
PROPHESEE
METAVISION FOR MACHINES

ABOUT US

PROPHESEE

KEY FIGURES

2010
FIRST PRODUCT

51
PATENTS
SENSOR
SYSTEM
ALGORITHMS
APPLICATIONS

$100M
RAISED

53
INTERNATIONAL RECOGNITIONS

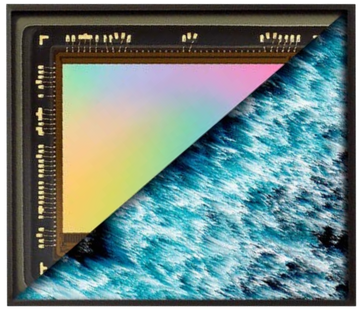
TEAM

100+
STRONG

5
OFFICES

PRODUCTS

METAVISION®
SENSORS



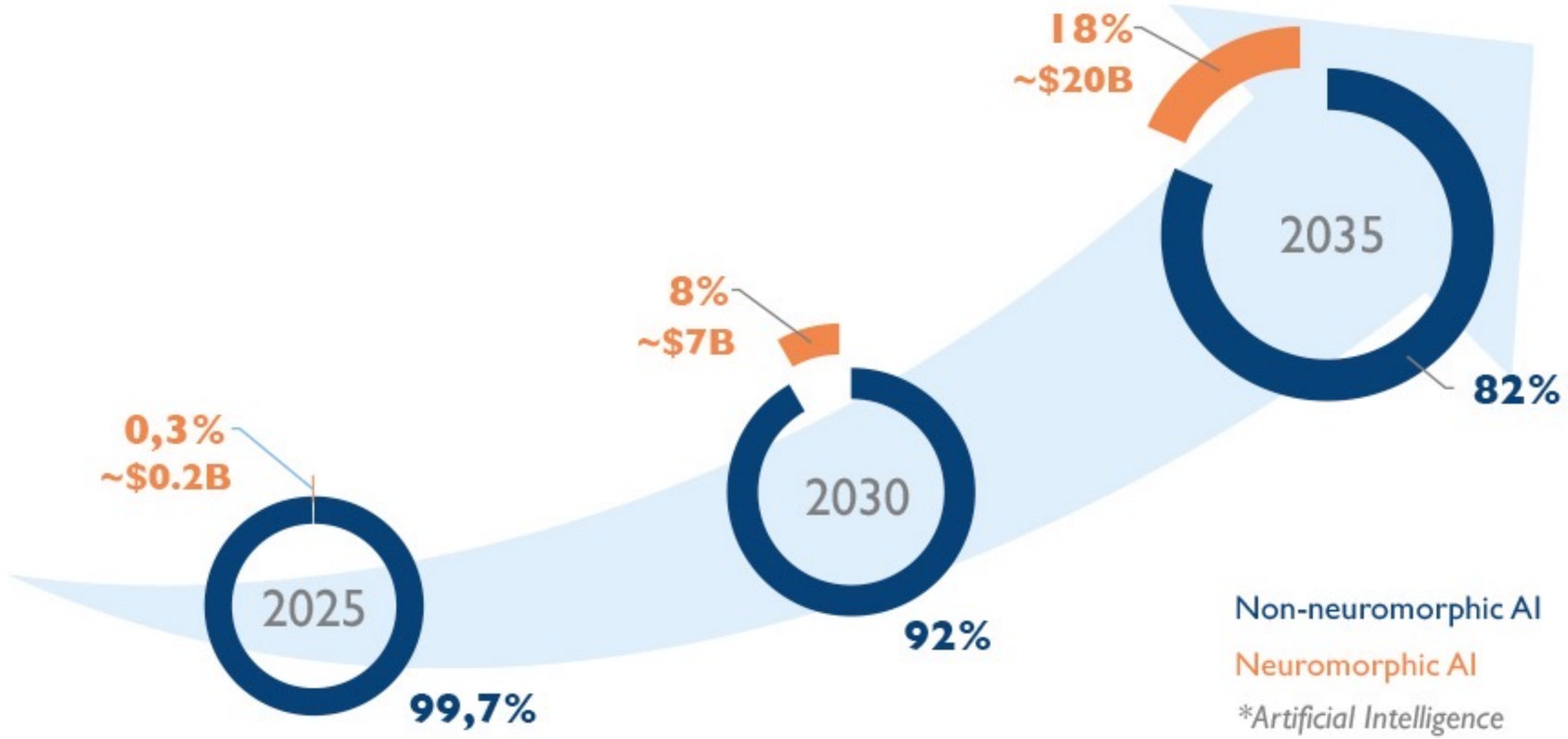
METAVISION®
INTELLIGENCE
SOFTWARE

DEVELOPMENT TOOLS

ECOSYSTEM

SONY SEMICONDUCTOR SOLUTIONS
intel
Tower Semiconductor
HUAWEI
RENAULT NISSAN
BOSCH
SINOVATION VENTURES
韦豪创芯 INNO-CHIP
XPERI
OMP
FRAMOS
iCatch
LUCID VISION LABS
IMAGO TECHNOLOGIES
OMS
CenturyArks
DARPA
Fraunhofer
SynSense
cambridge consultants
terranet
Penn
ORI
ROBOTICS & PERCEPTION GROUP
...

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



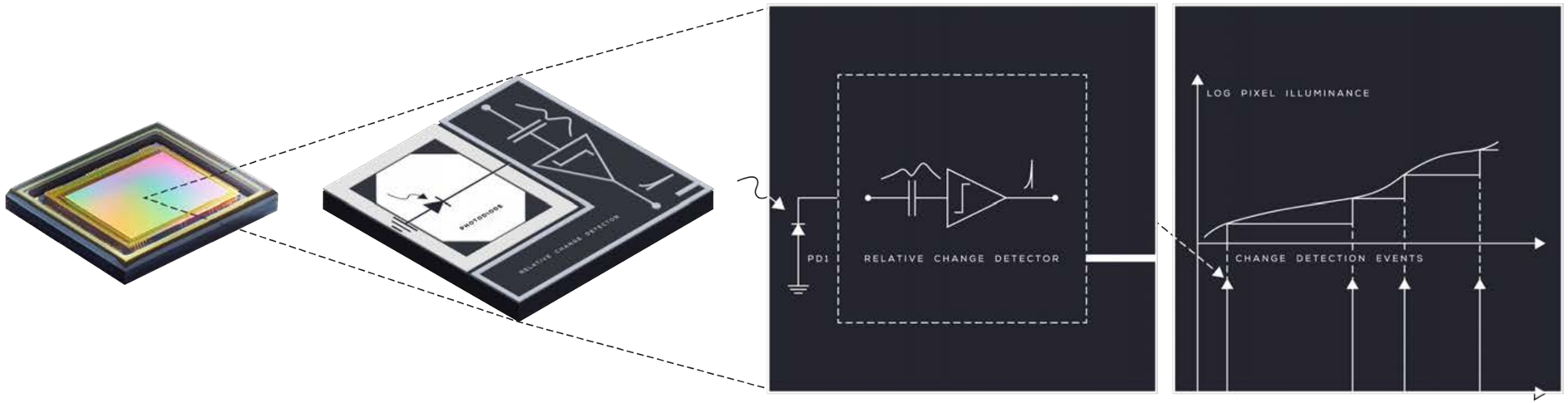
Source: Neuromorphic Computing and Sensing 2021, Yole Développement, May 2021

