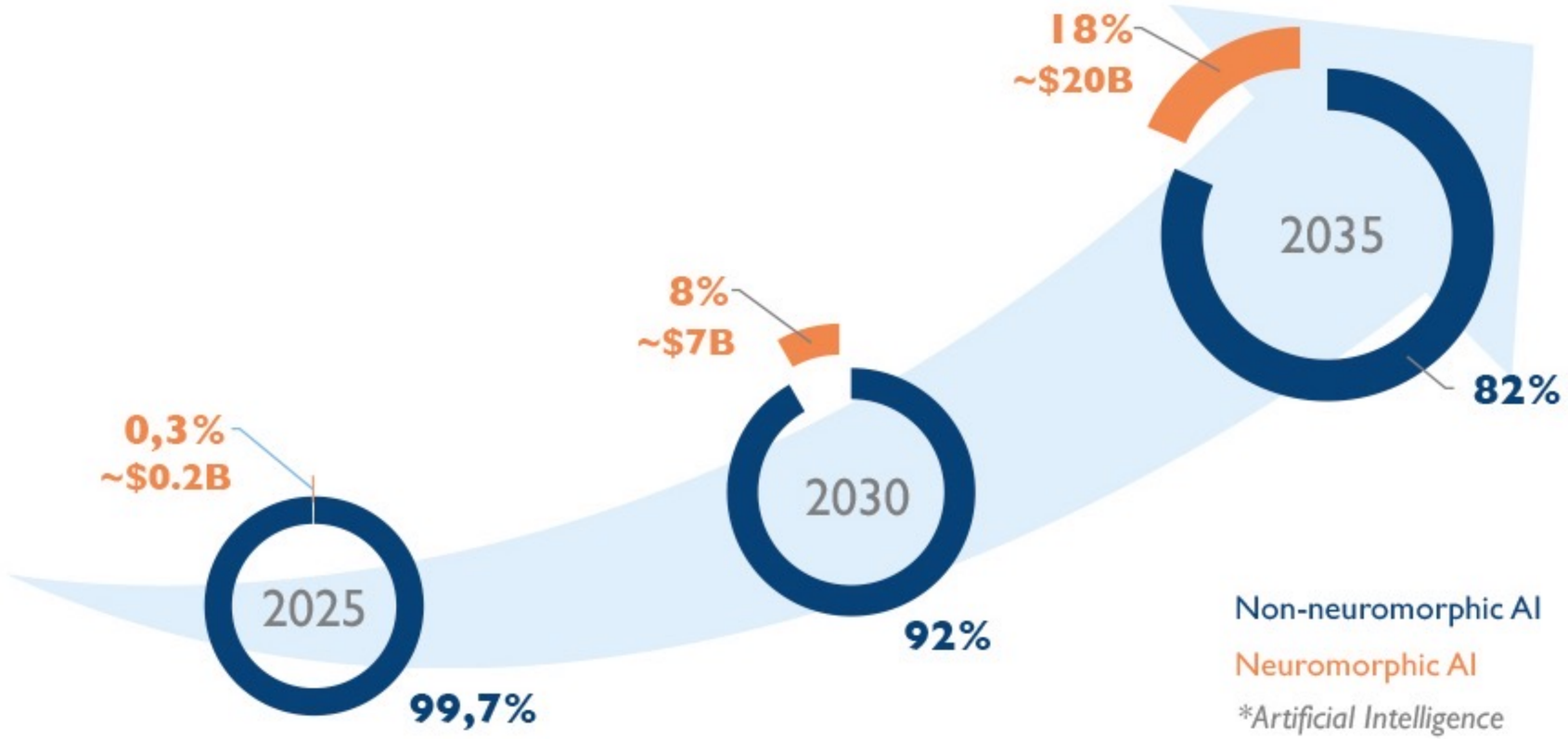
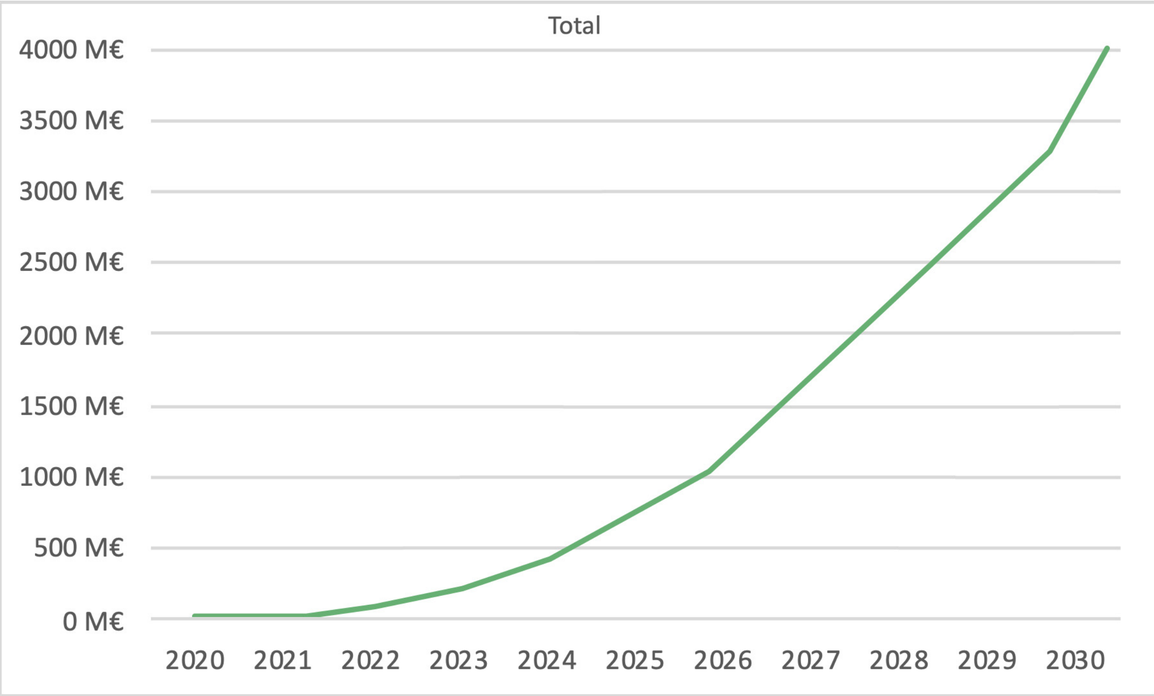

