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MEMS & Imaging Sensors Forum

Technology and Knowledge Open Hub: a Pathway to Future Imaging and MEMS

F. Profumo
President
National Research Council (CNR), Rome, Italy

FONDAZIONE BRUNO KESSLER

Abstract
Current and future challenges in novel fields, such as quantum technologies, require a new paradigm of cooperation in the research landscape. In this evolving context, Fondazione Bruno Kessler is adapting its model to operate as an “Open Hub” of knowledge and technologies, with a focus on future sensing and imaging devices. After being conceived and engineered within the internal facility, these can be transferred to high-volume production sites: from radiation detectors to plasmonics, from silicon photonics to single-photon imaging, FBK is giving its contribution to the devices of the future such as quantum technologies, enabling novel mobility and automotive scenarios, space exploration, and faster and secure communications.

Biography
Born in Savona in 1953, he is an engineer and academic, Professor of Electrical Machines of the Politecnico Torino. He has been Italy's Minister of Education from 16 November 2011 to 28 April 2013 appointed by Prime Minister Professor Mario Monti. He has been President of the National Research Council (CNR) and had previously served as Chancellor of the Politecnico di Torino from 2005 to 2011. He is President of Business School ESCP - Campus of Turin, President of Collège des Ingénieurs - Campus of Turin, Chairman of Associazione di Fondazioni e di Casse di Risparmio SpA (ACRI), Chairman of Fondazione Compagnia di San Paolo since 2016 and Chairman of Fondazione Bruno Kessler (Trento) since 2014.

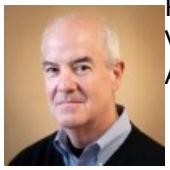
Embedded Computing the Next Paradigm Shift for Image Sensors

P. Cambou
Principal Analyst
Yole Développement, Photonics & Sensors,
Villeurbanne, France

Abstract
Imaging is an old industry which started in the 1830's on copper plates, from still images it moved to motion picture in the 1890's, the medium switched to organic film such as celluloid and then acetate. In the 1930's tube based cameras allowed television as we know it and was the first step for electronic based imaging. In the 1970's the transition to silicon based image sensors called CCDs allowed for mass adoption of electronic cameras. By the year 2000 digital photography and video took the world by storm. Since then a radical transformation of imaging applications and technology took place with Mobile applications and thanks to the CMOS image sensor technology. The world reached a peak in smartphones sales in 2017, nevertheless the sales of image sensors have grown 40% since then and the growth is expected to maintain for the 5 years to come. Two trends have contributed to this growth. The first one is the proliferation of cameras per phone and the second is the introduction of sensing cameras, mainly for biometric identification but also to help the photographic aspects such as bokeh. Innovation in imaging will not stop there and the next wave of innovation will come from artificial intelligence. While some of the innovation currently takes place either in the cloud or in the central APU, there is a trend to bring compute close to the sensor and actually embed significant amount of intelligence within or close to the sensor. In this presentation we will look at the reasons to do so and why it is important for the future of imaging. We will look at who are the players active in this new technology shift and for which kind of application.

Biography
Pierre Cambou MSc, MBA, is a Principal analyst in the Photonic and Display Division at Yole Développement (Yole). Pierre's mission is dedicated to imaging related activities by providing market & technology analyses along with strategy consulting services to semiconductor companies. He is responsible for the CIS Quarterly Market Monitor while he has authored more than 15 Yole Market & Technology reports. Pierre has an Engineering degree from Université de Technologie de Compiègne (France) and a Master of Science from Virginia Tech. (VA, USA), Pierre also graduated with an MBA from Grenoble Ecole de Management (France).

A Simple and Versatile Single Camera Near-Depth Solution



P. Gallagher
VP Strategic Marketing
Airy3D, Montreal, Canada

Abstract
Imaging is undergoing a radical transformation in the way that an image sensor captures, processes, and uses data. The traditional application to capture a memory has expanded to a fast-growing collection of applications spanning: facial and object recognition, robot and vehicle navigation, surveillance and biometrics, smart homes, appliances and cars, image retrieval, gaming and controls. These smart applications require accurate and reliable 3D images, and therefore, we've seen a proliferation of 3D imaging technologies.

This presentation will review different depth sensing technologies and the smart applications that are well suited for them. AIRY3D's DEPTHIQ™ platform for 3D computer vision will be introduced as well.

AIRY3D's DEPTHIQ™ TDM (Transmissive Diffraction Mask) optical encoder and IDP (Image Depth Processing) software enable any single 2D image sensor to produce high-quality color images and 3D near-field depth maps with unrivaled simplicity. DEPTHIQ-powered sensors are ideal for anti-spoofing by photos in facial identification, video bokeh, image segmentation, person detection and monitoring, collision avoidance, as well as a host of other embedded vision applications.