INTELLIGENCE, DOWN TO THE PIXEL

Each pixel in PROPHESEE Metavision® sensor

Detects intelligently when there is a change in the scene

And activates itself accordingly



THIS ALLOWS FOR

- ZERO REDUNDANCY SAMPLING
- PIXEL-INDIVIDUAL SAMPLING OPTIMIZATION
- TIME-DOMAIN EXPOSURE ENCODING

~~RAW DATA~~

ESSENTIAL INFORMATION

In a traditional Frame-Based sensor, the whole sensor array is triggered at a **pre-defined rhythm**, regardless of the actual scene's dynamics.

This leads to the acquisition of **large volumes of raw, undersampled or redundant, data.**

In Prophesee's patented Event-Based sensor, **each pixel intelligently activates** itself depending on the contrast change (movement) it detects.

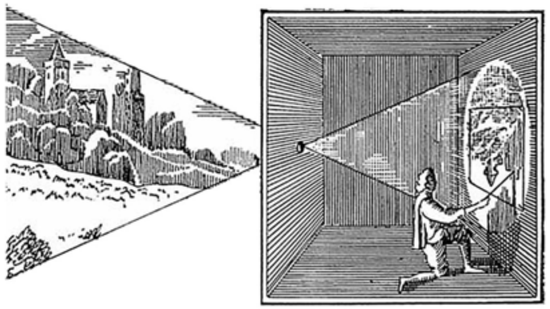
This enables the acquisition of only and all **essential motion information**, continuously, at the pixel level.

