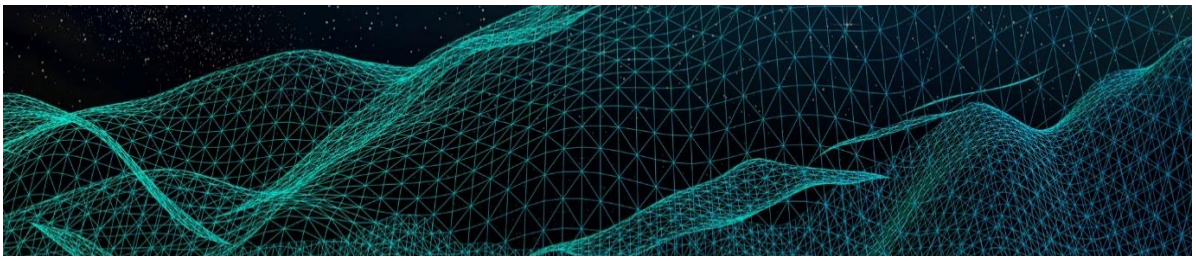

3D Sensing for Consumer Forum 2021

PROGRAM

September 17th PM, 2021

Yole Développement

Richard Liu

Technology & Market Analyst - Imaging

Richard Liu is a Technology and Market Analyst in the Photonics, Sensing & Display division at Yole Développement, part of Yole Group of Companies. Based in Shenzhen (China), Richard is dedicated on imaging activity (Monitors) as well as the development of technology & market reports.
Richard has over 12 years post graduate experience in both of imaging semiconductor and camera module industry, he has the successful track record in developing projects for the tier one smart phone and module makers, which brought him wide industry connection in the CMOS image sensor supply chain and ecosystem.
Richard graduated from Wuhan University (China) and holds an Electronics Engineering Degree.

With the arrival of dToF arrays on the iPhones, does it make 3D sensing hot again in the consumer market?

2020 has been a very epic year for 3D sensing with a roller-coaster of news. The first move was a positive one from Apple in following Huawei and Samsung introducing rear-facing 3D cameras on the iPad Pro and iPhone 12 Pro for AR or 3D scanning applications. However, Apple did bring a significant technology step forward by using Sony's dToF array instead of the well-established iToF arrays the same company was supplying so far to the Android camp. In the second quarter the epidemic had spread around the world and severely affected the mobile phone industry, its sales slowed down by about 10 percent. Even worse for mobile 3D sensing, Samsung stopped using rear 3D iToF cameras in its flagship phones and downgraded it to a multipoint dToF detector. Then in the summer we learned that Huawei, the de facto market leader in mobile 3D sensing, would not be able to contribute much in the future because of US sanctions against its business. So wrapping up 2020 and having 6 month into 2021 what is the situation of the 3D sensing market?
As a first glance we can already announce that Android players didn't give up on 3D sensing yet, they have been developing under-display cameras and in particular under-display structured light as some players already have demo phones on the table. Personal computers, tablets, and robot vacuum robot market, have all embraced 3D sensing to a certain extent, and have all benefited during the epidemic, due to stay-at-home policies. The epidemic situation, which requires for less contact, has prompted the market to develop products for non-contact interaction, which is a strong application benefit of 3D sensing, so is there more opportunity? What is the real dynamic of the 3D sensing market ? let's come to the forum and discuss.

Trinamix

Dr. Stefan Metz

Director 3D imaging

As Director 3D Imaging, Dr. Stefan Metz is leading trinamiX' activities in the field of 3D sensing. After earning his Ph.D. from Julius-Maximilians-Universität Würzburg in Germany, Stefan Metz pursued postdoctoral studies at Princeton University and Carnegie Mellon University, USA. He finally joined BASF SE in 2010, where he dedicated himself to the development of OLEDs in BASF research. Following this five-year period, Stefan Metz took on the opportunity to join the team of founding pioneers that would then form trinamiX – an innovative subsidiary of BASF SE that develops and sells cutting-edge 3D vision and infrared sensing solutions for use in both consumer electronics devices and industrial designs. From these early steps on, Stefan Metz has assumed several positions within trinamiX. From Supply Chain Management to Business Development and being head of the 3D Imaging business unit, he has gained a broad expertise on the chances and possibilities of 3D sensing. While Stefan Metz has been working from the trinamiX headquarters in Ludwigshafen (Germany) until now, he will be leading business from their new Shenzhen hub starting August 2021.

Secure face authentication behind OLED for mobile payment

Biometric recognition methods are becoming a de-facto standard for secure authentication for protecting personal data and enabling sensitive applications like mobile payment. They offer at the same time a convenient access as well as a high recognition rate which are a must for customer acceptance. The two most integrated solutions are fingerprint and facial recognition.