PROPHESEE
METAVISION FOR MACHINES

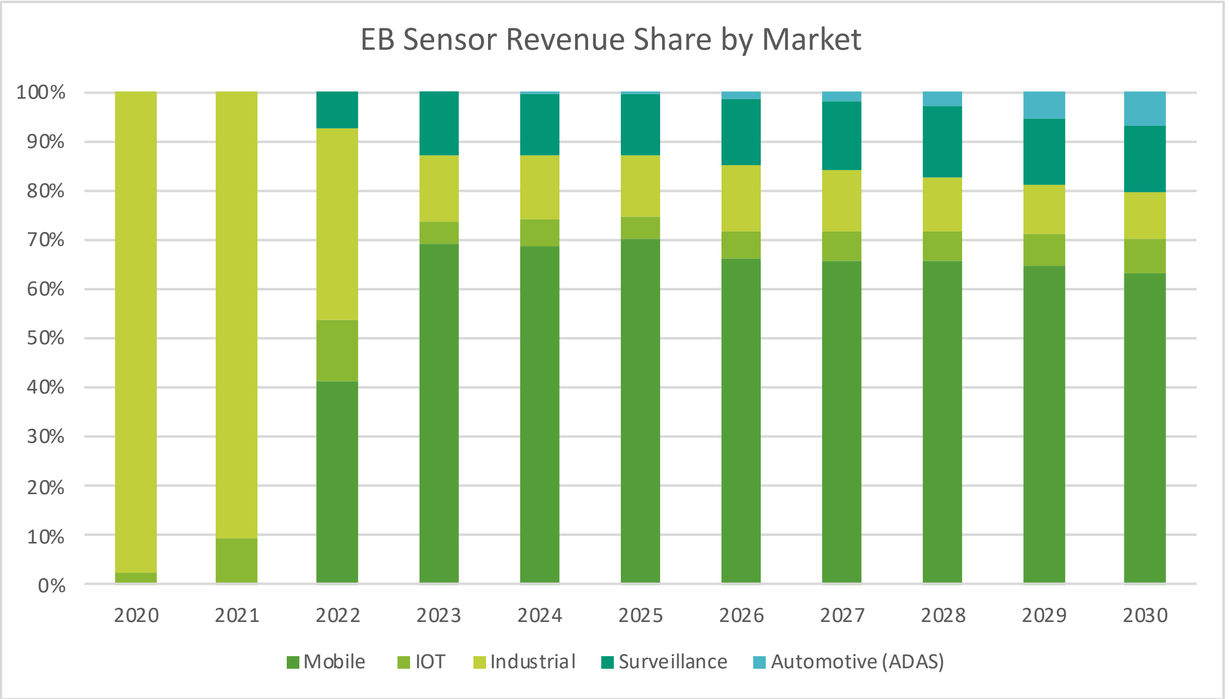
NEUROMORPHIC INTO AI COMPUTING & SENSING 2025-2030-2035 REVENUE EVOLUTION



Source: Neuromorphic Computing and Sensing 2021, Yole Développement, May 2021

EVENT-BASED VISION WILL PENETRATE 9% OF THE TOTAL CIS MARKET BY 2030





The main segments will be:
Mobile (60%),
Industrial and Surveillance (26%),
Others (14%)

Industrial is forecasted to be the first segment to adopt EB technologies followed by Surveillance, Robotics, Mobile and IoT.
After a maturation period (2024-25) Event-Based Vision technology is expected to penetrate the automotive market as well.

*source: Yole + internal data

ANALYSTS GET IT

YOLE Développement

« The neuromorphic sensing market will reach up to **US$5 billion by 2030**, with a **116% CAGR between 2025 and 2030**. »

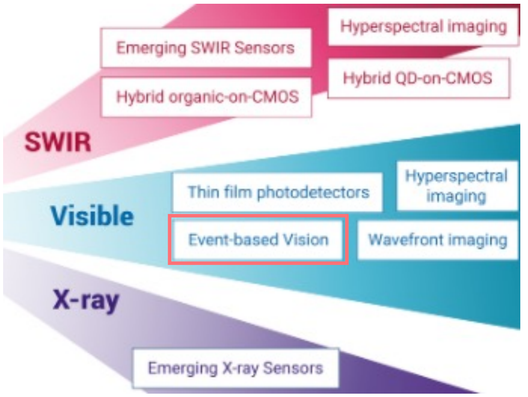
« These technologies will address most of the current challenges and could represent **20% of all AI computing & sensing by 2035**. »

accenture

« Event-based cameras developed by sensor startups Prophesee and Inivation are both **massively parallel**, **asynchronous**, spiking sensors that provide **drastically lower energy consumption**, **lower latency**, and **higher dynamic range** than standard image sensing chips. »

IDTechEx

Emerging Image Sensor Technolgies 2021 - 2031 Applications and Markets



Event-Based Vision mentioned in recent reports by

Gartner

menalto® ADVISORS MINDFUL M&A

CLIPPERTON

WOODSIDE CAPITAL PARTNERS WCP

GP.Bullhound

PRODUCTS

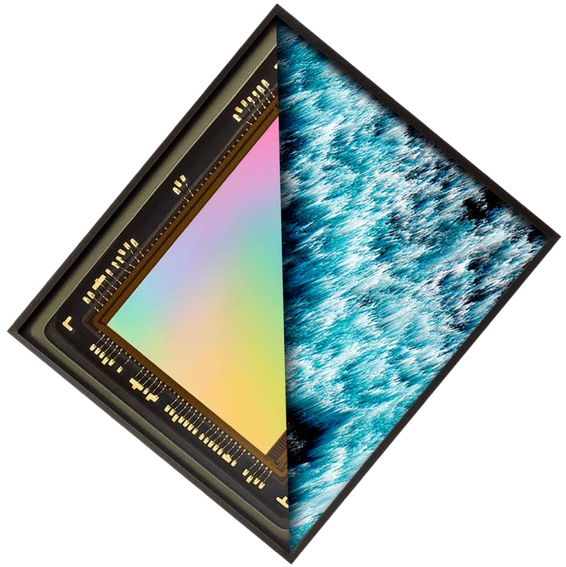
END TO END SOLUTION

METAVISION® SENSING + METAVISION® INTELLIGENCE

THE WORLD'S MOST ADVANCED EVENT-BASED VISION SENSING TECHNOLOGY.

Prophesee successfully built **4 sensor generations.** The last one co-developed with SONY reaches HD resolution through advanced **3D stacked 4.86 µm process.**

Inspired by the human retina, Prophesee's patented Event-Based Vision sensor features a new class of pixels, each powered by its **own embedded intelligent processing**, allowing them to **activate independently.**



THE MOST COMPREHENSIVE EVENT-BASED VISION SOFTWARE SUITE AVAILABLE TO DATE.

Covering every step of your development process, from **first discovery** to fast **prototyping** to **end-application development.**

Download your **free evaluation version** and experiment with more than **95** algorithms, **67** code samples and **11** ready-to-use applications in total.

