



PROJECT PROFILE

17003

Improved image capture technology will address key economic and societal demands and challenges

[CAVIAR: Cmos imAge sensor and VIdeo reseARch]



The CAVIAR project brings together important players with proven track records to improve system-level image capture for medical diagnostics, sustainable agriculture, live television productions, and safety and security. It will also extend the functionality of professional CMOS image sensors for multiple applications.

We are facing several economic and societal challenges. Firstly, society is ageing, leading to an increase in chronic diseases requiring intensive healthcare, which drives the need for change to keep treatment affordable. Improved diagnostics reliability can shorten turn-around times. Then there is agriculture. To make the agro-food industry sustainable, new 'precision agriculture' solutions are needed to deal with, for example, early detection of possible food-related causes of ill-health in order to reduce the burden of such diseases on our healthcare services. Thirdly, consumers are looking for ways of improving their viewing pleasure through Ultra-High-Definition (UHD) TV and High-Dynamic-Range (HDR) pictures, forcing media content creators to move to UHD slow motion. The result is a continuing altering of the broadcasting landscape, in which camera operators will need better means to focus on UHD TV and ensure a healthy and comfortable working space. Finally, the digital-component industry is also coming under pressure to develop general-purpose image-sensors for use in industrial vision, but also in safety and security applications (where cameras trigger early-warnings) and in automotive for driver and passenger monitoring.

The common technology for addressing all these application demands is image capture. However, current image-capture and processing systems have to be improved beyond the state-of-the-art in spatial-, temporal-, and spectral resolutions that enable better diagnostics, and or perception. What's more, in the case of picture performance, not only better image sensors are needed; but also new hardware, image-processing capabilities and high-data-rate handling need to be developed. That's where the CAVIAR project can provide the necessary answers.

Developing image-capture technologies for key application domains

CAVIAR will develop various aspects of image capture technologies, such as optics, image capture, video processing and transmission, needed for these applications. These features will improve system-level image capture for medical diagnostics, sustainable agriculture, live television productions, and safety

and security, as well as, extend the functionality of professional CMOS image sensors for multiple applications.

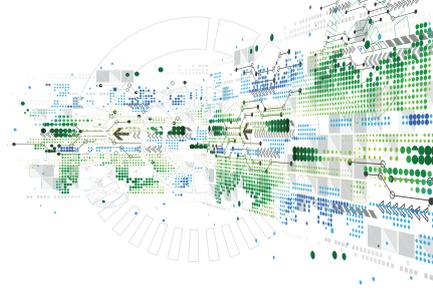
In particular, key project goals, deliverables and activities are as follows:

- Designing new image sensors and developing application demonstrators, including new hardware and firmware/software algorithms;
- Enhancing image performance by extending the light spectrum that can be captured, thus increasing pixel performance and enabling higher frame rates in UHDTV resolution;
- Developing image capture systems for digital pathology, Next-Generation Sequencing (NGS), operating room-assisted imaging and life-cell imaging to enable better diagnostics and shorter turn-around times in hospitals;
- Developing a multispectral camera for precision agriculture and food sorting, providing solutions for a sustainable agri-food industry and slow-motion image-capture for live television;
- Supporting content creators to transition from HDTV to UHDTV;
- Complying with the EMVA 1288, CoaXPress and SMPTE standards.

Additional benefits for Europe

Project research and results (mainly shared at conferences and trade shows) will close the knowledge gaps across the European value-chain for micro- and nanoelectronics-based components and systems, from technology providers to end-users. Importantly, project partners and their European business peers can use this market and application experience and expertise to define and specify next-generation CMOS image-sensor systems.

In addition, research conducted in CAVIAR will also reinforce and enhance existing strengths in Europe's micro- and nanoelectronics industries. To stay ahead of foreign competition in these markets, it is crucial to select and develop the right differentiating functionalities and



KEY APPLICATION AREAS

-  Health & Well-Being
-  Safety & Security
-  Digital Industry
-  Digital Life (Agriculture)

ESSENTIAL CAPABILITIES

-  Systems and Components Architecture, Design & Integration
-  Connectivity & Interoperability
-  Safety, Security & Reliability
-  Computing & Storage
-  ECS Process Technology, Equipment, Materials & Manufacturing

PARTNERS

Adimec Advanced Image Systems BV
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EVS Broadcast Equipment Brussels
EVS Broadcast Equipment Liège
Grass Valley Nederland BV
Institut Langevin
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TNO (Netherlands)
Université de Bourgogne

COUNTRIES INVOLVED

-  Belgium
-  France
-  Netherlands

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KEY PROJECT DATES

01 March 2019 to 28 February 2022

to optimise technologies used in end-user applications. More to the point, sharing and deploying these requirements will help optimise performance and functionality in line with what is really needed in image-capture systems, instead of a more general optimisation for wider, but average use.

Bright market outlook

Main medical-market drivers in the coming years will be faster diagnosis for more patient-friendly treatment; higher diagnosis quality in having fewer false-positives and false-negatives; and a lower total cost of ownership for the overall diagnostics workflow and supply chain. In digital pathology, the number of oncology incidences is expected to grow, while the number of pathologists across countries declines. Surgery repeat-rate is 23% with an average cost of US\$13,500, resulting in an average savings of US\$3,000 per surgery, for an annual total of US\$325m. Tele-pathology consultation services will increase and regulatory approval of digital pathology products for primary diagnosis will be given. In NGS, the cost of human genome sequencing will come down, making personally targeted medicines and treatment feasible. The world-wide NGS market is expected to double in value during 2016–2021, to US\$6.5 billion.

For precision agriculture, the main market drivers in the coming years will be an increasing use of multispectral imaging system technology in research, and new emerging technologies to make smaller portable multispectral cameras with advanced imaging capabilities and an increase in accuracy and consistency in captured data. The multispectral imaging systems market is expected to grow worldwide, from US\$7.41 billion in 2016, to US\$12.71 billion by 2021 (with a CAGR of 11.4%).

Regarding broadcasting, consumption of live events is growing globally and will continue to increase, resulting in a continuous investment in cameras. Slow motion will continue to grow in popularity. Broadcasters will be using more slow-motion cameras in a wider range of applications/programmes. Equipment prices and operational costs will decrease, giving content creators a faster return on investment. In the coming years (according to research published by Frost & Sullivan, IABM and Devoncroft), content creators will continue to move towards higher-resolution formats for sports television and cinema, to create premium-quality content in a market with intense competition (with Japan being the first to roll out UHDTV in 4K and 8K for the Olympics in 2020).

Finally, investigating the digital-component market for image sensors in industry, market reports (by Yole Développement) expect machine vision and inspection image-sensor demand to grow with a CAGR of 13.5% to 4m units in 2021, resulting in an overall market size of approximately €300 million in 2021.

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