REVEALING THE INVISIBLE BETWEEN THE FRAMES

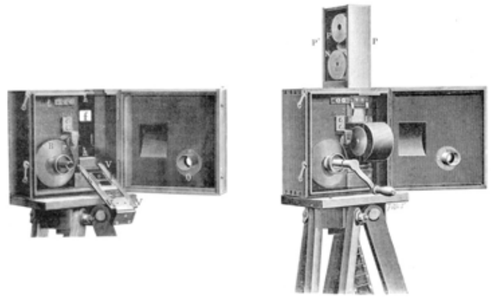
WE HAVE BEEN DOING THE SAME THING FOR CENTURIES

CAPTURE MOTION VIA STATIC REPRESENTATIONS

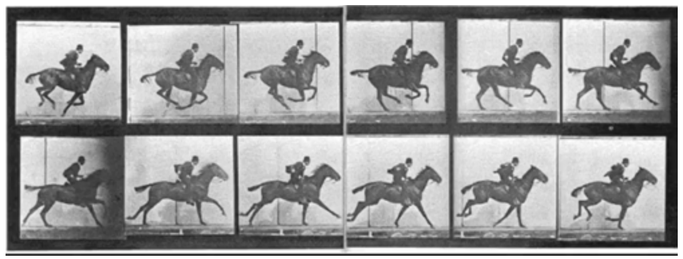
CAMERA OBSCURA



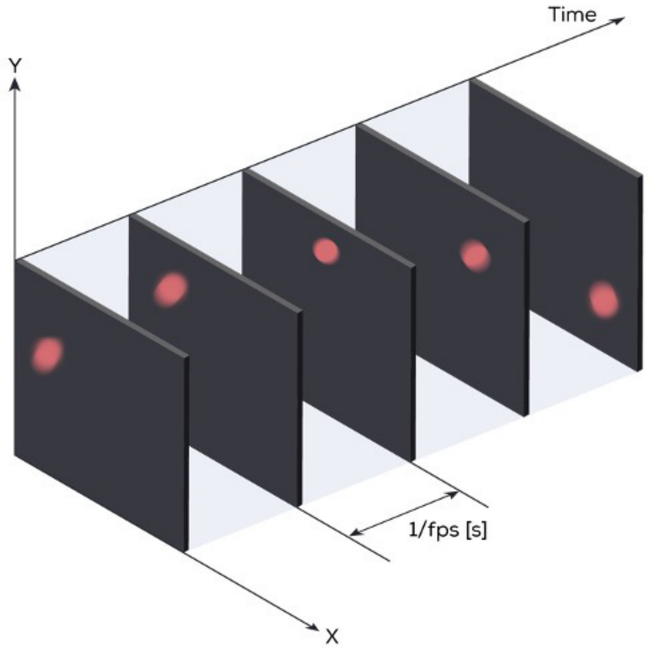
FRÈRES LUMIÈRE



SCUOLA DI ATENE – RAFFAELLO



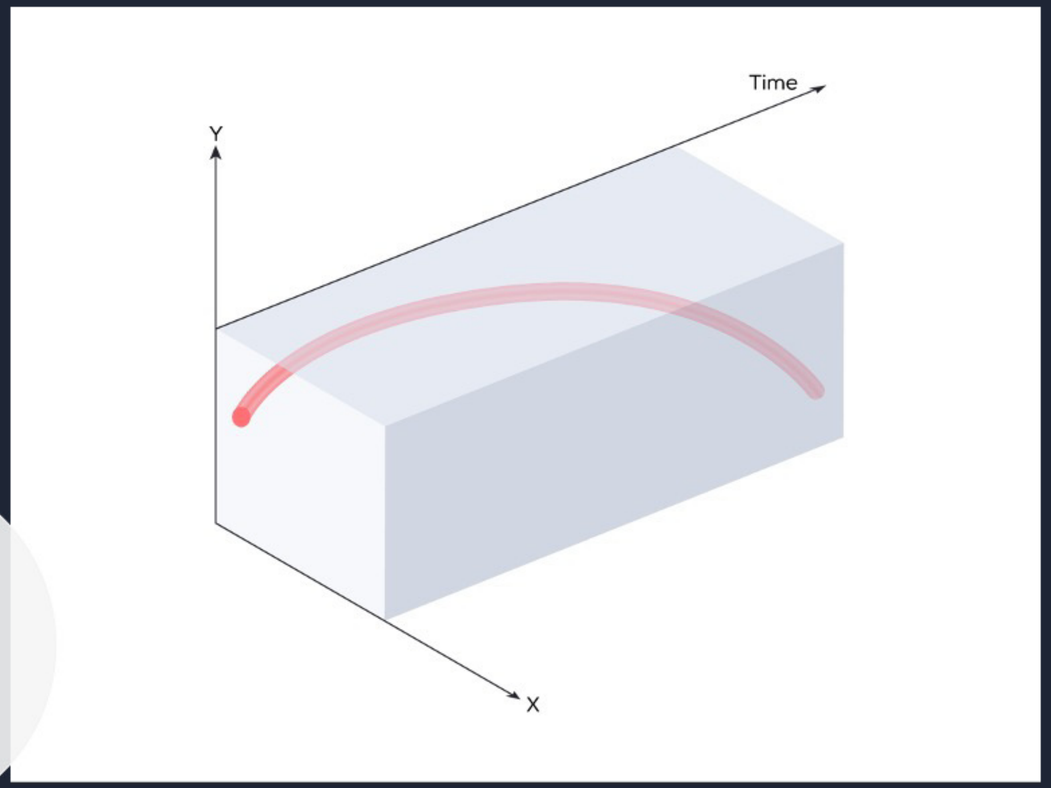
EADWEARD MUYBRIDGE



On the LEFT, a simulation of **Frame-Based Vision** acquisition of a rotationg dot,

This approach leverages traditional cinema techniques and records a **succession of static images** to represent movement.