DEVELOPMENT TOOLS

PROCESS AND PIXEL SIZE EVOLUTION

GEN 1

2015

GEN 2

2017

GEN 3

2019

GEN 4

2021

RESOLUTION

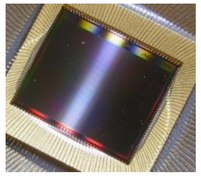
HD

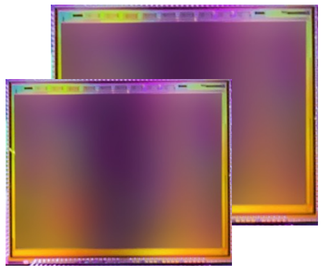
720p

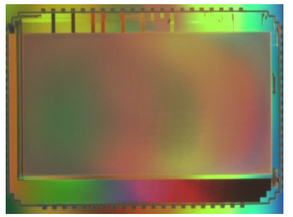
VGA

HVGA

QVGA



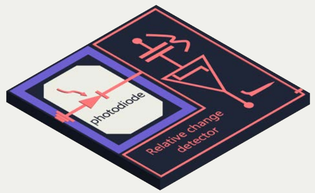




PIXEL SIZE

ATIS 30 µm
180nm CMOS

CD 15 µm
180nm CMOS



CD 15 µm
180nm CIS
25% fill factor

CD 4.86 µm
3D stacked
90nm CIS (BSI) on
36nm CMOS per-pixel
interconnects
80%+ fill factor

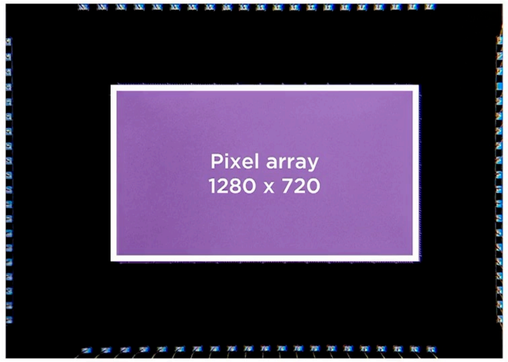
PROPHESEE

SONY SEMICONDUCTOR
SOLUTIONS CORPORATION

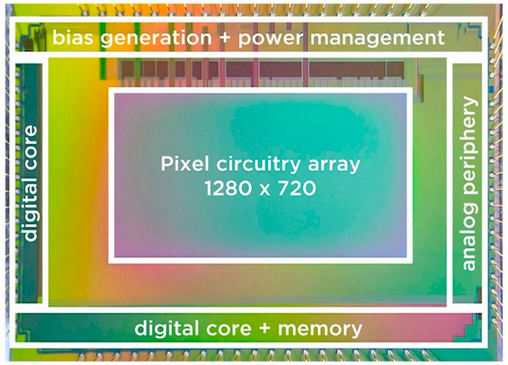
- Prophesee and Sony Announced during ISSCC 2020 they developed a
  - Stacked Event-Based Vision Sensor
  - with the Industry's Smallest Pixels and
  - Highest HDR Performance.

- Joint collaboration started in 2017 leading to a partnership in sensor development, production and commercial activities.

