FOR IMMEDIATE RELEASE:

Image and vision for AI, a unusual ecosystem

Extracted from: Image Signal Processor and Vision Processor Market and Technology Trends report and Artificial Intelligence Computing for Automotive report, Yole Développement, 2019 - ZF S-Cam 4 – Forward Automotive Mono and Tri Camera for Advanced Driver Assistance Systems and Mobileye EyeQ4 Vision Processor Family report, System Plus Consulting, 2019

LYON, France – September 10, 2019: *"AI[1] has completely disrupted hardware in vision systems, and has had an impact on entire segments,"* comments **Yohann Tschudi, PhD. Technology & Market Analyst at Yole Développement (Yole).**

A good example, is the penetration of Mobileye within the automotive market segment. Yole and its partner System Plus Consulting deeply analyzed a scenario for AI within the dynamics of the autonomous automotive market, especially with Mobileye's market positioning, and present an understanding of AI's impact on the semiconductor industry with two dedicated reports: Artificial Intelligence Computing for Automotive and Mobileye EyeQ4 Vision Processor Family.

Today, without doubts, image analysis adds a lot of value. Image sensor builders are therefore increasingly interested in integrating a software layer to their system in order to capture it. *"Image sensors must go beyond taking images – they must be able to analyze them",* adds Yohann Tschudi from Yole.

The market research and strategy consulting company, Yole pursues its investigation all year long, in the computing and software world.

Analysts propose today a new technology and market report, titled Image Signal Processor and Vision Processor Market and Technology Trends. This new report, part of the software & computing reports collection focuses on describing the markets related to hardware needed for image processing. Behind a camera, there may be several ways to process raw data depending on the purpose. The alternatives usually break down into viewing or analyzing the image to understand the environment around the module or system containing the camera. Each of these purposes, however, requires a different type of hardware. Under this report, Yole's analysts segment processing and computing respectively according to their

Image hardware: 2018-2024 volumes and revenues
(Source: Image Signal Processor and Vision Processor Market and Technology Trends 2019 report, Yole Développement, 2019)
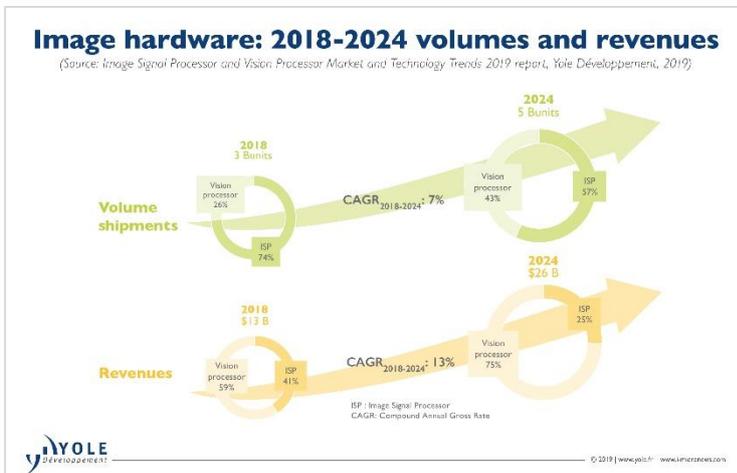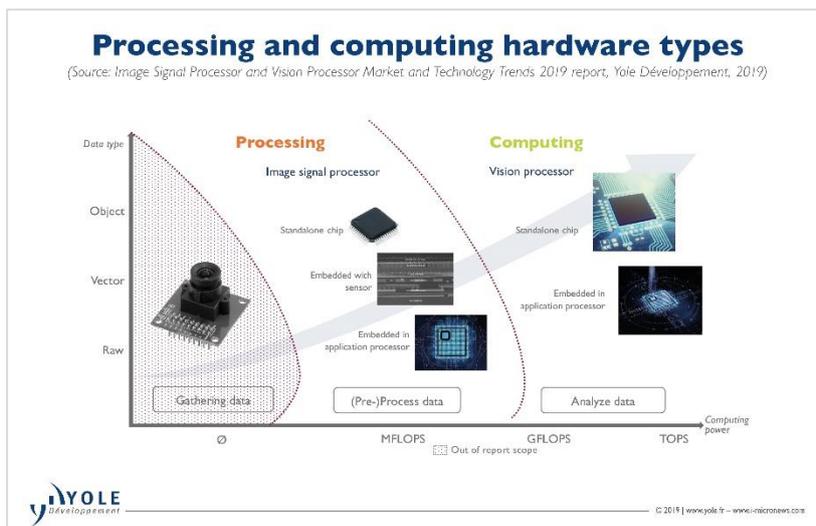
[1] AI : Artificial Intelligence

association with the image signal processor and vision processor. At the business level, segmentation is quite simple. Some companies offer a license and royalties for a design, which is known as IP[2] business. Other companies sell the chips, which we call the silicon business. Image signal processor, vision processor, deep learning, computing… What are we talking about? Yole and System Plus Consulting invite you to discover an overview of this industry.