Between these images, there is nothing, **the system is blind, by design.**



On the RIGHT, the same scene recorded using **Event-Based Vision**.

There is no gap between the frames, because there are no frames anymore.

Instead, a continuous stream of essential information **dynamically driven by movement, pixel by pixel.**

THE HYPER FAST AND FLEETING

Events at **sub-millisecond** time scale.
10,000 fps equivalent

ONLY THE ESSENCE OF THE SCENE

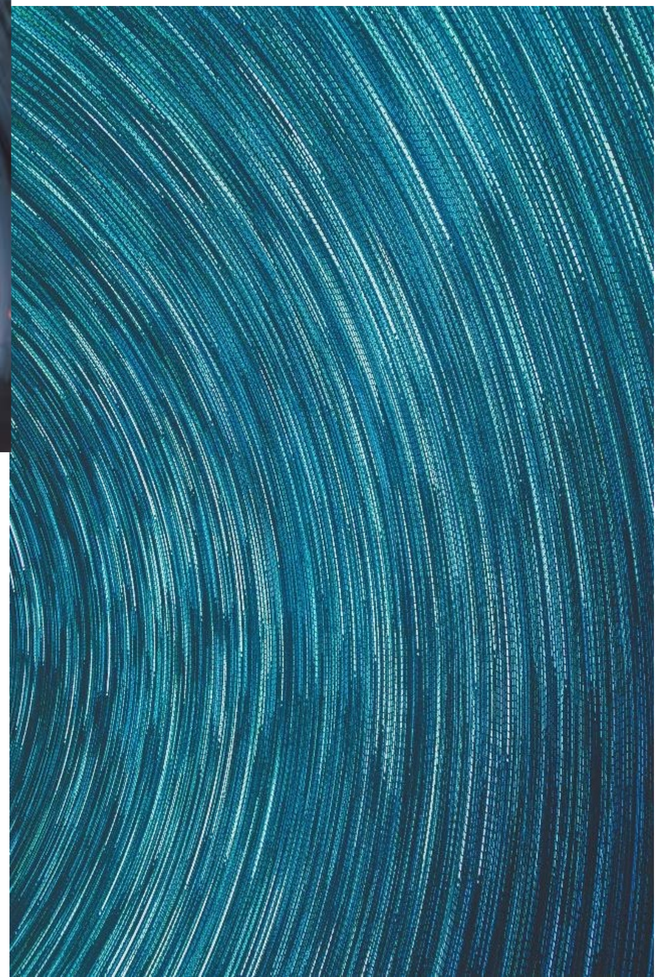
10 to 1000 times less data processed in comparison to standard approaches.

THE HIDDEN BY EXTREME LIGHTING CONDITIONS

>120dB
wide dynamic range.