READ MORE
https://bit.ly/2KHHydf

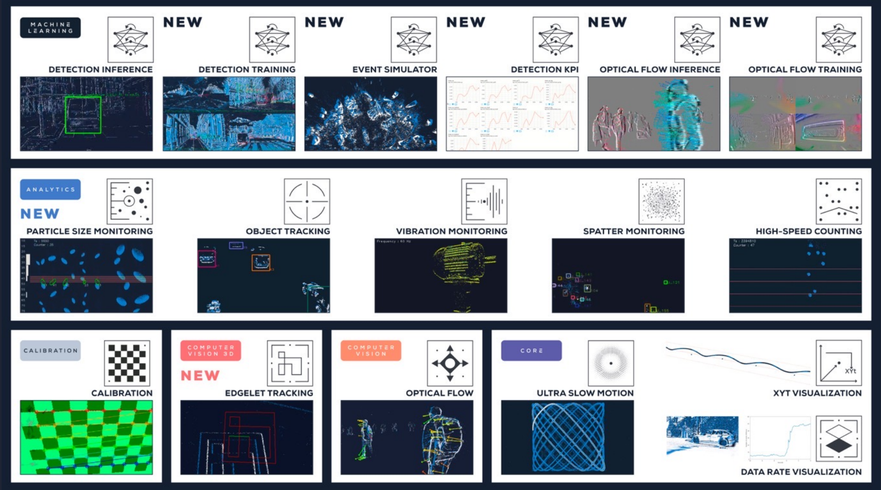


Micrograph of bottom part



Micrograph of top part

THE MOST COMPREHENSIVE EVENT BASED VISION SOFTWARE SUITE



95
algorithms

67
code samples

11
ready-to-use applications

6 EXTENSIVE MODULE FAMILIES

- MACHINE LEARNING
- ANALYTICS
- CALIBRATION
- COMPUTER VISION 3D
- COMPUTER VISION
- CORE

METAVISION
INTELLIGENCE SUITE

LEADING ML TOOLKIT

MOST PERFORMANT OBJECT DETECTOR TO DATE
spotlighted at NeurIPS 2020

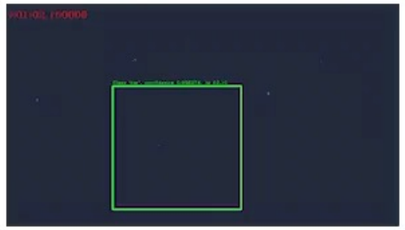
LARGEST HD PUBLIC DATASET

COMPLETE ML TOOLKIT
Training, Inference, Grading features

OPEN SOURCE ARCHITECTURE

MACHINE LEARNING

DETECTION INFERENCE



NEW

DETECTION TRAINING

NEW

EVENT SIMULATOR

NEW

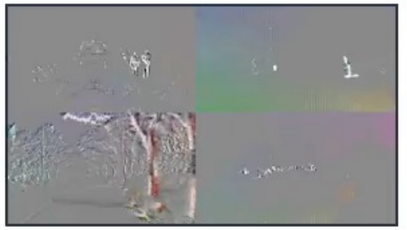
DETECTION KPI

NEW

OPTICAL FLOW INFERENCE

NEW

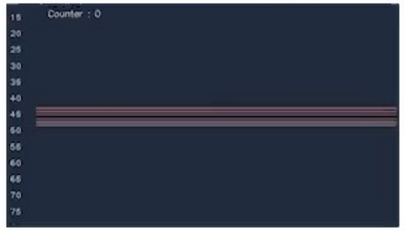
OPTICAL FLOW TRAINING



ANALYTICS

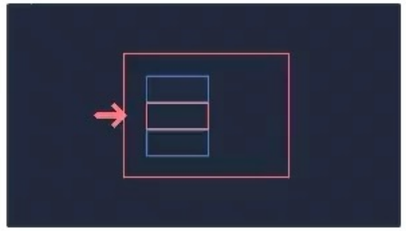
NEW

PARTICLE SIZE MONITORING



NEW

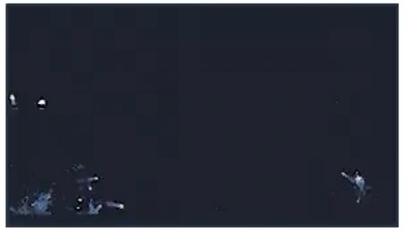
JET MONITORING



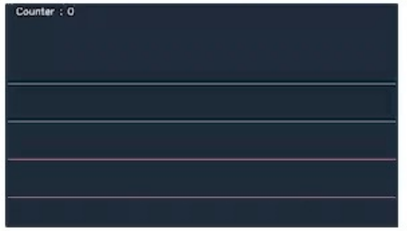
OBJECT TRACKING

VIBRATION MONITORING

SPATTER MONITORING

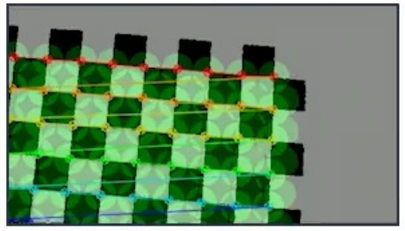


HIGH-SPEED COUNTING



CALIBRATION

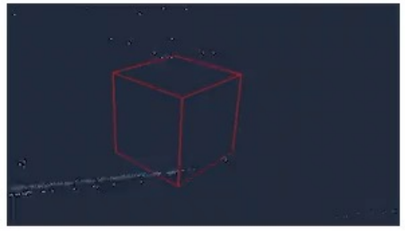
CALIBRATION



COMPUTER VISION 3D

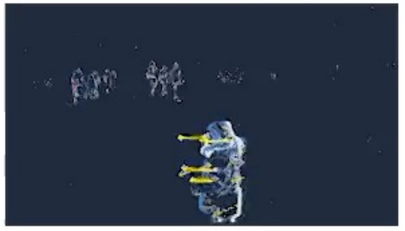
NEW

EDGELET TRACKING



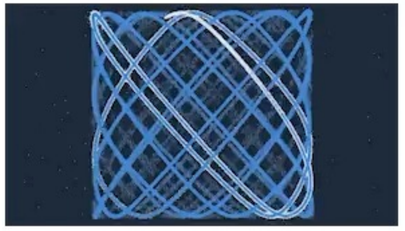
COMPUTER VISION

OPTICAL FLOW

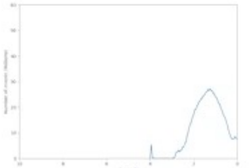


CORE

ULTRA SLOW MOTION



XYT VISUALIZATION



DATA RATE VISUALIZATION

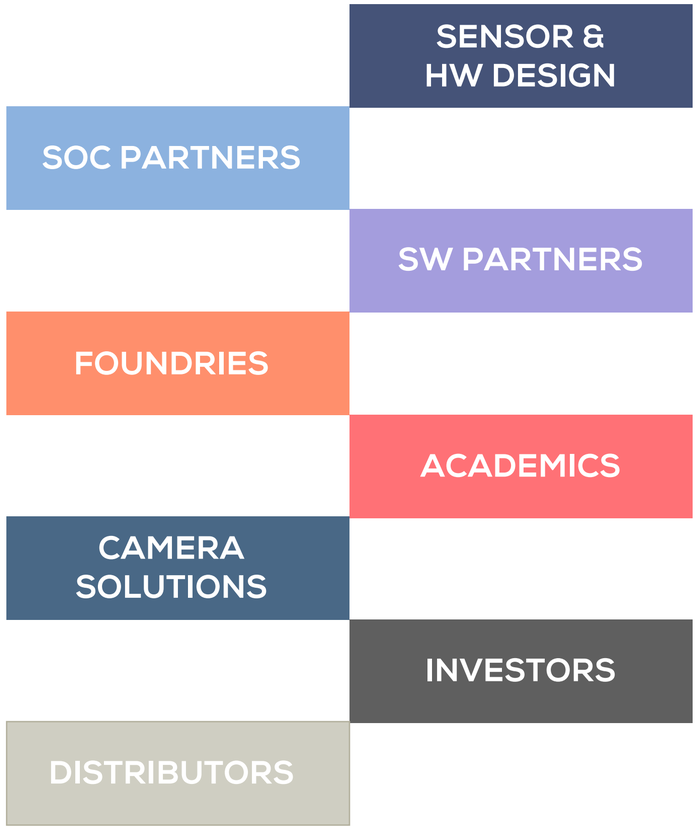
+1000

COMPANIES USING METAVISION INTELLIGENCE

BECOME PART OF A POWERFUL INTERNATIONAL NETWORK

Success stems from solid partnerships

Over the years we have surrounded ourselves with a strong network of partners that we wish to interconnect even more so you can succeed in bringing your Event-Based Vision product to market.



SONY SEMICONDUCTOR SOLUTIONS CORPORATION
intel
Tower Semiconductor
HUAWEI
RENAULT NISSAN
BOSCH Robert Bosch Venture Capital GmbH
XPERI
OMP DIGITAL MEDIA PROFESSIONALS
FRAMOS
OMS
CenturyArks
IMAGO TECHNOLOGIES
Fraunhofer
DARPA
terranet
Cambridge Consultants
Penn University of Pennsylvania
ORI Oxford Robotics Institute
ROBOTICS & PERCEPTION GROUP

POWERED BY PROPHESEE PARTNER'S PRODUCTS

CENTURY ARKS – SILKYEVCAM

Industrial-grade USB3.0 camera featuring Prophesee Metavision **Gen3.1** sensor and full compatibility with **Metavision® Intelligence**

KEY FEATURES

- Universal USB C connectivity
- Ultra-compact

SUPPORTED SENSORS

- 3.1

SERVICES

- Century Arks

IMAGO – VISIONCAM EB

Industrial-grade embedded Event-Based Vision system featuring Prophesee Metavision **Gen3.1** sensor and full compatibility with **Metavision® Intelligence**

KEY FEATURES

- Run applications at the edge: Dual Core ARM Cortex-A15 1.5 GHz CPU (Texas Instruments AM5726)

SUPPORTED SENSORS

- 3.1

SERVICES

- Imago

NEW

DEVELOPMENT TOOLS

EVALUATE – EVK 2 HD

C / CS MOUNT

S MOUNT

HIGHLIGHTS

- Integrates the NEW GEN4.1 HD test sample
- Access to the full performance of the sensor
- Contrast Detection (CD) events
- USB type C
- Compatible with Prophesee METAVISION 2.2 onward
- C/CS with S-mount adapter, available also S mount upon request

