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MEMS & Imaging Summit

Welcome Remarks

L. Altimime
President
SEMI Europe, Berlin, Germany



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Coming Soon

Biography

Laith Altimime, as President of SEMI Europe, leads SEMI's activities in Europe and the Middle East and Africa (EMEA). Altimime has P&L responsibility as well as ownership of all Europe region programs and events, including SEMICON Europa. He is responsible for establishing industry standards, advocacy, community development, expositions, and programs. He provides support and services to SEMI members worldwide that have supply chain interests in Europe. He manages and nurtures relationships with SEMI members in the region and globally as well as with local associations and constituents in industry, government, and academia. Altimime has more than 30 years of international experience in the semiconductor industry. Prior to joining SEMI in 2015, He held senior leadership positions at NEC, KLA-Tencor, Infineon, Qimonda and imec. Altimime holds an MSc from Heriot-Watt University, Scotland.

References

Smart Sensors for Smart Life – How Advanced Sensor Technologies Enable Life-Changing Use Cases

S. Finkbeiner
Generalmanager
Bosch Sensortec, BST/GM, Reutlingen-
Kusterdingen, Germany

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Smart and tiny sensors are catalysts for addressing major modern challenges like enhancing environmental health and elevating human well-being.

The rapid development of hearables and wearables promise entirely new fields of applications improving the user's well-being and lifestyle by integrating many different functions in multiple connected devices. MEMS sensors play a crucial role in the realization of such innovative devices. The presentation shows how cutting-edge sensor technology enables innovative devices for advanced use-cases. There will be a special focus on connected devices and the extended usage of algorithms on the sensor which enable even more complex applications. This leads to completely new use-cases such as full-body motion tracking, indoor navigation and air quality tracking.

The examples underscore the synergy between MEMS sensors and smart algorithms, unlocking vast potential across diverse fields. The presentation concludes with an outlook on innovative use cases ahead.

Biography

Dr. Stefan Finkbeiner has been CEO and General Manager at Bosch Sensortec GmbH since 2012.

In 2015, Dr. Finkbeiner was awarded with the prestigious lifetime achievement award from the MEMS & Sensors Industry Group. In 2016, 2022 and 2023 Dr. Finkbeiner has been elected Manager of the Year by the Markt & Technik Magazine.

He joined Robert Bosch GmbH in 1995 and has been working in different positions related to the research, development, manufacturing, and marketing of sensors for more than 20 years. Senior positions at Bosch have included Director of Marketing for sensors, Director of Corporate Research in microsystems technology, and Vice President of Engineering for sensors.

Dr. Stefan Finkbeiner received his Diploma in Physics from University of Karlsruhe in 1992. He then studied at the Max-Planck-Institute in Stuttgart and there received his PhD in Physics in 1995. He was born in 1966 in Freudenstadt, Germany.

References

Sensing the world: innovating for a more sustainable future

S. Ferri
APMS Group Vice-President, MEMS sub-group
General Manager
STMicroelectronics, Agrate Brianza, Italy



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Sensors are at the core of many of our interactions with the world. They serve as the bridge between the physical and digital realms. From this perspective, there is a strong expectation that sensorization remains human-centric, enhancing our daily lives by contributing to a better lifestyle. Also, there is an increasing urgency to keep up with long-term plans regarding sustainability. The path for a net-zero transition is everyone's responsibility, and embedding sustainability practices in our sensor strategy is essential to our people, our business, and society at large. Our commitment to sustainability is reflected in the way our sensors deliver valuable data efficiently across various industries, including automotive, industrial sectors, infrastructure projects, and consumer electronics, ensuring that our technological footprint is both meaningful and environmentally conscious.

Biography

Simone Ferri is General Manager for STMicroelectronics MEMS sub-group since February 2016. Simone began his career in STMicroelectronics in 1999 as an R&D engineer, before moving on to digital designer for the Audio Division, leading into product management after 5 years. In 2014, Simone was entrusted with ST MEMS consumer sensors then with global MEMS-sensor related Marketing and Application activities across all markets and segments, and, more recently with AMS Group Vice-President and General Manager of the MEMS sub-group. Simone Ferri was born in Milan in 1972 and graduated with a degree in Microelectronics from the Polytechnic of Milan, where he also completed his MBA.

References

A Paradigm Shift From Imaging to Vision: Oculi Enables 600x Reduction in Latency-Energy Factor for Visual Edge Applications

C. Rizk
Founder CEO
Oculi, Rochester, United States of America

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Remarkable progress has been achieved in AI, particularly in the use of deep neural networks, which has significantly enhanced the reliability of face detection, eye / hand tracking, & people detection. However, performing these tasks still demands substantial computational power & memory resources, making it a resource-intensive endeavor that remains to be solved. Consequently, power consumption & latency pose significant challenges for many systems operating in always-on edge applications.