Biography
Paul GALLAGHER, VP Strategic Marketing. With over 30 years of industry experience, Paul has held executive, technical and product leadership roles at many of the top imaging sensors original equipment manufacturers. He has worked in most applications involving imaging devices, from BarbieCams to Missile Navigation and Mobile Phones to DNA Sequencing. He conitnues to be an industry speaker and a reference source for market research studies. Paul holds a BE in Engineering Physics, Lasers & Applied Optics from Stevens Institute of Technology, and an MBA from Pepperdine University.

Sensors to Make the World Greener, Easier and Safer

P. von Schierstaedt
Vice President & General Manager of Radio Frequency & Sensors
Infineon Technologies, Neubiberg, Germany

Abstract
abstract description coming soon

Biography
Philipp von Schierstädt
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Philipp von Schierstädt has been Business Line Head RFS and Extended Board Member of the Power & Sensor Systems Division at Infineon Technologies AG since 2011. Philipp von Schierstädt was born on 19th May 1970 in Munich. He
has studied mechanical engineering and economics (Dipl. Ing. Technical University Berlin), holds a Master in Economics (University of St. Andrews) and has written his engineering diploma thesis at the Massachusetts Institute of Technology (MIT USA).

He joined Infineon Technologies AG in 2001.

MEMS Actuators at the Core of Emerging Applications

A. Hofmeister
Group Vice President - General Manager MEMS Actuator Division
STMicroelectronics, AMS Group, Agrate Brianza, Italy

Abstract
not available yet

Biography
Anton Hofmeister is Group Vice President at STMicroelectronics (STM) and General Manager of the MEMS Actuator Division. He is located in Agrate Brianza/Italy.
Anton has been with STM for over 30 years and has worked in Germany, France, USA and Italy. During his career, he has held managerial positions in Key Account Management, Product and Strategic Marketing, Advanced R&D and General Management. For the past >10 years, he has managed various product divisions in the MEMS sector. Anton has also served as a board member of the Singapore based Molecular Diagnostics company “Veredus Laboratories” and is Managing Director of STM’s German subsidiaries.

Novel Bonding Technologies for Photonic and MEMS Sensor Integration

B. Dielacher
Business Development Manager
EV Group, St. Florian am Inn, Austria

Abstract
MEMS sensors are a key technology for many of today´s applications and must meet the highest standards of performance and reliability. Current devices on the market already have a high level of integration to fulfil these requirements, such as inertial measurement units. Emerging MEMS applications are diversifying in their capabilities and increasingly focus on integrating technologies from other disciplines, such as photonics, biomedical and nanotechnology. Innovative manufacturing technologies are thus developed to enable such integration schemes. In particular, high precision adhesive wafer-level bonding provides a reliable interface to facilitate the integration of different materials and technology platforms. Advances in pre-processing such as surface preparation, coating and adhesive patterning will be discussed including the preparation of ultrathin adhesive films and EVG´s adhesive layer transfer technology. Furthermore, wafer bonding capabilities will be presented and it will be shown how individual photonic chips can be transferred and integrated with a collective wafer-based process.

Biography
Dr. Bernd Dielacher is business development manager at EV Group where he is responsible for the MEMS as well as the bio- and medical technology market.

Bernd holds a master’s degree in Microelectronics from Vienna University of Technology and received a PhD in Biomedical Engineering from ETH Zurich, where he explored metal nanostructures for electrical and plasmonic sensing in biomedical applications.

Toward Event-Based Vision Wide-scale Adoption

L. Verre
CEO
PROPHESEE, Paris, France

Abstract
Since their inception 150 years ago, all conventional video tools have represented motion by capturing a number of still frames each second. Displayed rapidly, such images create an illusion of continuous movement. From the flip book to the movie camera, the illusion became more convincing but its basic structure never really changed.

For a computer, this representation of motion is of little use. The camera is blind between each frame, losing information on moving objects. Even when the camera is recording, each of its “snapshot” images contains no information about the motion of elements in the scene. Worse still, within each image, the same irrelevant background objects are repeatedly recorded, generating excessive unhelpful data.

Evolution developed an elegant solution so that natural vision never encounters these problems. It doesn’t take frames. Cells in our eyes report back to the brain when they detect a change in the scene – an event. If nothing changes, the cell doesn’t report anything. The more an object moves, the more our eye and brain sample it.

This is the founding principle behind Event-Based Vision – independent receptors collecting all the essential information, and nothing else.

Prophesee is the inventor of the world’s most advanced neuromorphic vision systems. Composed of patented Metavision® sensors and algorithms, these systems enable machines to see what was invisible to them until now.