CHARACTERISTICS HD

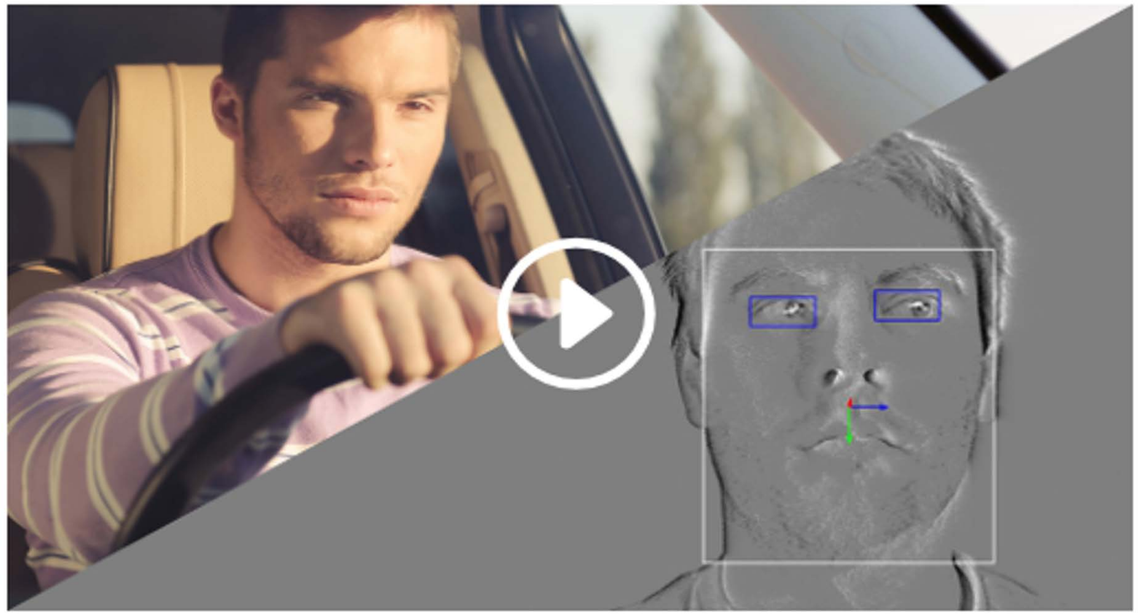
Supplier	PROPHESEE	Case	Aluminium	**MECHANIC**	
Year	2021	USB	Type C	EVK dimensions	102mm x 58mm x 42mm
Resolution (px)	1280 x 720	Trigger In	MCX	Weight	260g (excl. optic)
Latency (µs)	220	Sync In	MCX	**OPTIC**	
Dynamic Range (dB)	>110	Sync/Trig Out	MCX	D-FOV	81.5°
Nominal contrast treshold (%)	25	Camera power (W)	7.5	MOUNT	Foctek 5mm CS or S
Pixel size (µm)	4.86 x 4.86	DC in supply	12V 3A 2.1mm jack	**ADD. INFO**	
Camera Max. Bandwidth (Meps)	1066			Power	DC in for non type C host


APPLICATIONS
UP

PUBLIC

WORLD-FIRST IN-CABIN MONITORING TECHNOLOGIES RUNNING ON NEUROMORPHIC CAMERA SYSTEMS

XPERI | METAVISION® BY PROPHESEE



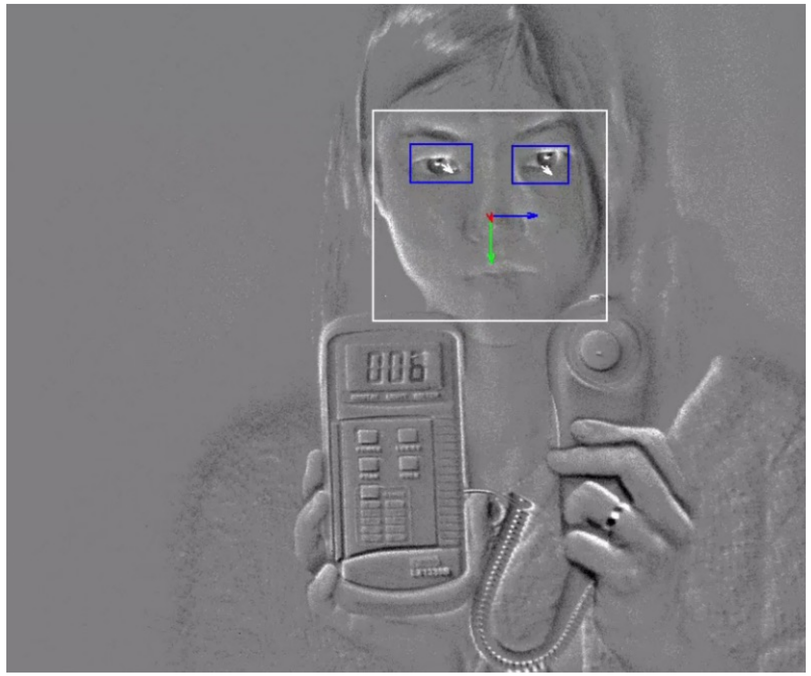
Courtesy of Xperi

Leveraging event input from Prophesee's Metavision sensing technologies, DTS, Inc. from Xperi Corporation developed a **world-first neuromorphic driver monitoring solution** (DMS).

With better **low light performance** for driver monitoring features as well as never seen before capabilities such as **saccadic eye movement** or **micro-expressions monitoring**, it is a breakthrough in **next-generation in-cabin experiences and safety**.

PUBLIC

EVENT-BASED VISION FOR DRIVER MONITORING SYSTEMS



ROBUST ATTENTION TRACKING

Using events instead of traditional frames allows to **detect fast motion** such as eye blink duration or saccadic movement with **very low power** and **data rate** (millisecond motion duration).

>120db HDR is ideal for all light conditions.

Events allows to generalize the ML model **irrespectively of the light conditions.**

IR COMPATIBLE

For completely dark environment, event vision is also capable to **detect IR in the 850nm-940nm** spectrum with a quantum efficiency around **20-40%.**