WITH UNPARALLELED POWER EFFICIENCY LEVELS

<10 mW



PROCESS AND PIXEL SIZE EVOLUTION

GEN 1

2015

GEN 2

2017

GEN 3

2019

GEN 4

2021

RESOLUTION

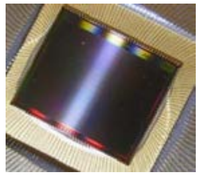
HD

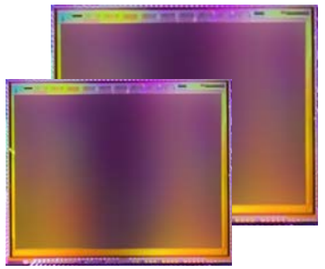
720p

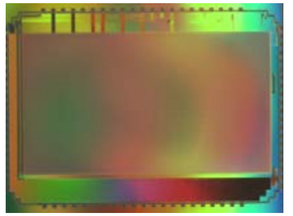
VGA

HVGA

QVGA



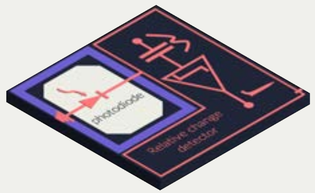




PIXEL SIZE

ATIS 30 µm
180nm CMOS

CD 15 µm
180nm CMOS

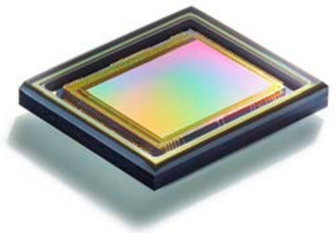


CD 15 µm
180nm CIS
25% fill factor

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

SENSORS

PROPHESEE



GEN3.1 – VGA

Fully qualified, packaged (mini pbga) Metavision® sensor, ready for **mass production deployment** in your hardware.

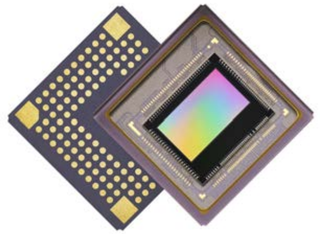
KEY FEATURES

• Resolution (px)	640x480 VGA
• Optical format	3/4"
• Latency at 1kLux (µs)	250
• Dynamic Range (dB)	>120
• Min contrast sensitivity (%)	25
• Die Power Consumption	26-176
• Pixel size (µm)	15 x 15

NEW

PROPHESEE

SONY SEMICONDUCTOR SOLUTIONS



IMX636ES (HD)

Start evaluation of Sony's breakthrough stacked Event-based Vision Sensor **realized in collaboration between Sony and PROPHESEE.**

KEY FEATURES

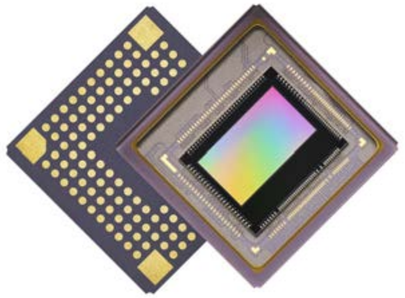
• Resolution (px)	1280 x 720 HD
• Optical format	1/2.5"
• Latency at 1kLux (µs)	<100
• Dynamic Range (dB)	>86*
• Nominal contrast treshold (%)	25
• Pixel size (µm)	4.86 x 4.86
• Event Signal Processing	embedded

*5 lux is the minimum light condition that guarantees imaging characteristics. **DR >120 dB** can be reached based on low light cutoff measurement being: 0.08 lux (imaging characteristics not guaranteed).

NEW

EVK4 HD

PRESENTATION



IMX636ES (HD)