The OCULI SPUTM (Sensing & Processing Unit), ideal for smart vision applications, represents an intelligent, programmable vision sensor capable of configuration dynamically to output select data in various modes depending on use case needs. These modes include video, polarity events, smart events, regions of interest (ROI), sparse random access, & actionable information that make the vision sensor efficient. Moreover, the SPU allows real-time programmability of spatial & temporal resolution, as well as dynamic range & bit depth. By enabling continuous optimization, visual AI solutions deploying the SPU can reduce the latency-energy factor by more than 600x at a fraction of the cost. Smart events, ROI, random access, & actionable information output modes are unique to the OCULI SPU.

Because the SPU is fully programmable, it can be dynamically optimized between latency & power consumption. It will enable the first truly wireless battery-operated always-on Visual AI products in the market. We will provide an overview of Oculi's novel vision architecture for edge applications, as well as key results for latency & energy results for multiple use cases of interest. Applicability to various markets including presence/people/pedestrian/object, face, hand, & eye detection will be reviewed. Finally, our results include a comparison with conventional solutions that demonstrate significant advantages in adopting a paradigm shift from imaging to vision for visual edge applications.

Biography

Charbel is Founder and CEO of Oculi.

Prior to this venture, Charbel was an Associate Research Professor at Johns Hopkins University, where he was recognized as a top innovator, thought leader, and successful Principal Investigator of multiple innovative and far-reaching concepts and technologies.

He has had numerous publications and intellectual property filings, and received 12 achievement/recognition awards.

Dr. Rizk was a pioneer in UAV technology, AI & machine learning, and autonomy. He has been a visionary for the optimized signal-to-information architecture that embodies dynamic software-defined multi-modal sensing and fusion and true edge processing.

References

P. D. Berger
MEMS Industrial Partnerships Manager
CEA LETI, DCOS - Components on Silicon Division,
Grenoble, France

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session chair

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session chair

References

Unlocking Novel Opportunities: How 300mm-capable MEMS Foundries will Change the Game

J. Gomez
CEO
Rogue Valley Microdevices, Medford, United
States of America



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Although the semiconductor industry began manufacturing on 300mm wafers in the early 2000s, benefiting from economies of scale, design standards, and standardized process nodes, the MEMS industry has lagged. In MEMS, it's still a single product, single process world – making it time-consuming and expensive to bring new devices to market. As the number of 300mm CMOS fabs continue to increase, so does the demand for 300mm-capable MEMS foundries to support critical technology integration, scalability, and efficiency.

For the MEMS industry, the adoption of 300mm wafers will signify a substantial leap forward in manufacturing automation and cost-effectiveness, yet it still presents many challenges. MEMS processing frequently utilizes non-CMOS compatible materials for metallization, sensing and actuation, making it nearly impossible to support both CMOS and MEMS manufacturing in the same facility. To be successful on a 300mm platform, MEMS foundries will need to manufacture a high mix of products to ensure their facilities run efficiently and at capacity.

This session will explore how Rogue Valley Microdevices – a pureplay, full-service precision MEMS foundry – has reacted to this need for 300mm MEMS with the construction of its second fab, a flexible, 300mm-capable MEMS foundry in Palm Bay, Florida with production set to begin in 2025. Rogue Valley Microdevices expects to address multiple areas of need, including thin film deposition, through-silicon via (TSV), RDL, UBM, wafer level packaging, and is poised to leverage 300mm technology to propel MEMS sensor development to unprecedented heights.

Join us as we explore how flexible, 300mm-capable MEMS foundries promise to revolutionize the integration of microsensors into the supply chain, fostering innovation and unlocking new possibilities for transformative products.

Biography

As founder and CEO of Rogue Valley Microdevices, Jessica Gomez has created a world-class precision MEMS foundry in the heart of Southern Oregon, with a second foundry under construction in Palm Bay, Florida. Integral to her role as CEO, Ms. Gomez practices a business philosophy of offering best-in-class process technology and R&D expertise to customers, to help them achieve the highest quality and reliability in their products. Prior to founding Rogue Valley Microdevices in 2003, Ms. Gomez honed her experience in semiconductor processing and production management through positions at Standard Microsystems Corporation, Integrated Micromachines, and Xponent Photonics.

Ms. Gomez plays an active leadership role within and beyond the technology industry. She is a board member of the prestigious SEMI Board of Industry Leaders, and she is the first executive selected for Spotlight on SEMI Women, which honors accomplished women in the global microelectronics industry.

Trends in Emerging MEMS

A. Fitzgerald
CEO
A.M. Fitzgerald & Associates, LLC, Burlingame,
United States of America



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End uses for MEMS are expanding into new areas beyond consumer electronics. These include ADAS and autonomous piloting systems, microfluidics for genomic analysis, portable ultrasonic devices, metaverse applications, and environmental monitoring.