LOW LIGHT NIGHT-TIME

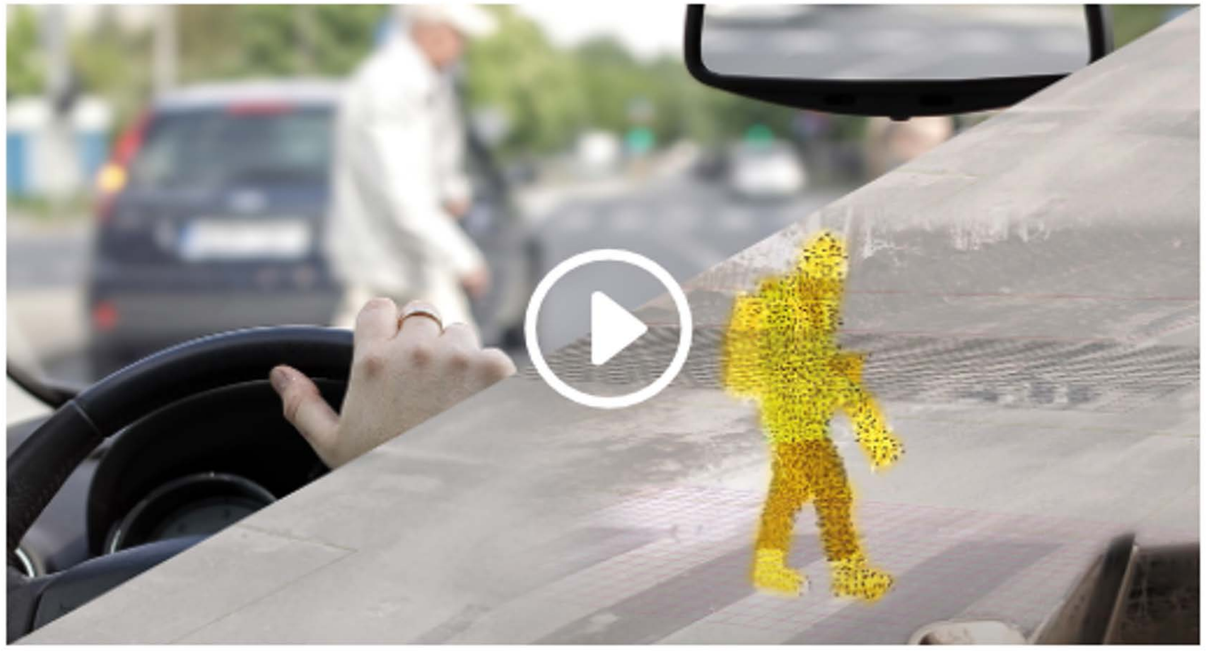
Typical night-time low light interior car conditions are covered thanks to the capability of event-based sensor to detect **down to 0.1 lux.**

REPORTING IMAGE RECONSTRUCTION

In case of violations and necessity to report the proof, **grayscale images can be reconstructed from events** without the needs of addition sensors.

PUBLIC

ADVANCED EVENT-BASED DRIVER ASSISTED SYSTEMS



Courtesy of Terranet

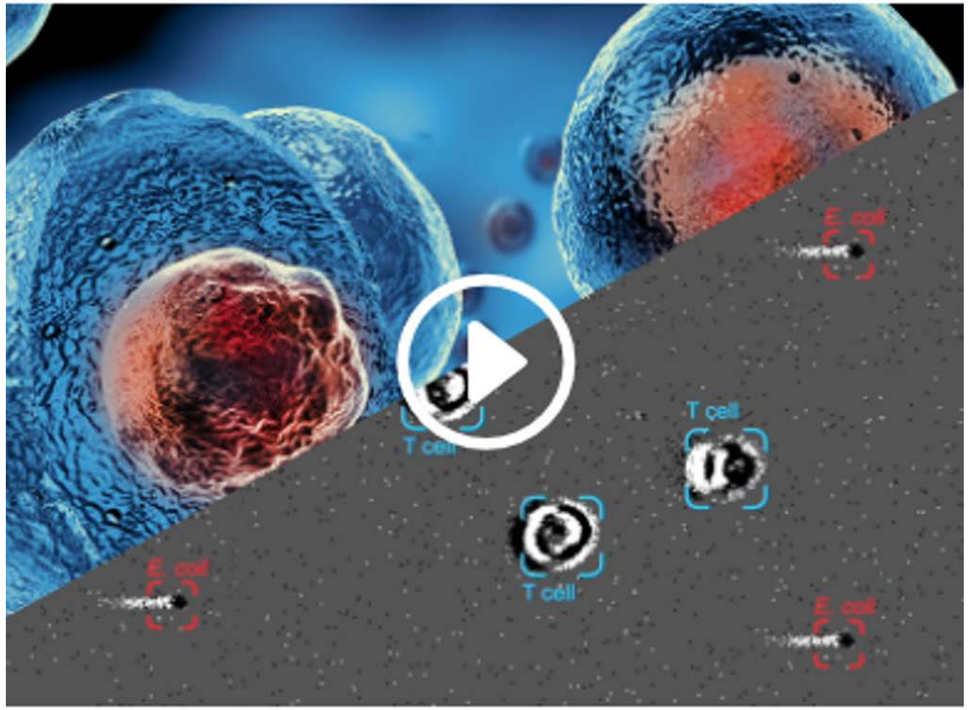
VoxelFlow™ developed by Terranet AB in conjunction with Mercedes-Benz, uses Prophesee Metavision® Event-Based Vision sensor so that autonomous driving (AD) and advanced driver-assistance systems (ADAS) can **quickly and accurately understand and decipher** what's in front of them, **enhancing existing radar, lidar, and camera systems** that particularly struggle within 30 to 40 meters, when an accident is most likely to take place.

40m **coverage around the vehicle**
5 Milliseconds **reaction time**

PUBLIC

NEXT-GENERATION CELL THERAPY THROUGH REAL-TIME CELL BATCH STERILITY TESTING

Cambridge Consultants | METAVISION® BY PROPHESEE



Courtesy of Cambridge Consultants

Today's state of the art sterility testing relies on **decades old microbiology taking 7-14 days,** adding substantial delay, human expertise, cost in the creation of life-saving cell therapies.

Using **Prophesee Metavision sensor** and **AI models** to detect, track and classify cells, **Cambridge Consultants** was able to build an automated sterility testing system, cutting down required testing time **from weeks to milliseconds.**