To run dedicated software, high power computing and memory are necessary, which led to the creation and development of vision processors. The ISP[3] market offers a steady 3% CAGR[4] from 2018 to 2024, making the total market worth US$4.2 billion in 2024. Meanwhile, the vision processor market is exploding, with a 18% CAGR between 2018 and 2024, making the market worth US$14.5 billion in 2024.

Beyond market figures, this is a completely new industry that has been created, especially with AI-powered newcomers. These companies are today reshuffling the pack of this industry.

Processing and computing hardware for the imaging market has been divided into two different business models. IP companies do not have physical products, but silicon companies sell the physical processors. The leaders are easy to identify for each category. ARM and Synopsys lead the IP segment and OmniVision, Mobileye and ON Semiconductor lead the silicon segment.

Yole's team had the opportunity to debate with **Andy Hanvey, Director of Marketing, Automotive at OmniVision** about the latest market trends and technical issues. During this discussion, he detailed OmniVision's vision for the future of image processing and its strategy. Discover the full interview on i-Micronews.com.

Processing and computing hardware types
(Source: Image Signal Processor and Vision Processor Market and Technology Trends 2019 report, Yole Développement, 2019)

The company is in the forefront of the scene thanks to its portfolio of image sensors in automotive sector and related ISPs. As an example, System Plus Consulting, sister company of Yole, did a detailed teardown of ZF's fourth generation ADAS S-Cam. This camera is using OmniVision's OV10642 image sensor in combination with the latest Mobileye EyeQ4 vision processor.
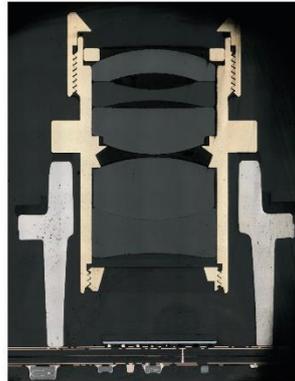
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[2] IP : Intellectual Property
[3] ISP : Image Signal Processor
[4] CAGR : Compound Annual Growth Rate

Narrow angle camera module in ZF Tri S-Cam
(Source: ZF S-Cam 4 – Forward Automotive Mono and Tri Camera for Advanced Driver Assistance Systems report, System Plus Consulting, 2019)

"ZF, one of the largest tier one suppliers of automotive systems, last year released its fourth Generation S-Cam with two solutions, one with a mono camera and the other with a triple camera set-up," explains **Audrey Lahrach, Cost Analyst at System Plus Consulting**. *"These cameras feature the Omnivision CMOS image sensor, which demonstrates the shift in the procurement strategies of ZF and Intel Mobileye. In fact, the use of the latest Mobileye EyeQ4 vision processor allows new sensors to be used and makes the S-Cam4 one of the smallest and lightest products in its category…"*

With this latest software & computing analysis, Yole's Semiconductor & Software team developed an impressive expertise in this domain. Therefore, this report is an opportunity to understand what is happening with the emergence of AI.

"Even if it is not a new technology, thanks to technological factors AI has made a spectacular entry into vision systems," asserts Yohann Tschudi. *"It opens new perspectives in mobile device, automotive, computing and surveillance industries."* Applications include biometry and photography, autonomous driving, behavioral recognition, human identification and tracking.

So what about this dedicated ecosystem? Indeed it is important to note that historical players have struggled to react to AI's arrival. That has allowed other companies to get into the business, including smartphone companies like Apple and Huawei, startups like Mobileye, and companies in other segments, like NVIDIA in automotive applications. However, because the trend is towards low-power, low-consumption, always-on computing hardware, the historical players are coming back into the game. AI technologies promise a bright future in many areas, with rapid software and hardware progress. This is very exciting for the entire area of vision systems.

A detailed description of the software & computing collection of reports is now available on i-Micronews.com, software & computing reports collection.

ABOUT THE REPORTS:
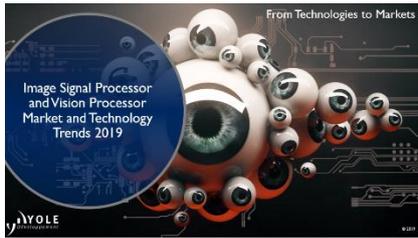
Image Signal Processor and Vision Processor Market and Technology Trends

Artificial intelligence-powered newcomers are reshuffling the pack. – A technology & market report performed by Yole Développement (Yole).

Companies cited:

Amazon, Altek, Ambarella, Apple, ARM, Bosch, CEVA, Canon, Chips&Media, Continental, Delphi, Denso, GestureTek, Google, Intel, Imagination, Kalray, Mediatek, Intel Mobileye, Intel Movidius, Nec, Nextchip, Nikon, NVIDIA, NXP, Oculus, Omek, OmniVision, ON Semiconductor, Panasonic, Pixelworks, Qualcomm, Quanergy, Samsung, Socionext, Sony, STMicroelectronics, Sunplus, Synopsys, Xilinx, Xperi… and more.