In view of these increasingly demanding MEMS applications for which high precision, robustness and small size are essential, new device architectures are emerging, particularly the use of piezoelectric thin films.

Drawing from her company's product development work, as well as from her view of current trends in MEMS and sensor R&D, Dr. Fitzgerald will provide a perspective on emerging MEMS architectures and materials for near-term business and growth opportunities.

Biography

Alissa M. Fitzgerald, PhD, has 30+ years of experience in MEMS design, fabrication methods, multiphysics simulation, and product development. She has personally developed over a dozen distinct MEMS devices such as piezoresistive cantilevers, pressure sensors, ultrasound transducers, and infrared imaging arrays, and she holds 11 US patents.

Dr. Fitzgerald advises clients on the entire cycle of microelectronic product development, from business and IP strategy to supply chain and manufacturing operations. In addition to her primary focus on industrial and commercial activities, she continues to engage in collaborative scientific research, serve on academic conference abstract review committees, participate in peer reviewed academic journal articles, and offer guest lectures at academic institutions such as UC Berkeley and Stanford University.

Dr. Fitzgerald is a member of the SEMI-MSIG Standards Committee and served as a board director on the MEMS Industry Group (MIG) Governing Council from 2008-2014. In 2013, she was inducted into the MIG Hall of Fame. She serves as a board director for Rigetti Computing (NASDAQ:RGTI), a full stack quantum computing company. Dr. Fitzgerald received her bachelor's and master's degrees from MIT and her PhD from Stanford University in Aeronautics and Astronautics.

References

The Most Common Antistiction Films are PFAS, Now What?

D. Springer
Product Manager, MVD and Release Etch Products
KLA Corporation, SPTS Division, Allentown, United
States of America



Body

Antistiction coatings are widely used in MEMS applications to improve device performance and enhance overall device lifetime. The most widely used chemicals are fluoropolymers like FDTS and FOTS, which are members of the large group of PFAS substances. MEMS integrators and manufacturers are increasingly seeking alternative antistiction coatings that do not use PFAS chemicals. The obvious solutions include hydrocarbon analogs of FDTS and FOTS, but these don't have the required thermal or mechanical stability. This talk will discuss the various alternatives to FDTS, explore their strengths and weaknesses, and introduce a new proprietary fluorine free antistiction coating.

Biography

David Springer is a Product Manager at KLA in charge of MEMS applications of MVD coatings, and XeF_2 release etch products. He joined SPTS in June of 2013 when SPTS acquired Xactix Inc. where he was President for 11 years. Previous to XACTIX, David was president of a design automation startup company and received his PhD. in Computer Engineering from Carnegie Mellon University.

References

Latest innovations in MEMS wafer bonding

T. Uhrmann
Director Business Development
EV Group, St. Florian am Inn, Austria



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MEMS and sensors play a crucial role in many of today's applications. As their complexity and integration continues to increase, innovative manufacturing technologies become essential to fulfil the requirements of next-generation applications. Wafer bonding is a key technology for MEMS and sensors encapsulation but also for advances in system integration. This presentation will discuss the latest developments in high-vacuum oxide-free wafer bonding, a technology that enables not only conductive bond interfaces but is also well suited for heterogenous material integration at low- or even room-temperature. In addition, recent innovations in high-volume 300 mm MEMS wafer bonding will be highlighted in this talk.

Biography

Dr. Thomas Uhrmann is director of business development at EV Group (EVG) where he is responsible for overseeing all aspects of EVG's worldwide business development. Specifically, he is focused on 3D integration, MEMS, LEDs and a number of emerging markets. Prior to this role, Uhrmann was business development manager for 3D and Advanced Packaging as well as Compound Semiconductors and Si-based Power Devices at EV Group. He holds an engineering degree in mechatronics from the University of Applied Sciences in Regensburg and a PhD in semiconductor physics from Vienna University of Technology.

References

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A. Bakal
CEO & Co-founder
TriEye, Tel Aviv, Israel



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Active Hyperspectral Imaging Using Extremely Fast Tunable SWIR Light Source

J. Soukkamäki
Lead, Hyperspectral & Imaging Technologies
VTT Technical Research Centre of Finland Ltd,
Oulu, Finland

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VTT has created an active hyperspectral imaging concept using spectrally tunable light source based on MEMS Fabry-Perot interferometer and supercontinuum laser. The proposed solution opens new possibilities in close and long range distances enabling detection even in the total darkness. Especially in the industrial lines, this new technology may enable hyperspectral market expansion from niche to machine vision mainstream.

Biography

Jussi Soukkamäki has over 20 years of experience in optoelectronics industry. During the last 12 years he has worked with spectroscopical applications in various positions from R&D to sales and business development in companies like Rikola Ltd, Senop, Timegate Instruments and Spectral Imaging Ltd. (SPECIM). Currently he works as a Lead, hyperspectral and imaging technologies, at VTT.

References