The integration of biometric identification methods into our daily lives prompted criminals to develop more sophisticated methods for spoofing biometric authentication and by that hacking the device or account of the user. Only a true and spoof-proof liveness detection will prevent such fraud attempts in the future. trinamiX GmbH, a vision and sensing company and wholly owned subsidiary of the publicly traded group BASF SE, has set out to create truly secure access: to smartphones, buildings, or ATMs for unlock, but also mobile payment. The German-based company, with locations worldwide, provides a secure face authentication solution that works in real time and even behind OLED displays.

Based on their patented technology, Beam Profile Analysis, trinamiX adds an additional security layer to face authentication by classifying between different materials. The trinamiX imaging system, that consists of a standard system set up and an illumination unit, captures not only a 2D image and 3D depth information of the face in front of the device, but further differentiates between real skin and other materials. Spoofing the system with a lifelike mask, 3D sculpture or 2D printout becomes virtually impossible. trinamiX provides a solution that is convenient to use and at the same time fulfills highest security standards as for example defined by FIDO. With the ability to bring its secure solution even behind OLED displays, trinamiX also offers new flexibility in designs, which can now be more consumer friendly. With the trinamiX solution consumers will in future no longer have to worry about whether unauthorized persons will gain access to their sensitive data, the protection of their data is reliably secured.

Deptrum Tech

Dr. Fanglu Lu

Co-Founder & CSO

Dr. Fanglu Lu is the chief scientist of Deptrum, a 3D sensing full-stack solution startup company. He focuses on the hardware R&D and mass production of both structured-light and ToF products for consumer electronics market. Dr. Lu obtained his PhD degree from University of California, Berkeley and Bachelor degree from Tsinghua University, both majoring in Electrical Engineering. His advisor at Berkeley was Professor Connie Chang-Hasnain (a member of National Academy of Engineering), a world-class expert in VCSEL. With a research focus on nano-photonics and nano-lasers, he has published nearly 30 journal and conference papers, among which three won best student paper awards and one was selected to Spotlight of OSA (Optical Society of America).

Redefinition of IoT computer vision with 3D sensing

In the past decade, people got to connect to the internet from anywhere through the mobile network. The number of connections has reached its upper limit due to the population size. Internet of things (IoT) are rapidly growing by connecting smart devices directly to internet, thus the number of connections are orders of magnitudes higher than the current mobile network. The internet can interact with the reality through the sensors and actuators on the IoT devices. Benefited from the breakthrough of AI technologies, computer vision is one of the major IoT perception capabilities. The conventional approaches based on 2D images demand complex algorithms and high computing power. Therefore, cloud or edge computing is needed to process the collected data. Three major constrains are raised in such architecture, which are the cost of computing and communication, the data and privacy security, and the latency and robustness. 3D sensing can capture the images with the same dimension as the real world. The information density is significantly higher than a 2D image. The AI tasks, such as recognition, localization, tracing, measurement, segmentation, can be accomplished with compact models on the IoT SoC. 3D sensing redefines the IoT computer vision by empower the perception capabilities on IoT device. Consequently, the massive and sensitive raw image data is contained in the device. It breaks aforementioned constrains on the cost, security and functions. With the continuous dropping cost and improving functionalities, 3D sensing is the key to IoT applications.

System Plus Consulting

Sylvain Hallereau

Principal Technology & Cost Analyst

Sylvain Hallereau is Principal Technology & Cost Analyst at System Plus Consulting, part of Yole Développement (Yole). He holds a master's degree in Microelectronics from the University of Nantes (France).
Working in close collaboration with the laboratory teams, Sylvain produces reverse engineering & costing reports while also contributing to custom projects, especially focused on solid-state lighting components, sensors, biotechnology devices, and ICs. Together, they define the objectives of the analysis and the most relevant methodology to gain a detailed understanding of the structure of the device. Sylvain then analyzes the results to describe the technology choices made by the leading semiconductor companies and the related process flows and also calculates the cost structure.
In parallel, based on his significant technical and industrial knowledge, Sylvain supports the development of the semiconductor device activities and the related team at System Plus Consulting. He also contributes to the strategies of this department.

Consumer Lidar Teardown and Cost Review: 3D direct ToF Lidar from Apple iPhone & iPad

Following the first introduction of a 3D sensing module for Face ID in the front side of the iPhone X, Apple is now releasing the new rear lidar scanner in a first time in the iPad Pro and today in their iPhone 12.
This rear 3D sensing module is using the first ever consumer direct Time-of-Flight (dToF) CMOS Image Sensor (CIS) product with in-pixel connection. It supports Apple's ARkit 3.5 development kit for augmented reality. The sensor from Sony, features 10 µm long pixels and a resolution of 30 kilopixels. the first time Sony has used 3D stacking for its ToF sensors.
The 3D sensing module includes also a VCSEL coming from Lumentum. The laser is designed to have multiple electrodes connected separately to the emitter array. Moreover, a new Diffractive Optical Element (DOE) from Himax is assembled on top of the VCSEL to generate a dot pattern.
Based on pictures extracted from teardown and physical analysis of Apple Lidar Module, the presentation will highlight the integration choices of Apple for their LIDAR, with the first 3D direct ToF CIS sensor from Sony and a dedicated Lumentum's VCSEL.