With 10-1000x less data generated, >120dB dynamic range and microsecond time resolution (over 10k images per second equivalent), Prophesee Metavision® opens vast new potential in areas such as **autonomous vehicles, industrial automation, security and surveillance, mobile, IoT and AR/VR**. Its solutions improve safety, reliability efficiency and user experiences across a broad range of use models.

Biography
Luca Verre is Co-Founder and CEO of Prophesee, the inventor of the world’s most advanced neuromorphic vision systems. Prophesee’s patented technology is inspired by human vision, giving sight back to the blind and unlocking new safety and autonomy standards for cars, robots and mobile devices.

Luca is a World Economic Forum Technology Pioneer. He has extensive international management experience in the industrial and electronics sectors. His experience includes project and product management, marketing and business development roles at Schneider Electric. Prior to Schneider Electric, Luca worked as a Research Assistant in Photonics at the Imperial College of London. Luca holds a MSc in Physics, Electronic and Industrial Engineering from Politecnico di Milano and Ecole Centrale and an MBA from INSEAD.

Above and Beyond Methodology: Robustness Validation of Automotive MEMS Sensors

S. Vos
R&D Director, PL Motion Sensors
NXP Semiconductors, Chandler, United States

Abstract
MEMS & Sensor devices have been used for safety applications for 2 to 3 decades, but quality and reliability requirements continue to outpace capabilities. The electronics industry has not defined an advanced quality and reliability beyond the AEC Q100 and ZVEI Robustness Validation specifications.
NXP is proposing an "Above and Beyond" methodology intended to 1) produce higher body of evidence to enable lower ppm resolution of stress testing, 2) run serial reliability testing to better evaluate failure mechanisms and produce physico-chemical models of these mechanisms, 3) test reliability stress-to-fail to enable reliability modeling of failure mechanisms, and 4) reliability test corner lots to understand the design-process-manufacturing space with respect to quality and reliability.
In the presentation, NXP will propose a methodology for tailoring these four types of quality and reliability evaluation testing to MEMS/Sensor products and their intended use-cases: supply chain / assembly and end-user application.
Moreover, NXP will promote adoption of this methodology as a means of addressing the continuously stricter requirements particularly related to the security and safety of automotive applications.

Biography
Sandy Vos received her PhD from University of Minnesota in Materials Science and Engineering and has 20 years of industry experience in MEMS, microsystem, materials, component, composite and semiconductor technology and product development. She joined NXP in 2018 and is currently Director of R&D focused on inertial sensing, including automotive safety-critical devices. Her work requires the incorporation of functional safety and advancements in the state-of-the-art quality to MEMS physical sensors, within the significant challenges of an aggressive automotive-focused market as it extends into the vision of autonomous vehicles. Dr. Vos was Director of MEMS Engineering and Sr Manager of Product Development at Knowles Corporation in their Consumer Electronics division. At Knowles she was also a technical and design lead for consumer and hearing health microphone development programs in acoustic MEMS sensors. She has worked in the fields of surface mount fuse and suppressor design and manufacturability at Littelfuse, Inc and plastic composite design and manufacturability at Azdel, Hanwha.

120fps, Ultra High Definition (8K UHD), Low Noise, Global Shutter Sensor for High-end Rigid Endoscopy

J. Segovia
Senior Principal Engineer
Teledyne e2v, Technology & Product Development, Seville, Spain

Abstract
Teledyne e2v presents the use of our Emerald 36M CMOS image sensor (which is a derivate version of Emerald 67M) for use in high-end rigid endoscopy. Teledyne e2v has several image sensors suitable for rigid endoscopy: Emerald 2M, Emerald 8M and finally Emerald 36M. This particular sensor provides ultra-high definition resolution, low noise (2.8eRMS) and high speed (120fps), enabling the medical surgeon to have a system with a reduced number of total cameras, increased precision in surgery and also improved patient comfort.

Biography
Jose Segovia Senior Principal Engineer

B. Eng. Engineering Telecommunications Electronics Seville University 2003
MhD. Degree Microelectronic Master: Design and applications of Micro and Nanometer systems (December 2010). University of Seville

Telecommunications Electronics Engineer from the University of Seville. Joined Teledyne AnaFocus in 2005 as analog and mixed-signal design engineer. He was involved in high-speed pipelined ADCs, current steering DACs, LVDS drivers between others. In 2009 he was promoted to technical director in image sensors project. Under Jose's direction, more than 5 projects has been successfully developed becoming specialist in ultra-high speed sensors and low noise CIS, with strong background on analog and mixed-signal design. In 2010 he received the MhD. Degree from University of Seville and Microelectronic Institute of Seville. Recently, in June 2019 he has promoted to Senior Principal Engineer taking care of the technology development of images sensors inside Teledyne in several sites. He has written several papers in international conferences and he contributes actively to the development cutting-edge technology in Teledyne.