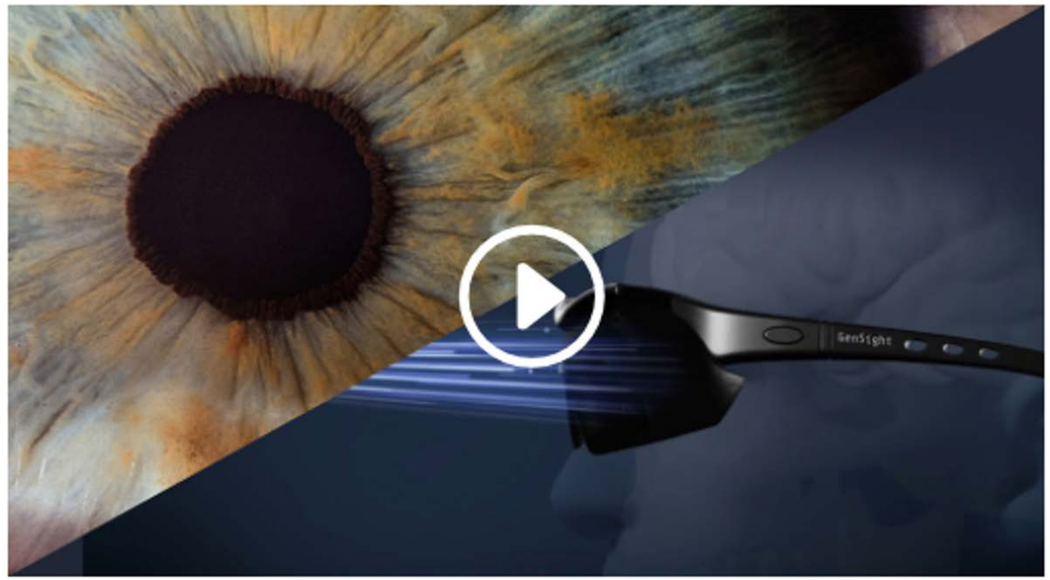
PUBLIC

FIRST CASE OF PARTIAL RECOVERY OF VISUAL FUNCTION IN A BLIND PATIENT AFTER OPTOGENETIC THERAPY

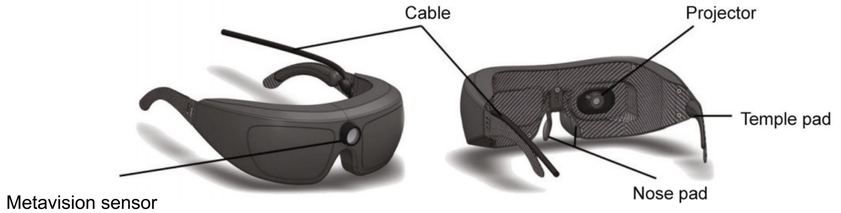
GenSight BIOLOGICS | METAVISION® BY PROPHESEE

nature medicine

Nature Medicine published the first case report of **partial recovery of visual function in a blind patient with late stage retinitis pigmentosa (RP)**. The patient is the subject of the ongoing trial of GenSight Biologics' GS030 optogenetic therapy.



Life-changing project combines gene therapy with a **light-stimulating medical device** in the form of goggles sensing the world through our **Metavision® Event-Based Sensor.**



Courtesy of Gensight

UNDISCLOSED

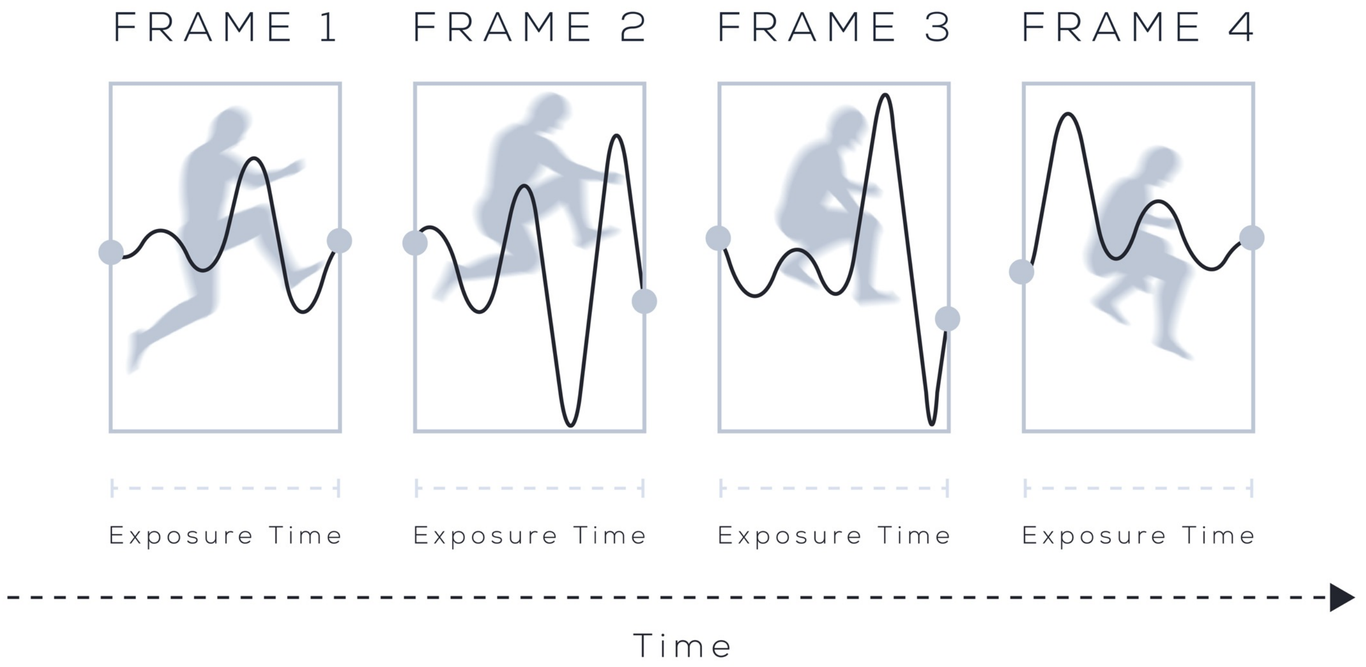
LIVE DEBLURRING

LIVE DEBLURRING

Using microsecond Events inside the frames

High-Performance Event-Based deblurring is achieved by **synchronizing a frame-based and an event-based sensor** on the same time base. This enables the system to **relate events to the exposure time of each frame.**

Results are achieved by focusing specifically on events happening **during the exposure time of each frame**. Using these events, algorithms can extract motion with **1 microsecond time resolution** as well as the **motion blur** associated to it.



UNDISCLOSED

LIVE DEBLURRING

UNDISCLOSED

VIBRATION MONITORING

Typical use cases: Motion monitoring, Vibration monitoring, Frequency analysis for predictive maintenance