METAVISION INTELLIGENCE SUITE

VISION AWARD 2021

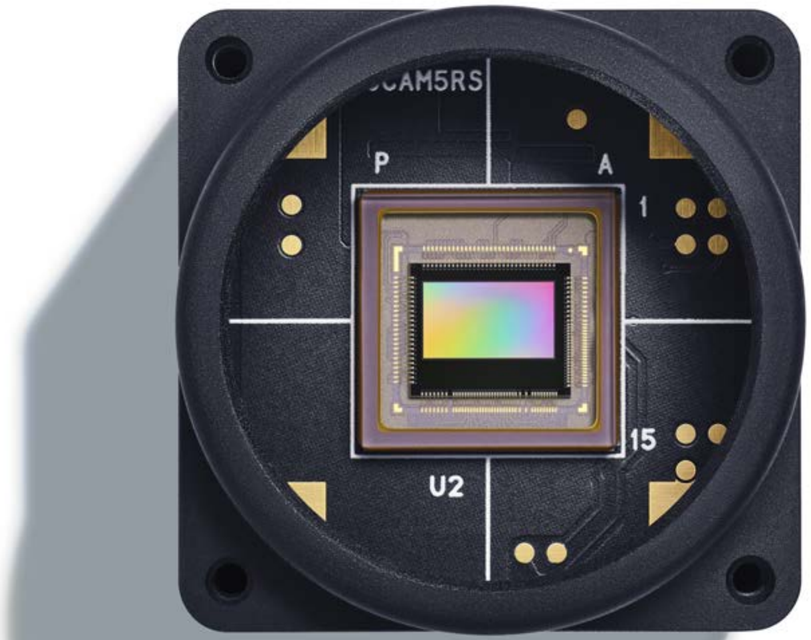
TINY ML

2023 Vision Systems Innovators Awards

AutoSens Awards

rb ROBOTICS BUSINESS REVIEW

5X AWARD-WINNING SOFTWARE



A2017 AI 40g

ALUMINUM STRONG & LIGHT

BUILT TO ENDURE

C / CS MOUNT

TOTAL LENS FLEXIBILITY

USB 3.0 TYPE-C IX SERIES CONNECTOR

UNIVERSAL CONNECTIVITY

30x30x36mm

PROPHESEE

POWERED BY PROPHESEE PARTNER'S PRODUCTS

LUCID – TRITON EB

Factory Tough™ prototype featuring Prophesee Metavision **Gen3.1** sensor and full compatibility with **Metavision® Intelligence**

