Yole Développement

Pierre Cambou

Imaging Principal Analyst

Pierre Cambou has been part of the imaging industry since 1999. He first took several positions at Thomson TCS, which became Atmel Grenoble in 2001 and e2v Semiconductors in 2006. In 2012 Pierre founded Vence Innovation, later renamed Irlynx, to bring to market an infrared sensor technology for smart environments and interactions. He has an Engineering degree from Université de Technologie de Compiègne and a Master of Science from Virginia Tech. Pierre also graduated with an MBA from Grenoble Ecole de Management. In 2014 he joined Yole Développement as Imaging Activity Leader.

Envision the future of 3D imaging & sensing

In the past two years 3D sensing has become a major technology milestone for consumer electronics. In 2017 the iPhone X brought a major disruption with a touch-less biometric interface using a 3D structured light camera. The full consumer electronics industry is now in motion to adopt 3D sensing as a new touch-less user interface . In the process new technologies are entering such as Time of Flight cameras and Active Stereo Vision. As space and dollars are a scarce resource on the front side of phones, the application of 3D sensing is now starting on the rear of phones and expending into tablets, smart assistants, and payment devices.

Sony Semiconductor Solutions

Michiki Mikuriya

General Manager

Having experienced 12yrs of image sensor module development in Sony, including 5yrs of general manager responsibility, in 2016 he started Sony's first "Time-of-Flight" system development, including sensors, optics, illuminators, software, that was built into the Sony's entertainment robot "aibo" released in 2017. Since then he took the lead of Sony Semiconductor's indirect ToF system development, and every day, trying to make the world more interesting by having 3D information

Sony’s ToF application exploration in consumer area

Sony has been accelerating its development of ToF product after the merger of SoftKinetic Systems S.A. in 2015.
The first ToF commercial product released to the market is Sony's entertainment robot "aibo" in 2017.
After that, first back-illuminated high performance ToF product followed and was released in 2018, used in several smartphones.
Throughout those activity, Sony has been very active developing not only ToF sensor itself, but all the reference design
of optics, illuminators, commercial software for ToF signal processing, and even joint development of application software like AR gaming,
in cooperation with major game venders.
In this Forum, Sony ToF representative present how ToF works in general, compared to other technologies such as stereo camera, structured light,
And update such recent application development status, and further prospect how consumer experience will change in the long term, through depth sensing technology

ams AG

Allan Frederiksen

VP OSS System Engineering

Allan has 18 years of experience in complex technology engineering, delivered highly complex technical deliverables into mobile devices that has been used by 100s of millions of people, has a M.Sc.E.E. in digital signal processing from Aalborg University, and he has held various roles from System & SW architect to leading global multi-site, multi-cultural organizations, and are now leading the 3D System Engineering activities in ams AG, taking an application and system approach, and developing full reference systems for 3D applications.

3D Sensing Solutions

While mastering the core technologies across the different 3D sensing fundamental techniques, taking a system approach to building 3D solutions is essential for driving the performance further and solve the integration and complexity challenges with new space requirements e.g. in mobile. With co-design of algorithms and various HW building blocks, cost and performance of known technologies like active stereo can be improved further. Having system capability is also a pre-requisite for evaluating usage of 3D systems in emerging applications, to ensure right availability of technology when the application will get wider adoption, and enables providing turn-key solutions is an enabler for addition of 3D sensing to new applications,

System Plus Consulting

Romain Fraux

CEO

Romain Fraux is the CEO of System Plus Consulting (part of our Yole Group of companies), that focuses on Reverse Costing analysis of electronics, from semiconductor devices to electronic systems.
Supporting industrial companies in their development, Romain and his team are offering a complete range of services, costing tools and reports. They deliver in-depth production cost studies and estimate objective selling price of a product, all based on a detailed physical analysis of each component in System Plus Consulting laboratory.
Romain has been working for System Plus Consulting for more than 12 years and was previously the company's CTO.
He holds a bachelor's degree in Electrical Engineering from Heriot-Watt University of Edinburgh (Scotland), a master's degree in Microelectronics from the University of Nantes (France), France and a Master of Business Administration.