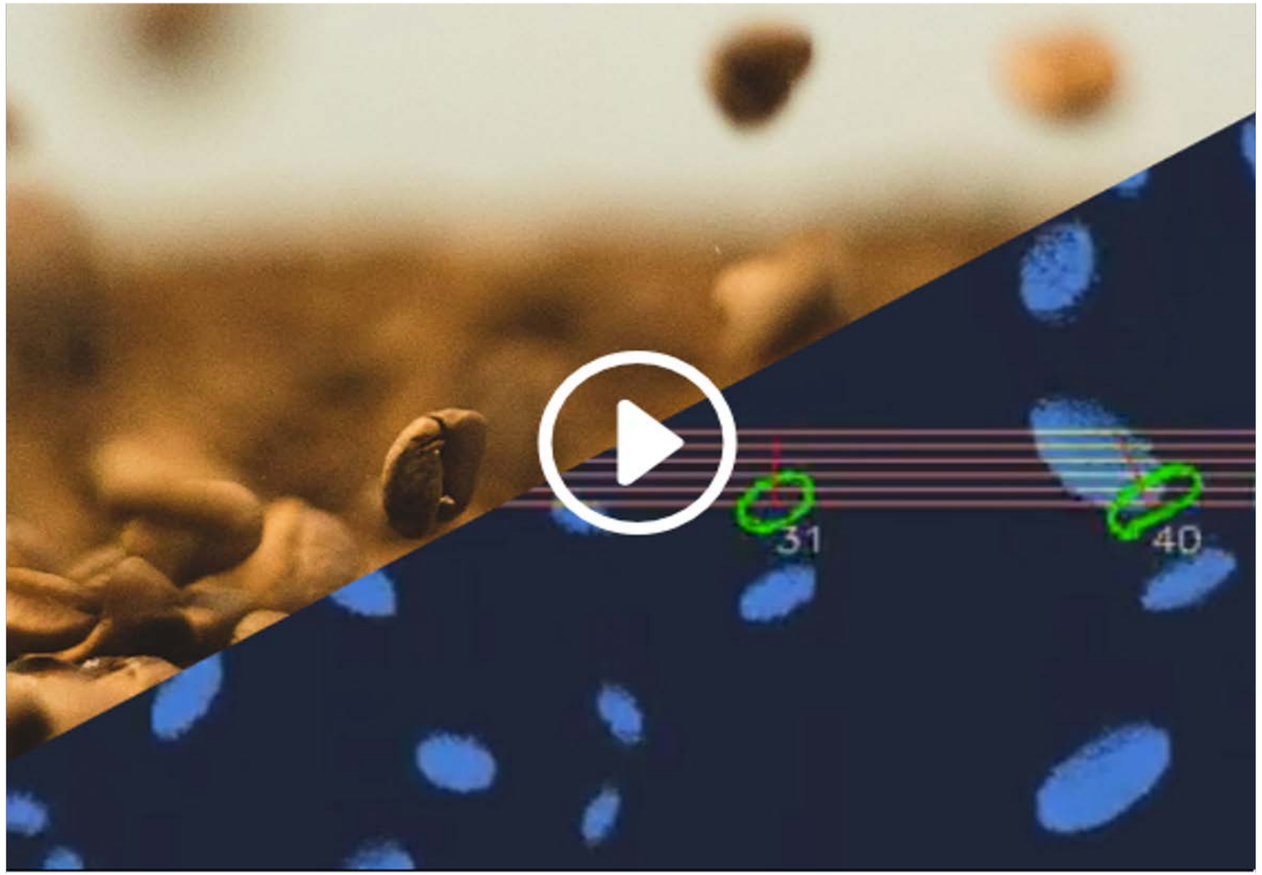
Monitor vibration frequencies continuously, remotely, with precision, by tracking the temporal evolutipixelon of every pixel in a scene.

For each event, the pixel coordinates, the polarity of the change and the exact timestamp are recorded, thus providing a **global, continuous understanding of vibration patterns.**

From 1Hz to kHz **range**
1 Pixel **Accuracy**

UNDISCLOSED

PARTICLE SIZE MONITORING



Typical use cases: High speed counting, Batch homogeneity & Gauging

Control, count and measure the size of objects moving at very high speed in a channel or a conveyor.
Get **instantaneous quality statistics** in your production line, to control your process.

Up to 500 000 pix/s **speed**
99% **counting precision**

UNDISCLOSED

SPATTER MONITORING

Typical use cases: High speed counting, Batch homogeneity & Gauging

Track small particles with spatter-like motion.

Thanks to the **high time resolution** and **dynamic range** of our Event-Based Vision sensor, small particles can be tracked in the most difficult and demanding environment.

Up to 200k fps rendering (5 µs time resolution)
Simulatenous XYT tracking of all particles

UNDISCLOSED

CROWD DETECTION & TRACKING

Typical use cases: *Crowd detection & tracking - Part pick and place – Robot Guidance – Trajectory monitoring*

Detect and Track moving objects in the field of view. Leverage the **low data-rate** and **sparse information** provided by event-based sensors to track objects with **low compute** power.

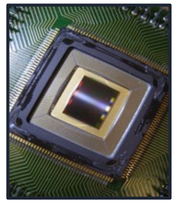
Continuous tracking in time: **no more "blind spots" between frame acquisitions**
Native segmentation: **analyze only motion, ignore the static background**

mAP@[0.5]: 0.85
› 100 FPS (Tracking)

THE HISTORY OF PROPHESEE

2010-2011

FIRST ATIS SENSOR



FIRST PRODUCT

Pixium Vision

2013-2015

$5M FUNDRAISING

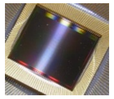
Chronocam

+20 patents in HW & SW

BOSCH Invented for life

SUPER NOVA INVEST

LAUNCH GEN 1 30µm QVGA



2016

$15M FUNDRAISING

BOSCH Invented for life

intel Capital

RENAULT NISSAN

360 CAPITAL PARTNERS

IBIONEXT

SUPER NOVA INVEST

TECHNOLOGY PIONEER

WORLD ECONOMIC FORUM

TOP 100 AI STARTUPS

CB INSIGHTS

COOL VENDOR

Gartner

2017

TOP UP & COMING IMAGE SENSOR COMPANY

IS EUROPE AWARDS

Collaboration DARPA

LAUNCH GEN 2 15µm HVGA

2018

$19M FUNDRAISING

PROPHESEE

+50 patents in HW & SW

TECHNOLOGY INNOVATION AWARD

ISSCC

MIT Technology Review

Vision Systems Innovators Awards 2018

AutoSens Awards

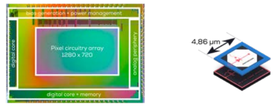
ASPENCORE EETimes

2019-2021

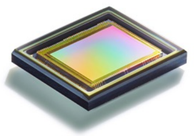
$28M FUNDRAISING

PROPHESEE | SONY SEMICONDUCTOR SOLUTIONS CORPORATION

ANNOUNCED GEN 4 4.86µm STACKED HD SENSOR



LAUNCH GEN 3 15µm VGA PACKAGED



LAUNCH METAVISION INTELLIGENCE SOFTWARE

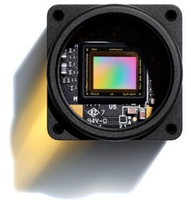
METAVISION INTELLIGENCE SUITE

FIRST INDUSTRIAL EMBEDDED SYSTEM

IMAGO | POWERED BY PROPHESEE

FIRST INDUSTRIAL USB SYSTEM

CenturyArks | POWERED BY PROPHESEE



ABOUT US

PROPHESEE

KEY FIGURES

2010
FIRST PRODUCT

51
PATENTS
SENSOR
SYSTEM
ALGORITHMS
APPLICATIONS

SONY SEMICONDUCTOR SOLUTIONS CORPORATION

$68M
RAISED

37
INTERNATIONAL RECOGNITIONS

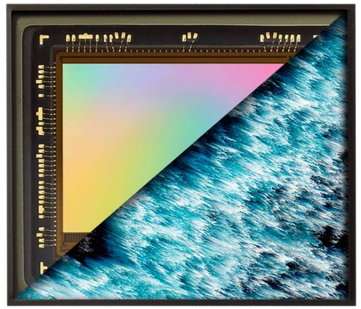
TEAM

100+
STRONG

5
OFFICES

PRODUCTS

METAVISION® SENSORS



METAVISION® INTELLIGENCE SOFTWARE

DEVELOPMENT TOOLS

ECOSYSTEM

SONY SEMICONDUCTOR SOLUTIONS CORPORATION

THANK YOU

www.prophesee.ai