KEY FEATURES
- GigE PoE
- IP67 protection

SUPPORTED SENSORS
- 3.1

SERVICES
- Lucid

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

TINY ML

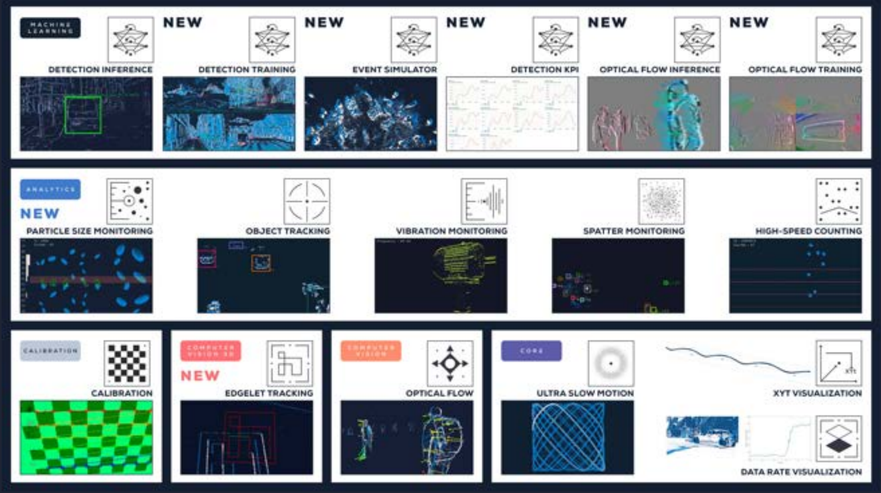
VISION AWARD 2021

Vision Systems 2021 Innovators Awards

rbr ROBOTICS BUSINESS REVIEW

AutoSens Awards

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

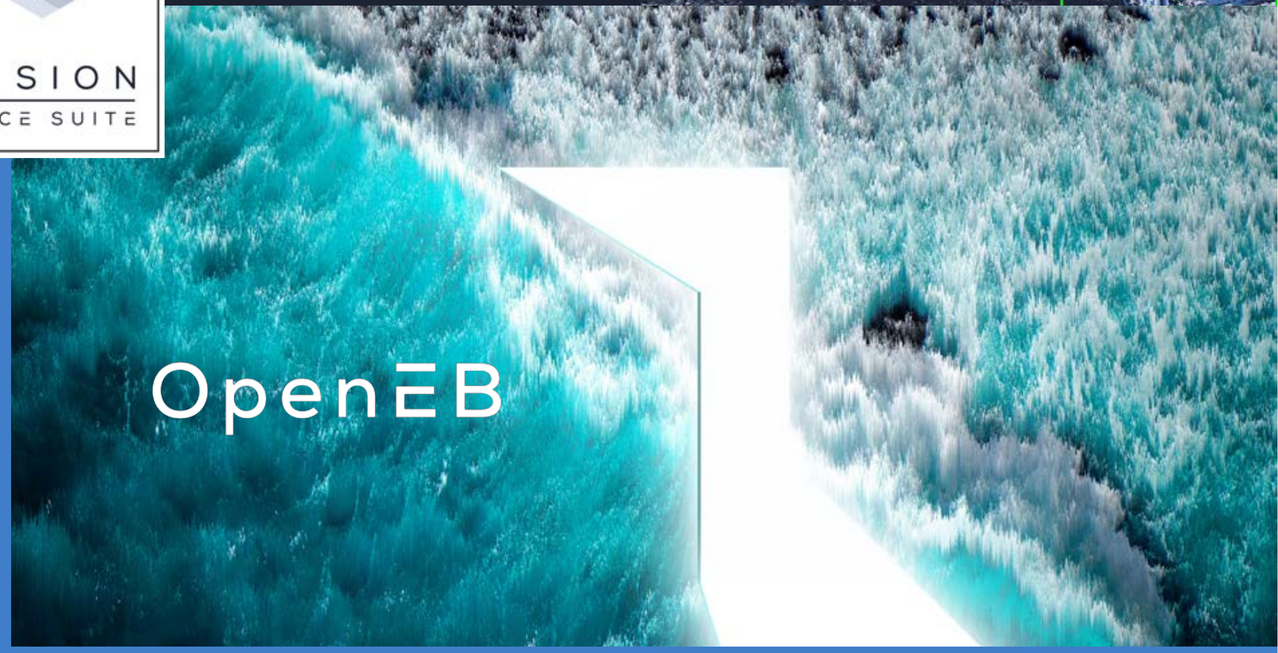
METAVISION
INTELLIGENCE SUITE

LEADING ML TOOLKIT

MOST PERFORMANT OBJECT DETECTOR TO DATE
spotlighted at NeurIPS 2020

LARGEST HD PUBLIC DATASET

COMPLETE ML TOOLKIT
Training, Inference, Grading features

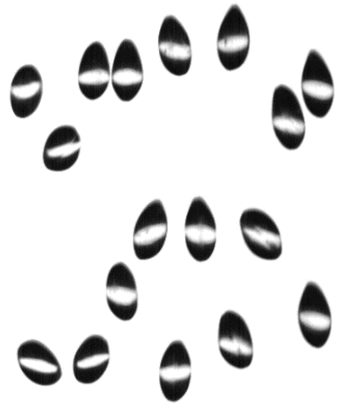


OPEN SOURCE ARCHITECTURE