Lumentum

Ken Huang

Product Line Director at Lumentum

Mr. Ken Huang is the Product line Director in Lumentum. He is mainly promoting the laser illumination solution for 3d sensing market. The first job he had was working in the optical pickup head design of DVD rom at ITRI (Industrial Technology and Research Institute of Taiwan) And then he had been working in Foxconn on all system-level integration projects for 10 years. In 2010, he was in charge of the first 3d sensing product (Microsoft Kinect V1) and co-worked with PrimeSense (which is acquired by Apple) to implement edge emitting laser to the consumer market. Afterward, he kept engaging in the most of standalone 3D sensing products. In 2017, the first smartphone with 3D sensing was announced in the market with his contribution. Now, he takes responsible for the business development and marketing strategy for the smartphone market at Lumentum.

New multi-Junction VCSEL with addressability enables 3D Sensing IoT Applications

More efficient VCSEL array chips are well-developed now and have been broadly implemented into all kinds of consumer electronic devices. And it realizes all new smart IoT applications and makes the world in 3D, like smart device (like smartphone, robot vacuum cleaner), smart home (like door lock), smart building, smart healthcare and etc. Lumentum will introduce the whole new VCSEL array which has been upgraded from single zone design to multiple zone, single junction structure to multi-junction. With smarter control method, the depth data (or depth map) can be easily obtained and used for all kinds of application. And from the technical point of view, the power consumption and the heat dissipation will not be the issue anymore.

II-VI Incorporated

Gerald Dahlmann

Director Strategic Marketing at II-VI Incorporated

Gerald Dahlmann is Director of Strategic Marketing at II-VI Inc, where he is responsible for the Consumer Electronics market vertical. Over the past 15 years, he has worked for several companies in the field of semiconductors and sensors. Prior to II-VI, he was Head of Sales at MESA Imaging, the Zurich based start-up that commercialized the world's first 3D cameras and is now part of AMS. Gerald holds a diploma in Electrical Engineering from TU Darmstadt in Germany and a PhD from Imperial College London.

Smartphones and beyond – Innovative solutions for next generation 3D sensing

Since the launch of the iPhone X in 2017, mobile devices have been the main growth driver for 3D sensing technology. Numerous smartphones and tablets with depth sensing technology have been brought to market over the last four years. Initially, these had sensors only on the frontside for facial identification, but more recently, more and more devices have a sensor also on the backside for advanced photography and 3D scanning applications. Technology has been making great advancements along the way, but it is still in an early stage of its development and further improvements are in the works. Seamless integration into edge-to-edge touch displays, longer range with higher resolution and better power efficiency are among the challenges that are being addressed in next generation depth sensors. In parallel, new applications in wearables, augmented and virtual reality headsets have just started to emerge. Proximity sensing and eye/hand/face tracking for gesture and gaze control are among the novel use cases that pose new engineering challenges. Wearable electronics add further constraints, as far as form factor and heat dissipation are concerned. These require new solutions, and we expect these new challenges to be a driver for innovation in the coming years. II-VI is a leading and vertically integrated supplier of VCSELs to the smartphone industry and continues to be at the forefront of innovation in VCSELs, from material growth to packaged devices. Beyond this, the company offers other key technologies and platforms that will enable next generation 3D sensing solutions, such as SWIR lasers and detectors, driver ICs, meta-surface optics, as well as complete illumination modules.

TRUMPF

Kevin (Yuanjie) Lu

DIRECTOR OF MARKETING AND SALES APAC

Kevin (Yuanjie) Lu have been engaged in semiconductor and electronics industry since 2000. Experienced in sales job of the long supply chain from EDA, semiconductor front-end and back end, electronics manufacturing etc. I joined TRUMPF Photonics Component in Apr 2020 and manage the sales and marketing activity for APAC region.

TRUMPF's ViBO technology: VCSELs with integrated optics

TRUMPF Photonic Components, a global leader in VCSEL (Vertical Cavity Surface Emitting Lasers) and Photodiode solutions for the consumer electronics, data communications, industrial sensing and heating markets, will present the new ViBO product platform. ViBO (VCSEL with integrated Backside Optics) is a revolutionary VCSEL array technology based on TRUMPF's high-performance VCSELs with unique, patented lens forms directly etched into the GaAs-substrate. This VCSEL array technology with monolithically integrated micro-optical elements gives 3D sensing solution providers unprecedented benefits in creating tailored illumination profiles needed in advanced 3D sensing applications. It supports a new generation illumination devices that are for instance inherently eye-safe as the diffusor optics are monolithically incorporated into the laser array. Furthermore, the devices can be directly SMD mounted onto a board or driver IC without additional wire bonding. This significantly reduces the form factor over present hybrid VCSEL package solutions and supports for instance easier integration under smartphone displays.