertical scaling component. The third generation replaced the low distortion insulating direct bond used in the first two generations with a low distortion hybrid direct bond enabling submicron scalable per pixel 3D electrical interconnections interior to the pixel array and the elimination of expensive TSVs.

This presentation will describe insulating and hybrid direct bond variants invented and developed at Ziptronix and now available from Invensas which have been registered and are known as ZiBond® and DBI®, respectively. Realized CIS scaling and potential further improvements in CIS enabled by use of direct bond technology will also be discussed.

Biografie
Kathy Cook has over twenty years of experience in the semiconductor industry. Prior to joining Ziptronix, which was acquired by Tessera last year, she held engineering, technical sales and business development positions with companies such as Applied Materials, Millipore Corporation, ULVAC Technologies and SUSS MicroTec. For the past ten years, she has focused on 3D integration. She holds a Bachelor of Science degree in Mechanical Engineering from the University of Texas Austin and a Master of Materials Engineering degree from Auburn University.

Advanced Wafer Level Chip Scale Packaging Solution for Industrial CMOS Image Sensors.

J. VANRUMBEKE
Profesionnal Imaging Sensors Project Manager
e2v Grenoble, Saint-Egreve, France

Abstract
This article will address the application of advanced Wafer Level CSP process technology applied on CMOS Image Sensors for demanding industrial applications. Full assessment of the WLCSP solution will be presented including : Electro-Optical results, Reliability, Supply Chain, as well as comparison with other standard packaging solution. New challenges linked to the introduction in industrial market will be emphasised, as well as the evolution in market applications.

Biografie
Jérôme Vanrumbeke, e2v Semiconductors, France, Professional Imaging Sensors Project Manager
Biography – Jérôme has over 15 years of experience in the packaging & assembly of imaging sensors. He started his career working for the Atmel group before joining the e2v Professional Imaging Division at Grenoble France. Jérôme graduated with a Masters Degree in Microelectronic in 2001 at EUDIL / Polytech'Lille France.

High Dynamic Range (HDR) stereo camera system for applications in robotics

M. Strobel
Head of Department Vision Sensors
Institut für Mikroelektronik Stuttgart, Stuttgart, Germany

Abstract
In modern manufacturing lines the use of robotics will further increase in the future. In traditional e.g. automobile production the robot working area is separated and secured from direct contact to workers for safety reasons. But in fabrication processes where an interaction between the worker and the robot is desired, sensor systems must give the robot systems their senses to establish a secure human-machine-collaboration. Sensors can be placed on the robot at the point of interaction or be installed distantly to remotely monitor both man and robot. The visual information from an imaging system is the most important information to recognize, navigate and interact with humans and objects. In addition nonverbal communication can be perceived in order to react accordingly.
A 3D-sensor system consisting of a High Dynamic Range (HDR) stereo camera board combined with an embedded processor board for real time depth map calculation was developed for human-robot-interaction. HDR image acquisition with a logarithmic opto-electronic conversion function (OECF) is well suited for image processing algorithms based on edge detection operators especially under uncontrolled lighting conditions, like depth calculation from stereo images and object recognition. For robotic applications where a small form factor und low weight is required at the robot’s point of interaction a HDR stereo camera head with serialized stereo data transmission has been build up.

Biografie
Markus Strobel received a degree in Electrical Engineering (Dipl.-Ing.) from the University Stuttgart, Germany, and heads the Department Vision Sensors at the Institute for Microelectronics Stuttgart (IMS CHIPS). He has been with IMS CHIPS since 1997 and focuses on CMOS Imaging, namely development of high dynamic range CMOS (HDRC) image sensors, optical characterization, optical and electrical test environments as well as camera system integration for automotive, industrial and custom specific applications.

Deep submicron CMOS for novel types of smart image sensors

P. Seitz
Adjunct professor of optoelectronics
ETH Zurich, ieLab - Innovation and
Entrepreneurship Lab, Zurich, Switzerland

Abstract
Over the past six decades, semiconductor technology has progressed at a relentless pace: Minimum feature size was being reduced by a factor of two about every four years. During the past 10 years it has become more difficult to keep up this unremitting progress, and a large variety of novel materials had to be introduced into advanced semiconductor processes. This is a superb opportunity for sensing applications because many novel sensor modalities have become possible in deep submicron CMOS processes: Silicon-based photodetectors with extended sensitivity in the mid-infrared, the far infrared and even the THz spectral range were demonstrated, either by new co-doping approaches or by exploiting nanometer-scale charge confinement effects. Unusual mechanical properties of newly employed materials can be exploited for acoustic transducers and on-chip high-Q resonators. Uncommon thermal properties can be used for new kinds of low-cost CMOS-compatible thermal infrared image sensors.
The rich variety of materials required for today's deep submicron CMOS processes is a treasure trove for the developers of novel types of smart image sensors, combining sensing transducer, analog and digital signal processing on the same chip and even in each pixel of an image sensor.

Biografie
Peter Seitz received his M.Sc. degree in experimental physics and his Ph.D. in biomedical engineering both from ETH. From 1984 to 1987 he was a staff member of the RCA Research Laboratories in Princeton, New Jersey (David Sarnoff Research Center) and in Zurich, Switzerland, performing applied research in optics and image processing. In 1987 he joined the Paul Scherrer Institute (PSI), where he created and led the Image Sensing research group. From 1997 to 2012 he worked for CSEM, the Swiss Center for Electronics and Microtechnology, first as a group leader and then as Vice President Photonics, heading CSEM's photonics division. From 2006 to 2011, he was CSEM's Vice President Nanomedicine.
Since 2012 Peter Seitz has been concurrently head of the Hamamatsu Photonics Innovation Center Europe, adjunct professor of optoelectronics at EPFL, and innovation sherpa at the Innovation and Entrepreneurship Lab (ieLab) of ETH Zurich.

Peter Seitz has authored and co-authored about 200 publications in the fields of applied optics, semiconductor image sensing, machine vision, optical metrology and in the MedTech domain. He holds 50 patents, and he has won more than 20 national and international awards together with his teams, of which the most prestigious is the IST Grand Prize 2004 of the European Commission. He is a Fellow of the European Optical Society EOS, member of the Swiss Academy of Engineering Sciences SATW, and he is a member of the Executive Board of the ETP Photonics21, chairing the workgroup on sensors, metrology and security.