Review of Consumer 3D Sensing Technologies

3D Sensing has been introduced on the consumer market a few years ago, but since late 2017 and the release of the iPhone X with Face ID a lot of companies have been investigating this space. Most of the OEM have now integrated 3D sensing, for face recognition or depth sensing. Integrating these modules is very challenging due to the limited space and the related cost.
Three approaches have been considered in consumer applications: active stereo vision (AS), structured light (SL) and Time-Of-Flight (ToF) sensing. SL was developed by Apple, which brought it to the market for the first time in 2017. It's based on a complex system requiring several components, including a Global Shutter (GS) image sensor and a dot projector. The latter has been considered difficult and expensive to make due to the precision required. The ToF approach could be less complex and less expensive due to the only need of a ToF Image sensor and a flood illuminator to bring depth sensing to a system.
Based on pictures extracted from physical analyses of several modules from the leading players the presentation will highlight the latest technologies trends for the key components and the evolutions in term of manufacturing process and package integration.

Oxford Instruments Plasma Technology

Stephanie Baclet

Senior Technical Marketing Engineer

Stephanie Baclet has worked for 8 years in the semiconductor industry. She works closely with optoelectronics device manufacturers to translate requirements of their device characteristics into nanofabrication requirements for plasma processing products. She has worked as a Senior Application Engineer focused on new product introduction and developed processing techniques for various technologies such as HBLED, Laser diodes, and transistors.

Performance, Precision and Productivity: Solutions for VCSEL fabrication.

As VCSEL technology transitions from Data Communication to Face ID, world facing 3D sensing and potentially LiDAR the design and fabrication process of VCSEL dies must be altered. In order to enable high resolution sensing at long distance, the optical output power of the laser diode must increase. To increase power, VCSEL designers have several options these include increasing the number of emitters within an array. However, tighter control of front-end processing is required to fabricate denser VCSEL arrays. Additionally, increasing the density also increases instabilities in the electro optical performance of the laser because of thermal cross talk between emitters in the same die. As a result, VCSEL designers must compromise and find a balance between cost and performance. They must increase the size of the die in order to increase spacing between emitters. This primary need leads to less device per wafer and therefore a higher die cost. Oxford Instruments Plasma Technology offers a path to cost efficient high performance VCSEL array manufacturing.
The mesa dry etching solution focuses on yield, cost and performance. Mesa processing with ultra-low footing on vertical mesas enables manufacturers to produce VCSEL dies with higher density of emitters thanks to precise control of etching depth on high aspect ratio features. Ultra-low footing is achieved in combination with ultra-smooth sidewalls across full wafers, achievable with cost effective photo resist patterning. Overall, high etch processing uniformity at 150mm wafer delivers the performance and high yield manufacturing required to enable the next generation of VCSEL devices.

Orbbec

Dr. Chen Zhi

Vice President

PhD in 3D imaging system, Vice president of Orbbec, Senior R&D Scientist at Orbbec

Dr. Chen Zhi received his bachelor's degree from National University of Singapore, Engineering Science Program with a specialization in optics and photonics. After graduation, he joined research laboratory at Singapore-MIT Alliance for Research and Technology. Since 2012, he began to pursue a PhD under the supervision of Prof. George Barbastathis from MIT 3D optical system group. Dr. Chen's main research area is in 3D optical imaging system, holographic imaging system, computational imaging, and microscopy. He has published several peer reviewed research articles in top optics journals, and is a voluntary journal reviewer for optics letters, Optics Express. Dr. Chen Zhi joined Orbbec in 2016, he now serves as the vice president in R&D of Orbbec.

A Roadmap to the future of 3D sensing technology

After the launch of iPhone X and Find X smartphones, the IOS and Android smart phones have had the first wave of adopting 3D sensing technology for non-contact biometric identification purposes. Since then, various technologies are explored, including structured light, stereo vision and time-of-flight. The supply chain is maturing to prepare more applications of 3D sensing in our daily life. In this talk, we will review the various methods in the markets from a technical perspective, and show various applications from Orbbec's global customers.