Artificial Intelligence Computing for Automotive

Artificial Intelligence for automotive: why you should care. – Performed by Yole Développement (Yole)

Companies cited:

Alphabet, Algolux, Amazon, AMD, Apple, ARM, Baidu, Bosch, BMW, Continental, Delphi, Eyesight Faurecia, Ford, General Motors, Google, Infineon, Intel, Intel Mobileye, Kalray, Lyft, Melexis, Mercedes-Benz, Microship, Microsoft, Nio, Nissan, Nuance, NVIDIA, NXP, Parrot… And more

Author of these reports:

As a Technology & Market Analyst, **Yohann Tschudi**, PhD is a member of the Semiconductor & Software division at Yole Développement (Yole). Yohann is daily working with Yole's analysts to identify, understand and analyze the role of the software parts within any semiconductor products, from the machine code to the highest level of algorithms. Market segments especially analyzed by Yohann include big data analysis algorithms, deep/machine learning, genetic algorithms, all coming from Artificial Intelligence (IA) technologies. After his thesis at CERN (Geneva, Switzerland) in particle physics, Yohann developed a dedicated software for fluid mechanics and thermodynamics applications. Afterwards, he served during 2 years at the University of Miami (FL, United-States) as a research scientist in the radiation oncology department. He was involved in cancer auto-detection and characterization projects using AI methods based on images from Magnetic Resonance Imaging (MRI). During his research career, Yohann has authored and co-authored more than 10 relevant papers. Yohann has a PhD in High Energy Physics and a master degree in Physical Sciences from Claude Bernard University (Lyon, France)

Mobileye EyeQ4 Vision Processor Family

Fourth generation Mobileye vision processor for Advanced Driver Assistance Systems: EyeQ4-High version for Tri-cam and EyeQ4-Mid version for Mono-cam. – Performed by System Plus Consulting

Authors:

Sylvain Hallereau is in charge of costing analyses for IC, power and MEMS. He has more than 10 years of experience in power device manufacturing cost analysis and has studied a wide range of technologies.

Véronique Le Troadec has joined System Plus Consulting as a laboratory engineer. Coming from Atmel Nantes, she has extensive knowledge in failure analysis of components and in deprocessing of integrated circuits.

ZF S-Cam 4 – Forward Automotive Mono and Tri Camera for Advanced Driver Assistance Systems

Fourth generation of the S-Cam family from the leading ADAS camera player – Performed by System Plus Consulting

Authors:

Wilfried Théron is Head of Department Electronic Systems & QA Manager. Wilfried holds a master's degree in Micro-electronics from the University of Nantes, France.

Audrey Lahrach is in charge of costing analyses for IC, LCD & OLED Displays and Sensor Devices. She holds a Master degree in Microelectronics from the University of Nantes.

Guillaume Chevalier performs physical analyses. He holds a two-year university degree in technology of physical measurements and instrumentation technics.

ABOUT YOLE GROUP

System Plus Consulting specializes in the cost analysis of electronics, from semiconductor devices to electronic systems. Created more than 20 years ago, System Plus Consulting has developed a complete range of services, costing tools and reports to deliver in-depth production cost studies and estimate the objective selling price of a product.

System Plus Consulting engineers are experts in Integrated Circuits - Power Devices & Modules - MEMS & Sensors - Photonics – LED - Imaging – Display - Packaging - Electronic Boards & Systems. Through hundreds of analyses performed each year, System Plus Consulting offers deep added-value reports to help its customers understand their production processes and determine production costs. Based on System Plus Consulting's results, manufacturers are able to compare their production costs to those of competitors. System Plus Consulting is a sister company of Yole Développement. More info on www.systemplus.fr and on LinkedIn and Twitter.

Founded in 1998, **Yole Développement (Yole)** has grown to become a group of companies providing marketing, technology and strategy consulting, media and corporate finance services, reverse engineering and reverse costing services and well as IP and patent analysis. With a strong focus on emerging applications using silicon and/or micro manufacturing, the Yole group of companies has expanded to include more than 80 collaborators worldwide covering MEMS & Sensors - Imaging - Medical Technologies - Compound Semiconductors - RF Electronics - Solid State Lighting - Displays - Photonics - Power Electronics - Batteries & Energy Management - Advanced Packaging - Semiconductor Manufacturing - Software & Computing - Memory and more...

The "More than Moore" market research, technology and strategy consulting company Yole Développement, along with its partners System Plus Consulting, PISEO and KnowMade, support industrial companies, investors and R&D organizations worldwide to help them understand markets and follow technology trends to grow their business. . For more information, visit www.yole.fr and follow Yole on LinkedIn and Twitter.

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