APPLICATIONS
UP

IMAGO TECHNOLOGIES

LINE SCAN VIEW

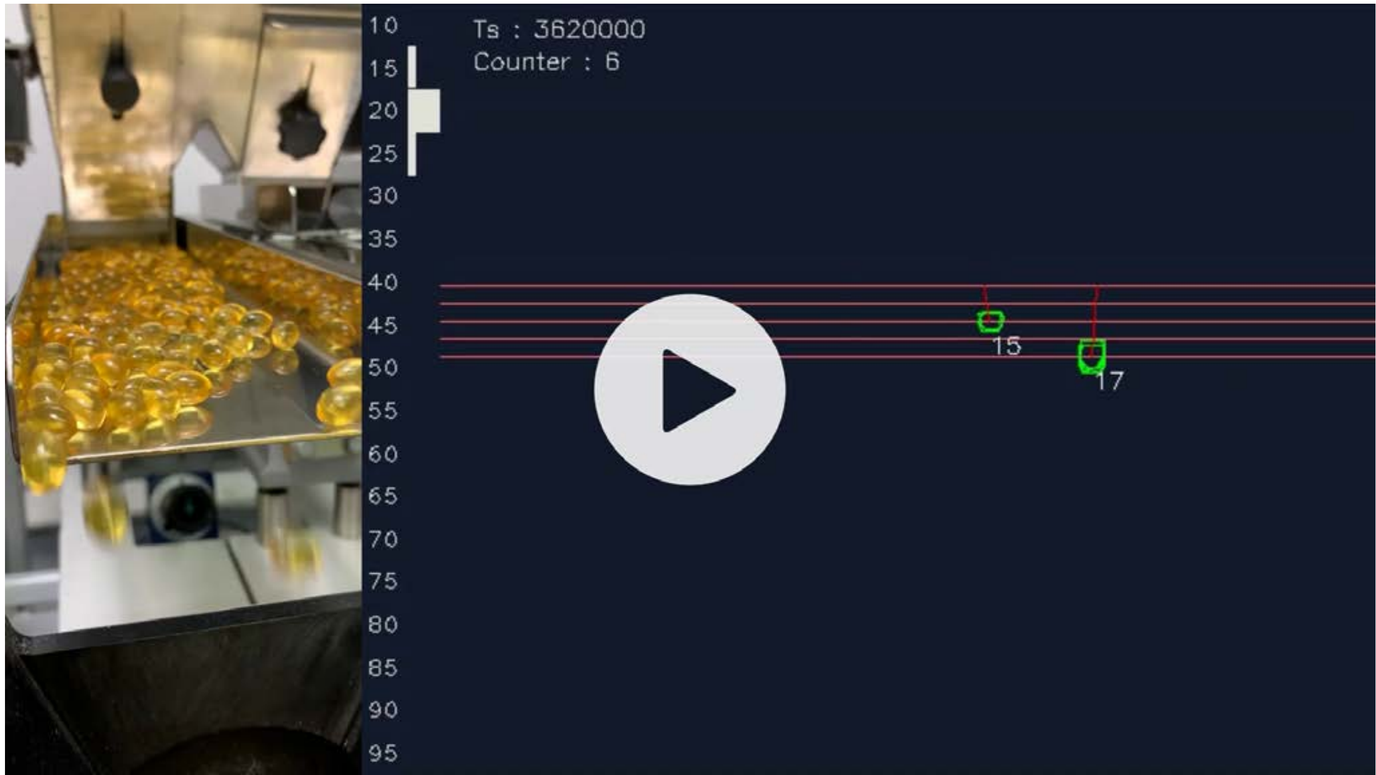


HIGH-SPEED COUNTING FOR TRANSPARENT, LOW-CONTRAST GEL CAPSULES

Using line scan technology, gel capsules **could not be counted at high speeds** due to the **transparency** of the capsules and the **lack of contrast** caused by the yellow color.

With Event-Based Vision, transparency or constrast are no issue, objects can be recognized and counted, pixel by pixel at high-speed.

Count at 1000 obj/s throughput
Data processed **at the edge**



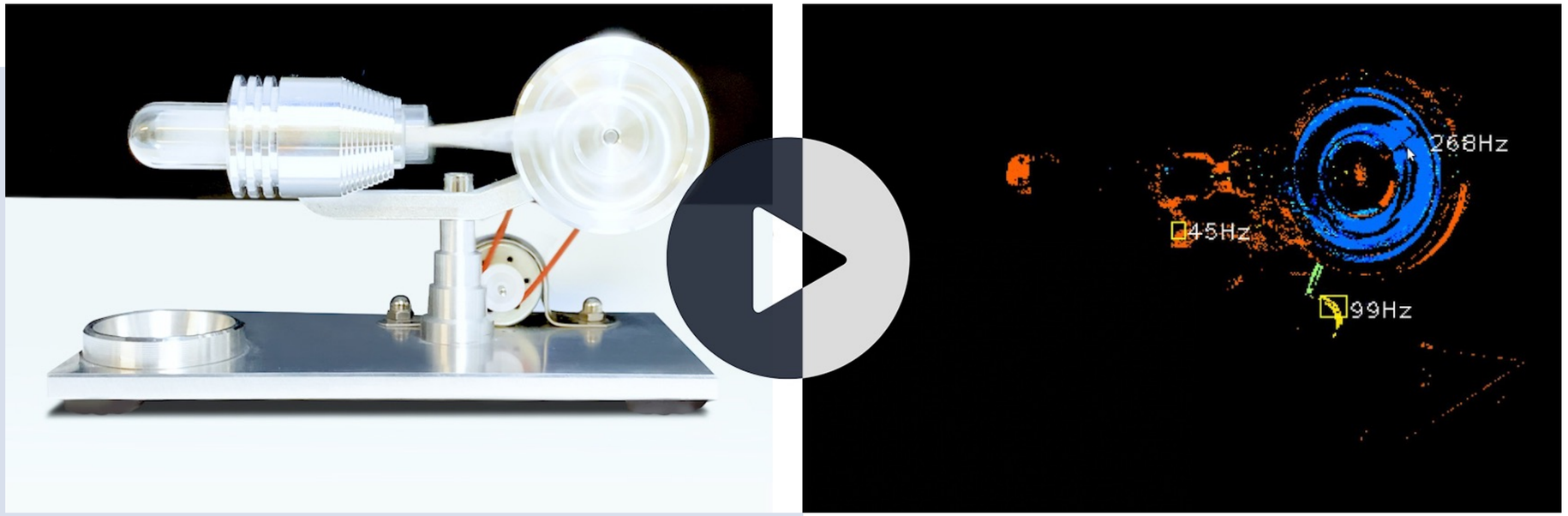
Courtesy of Imago Technologies - marketing@imago-technologies.com

ANALYTICS

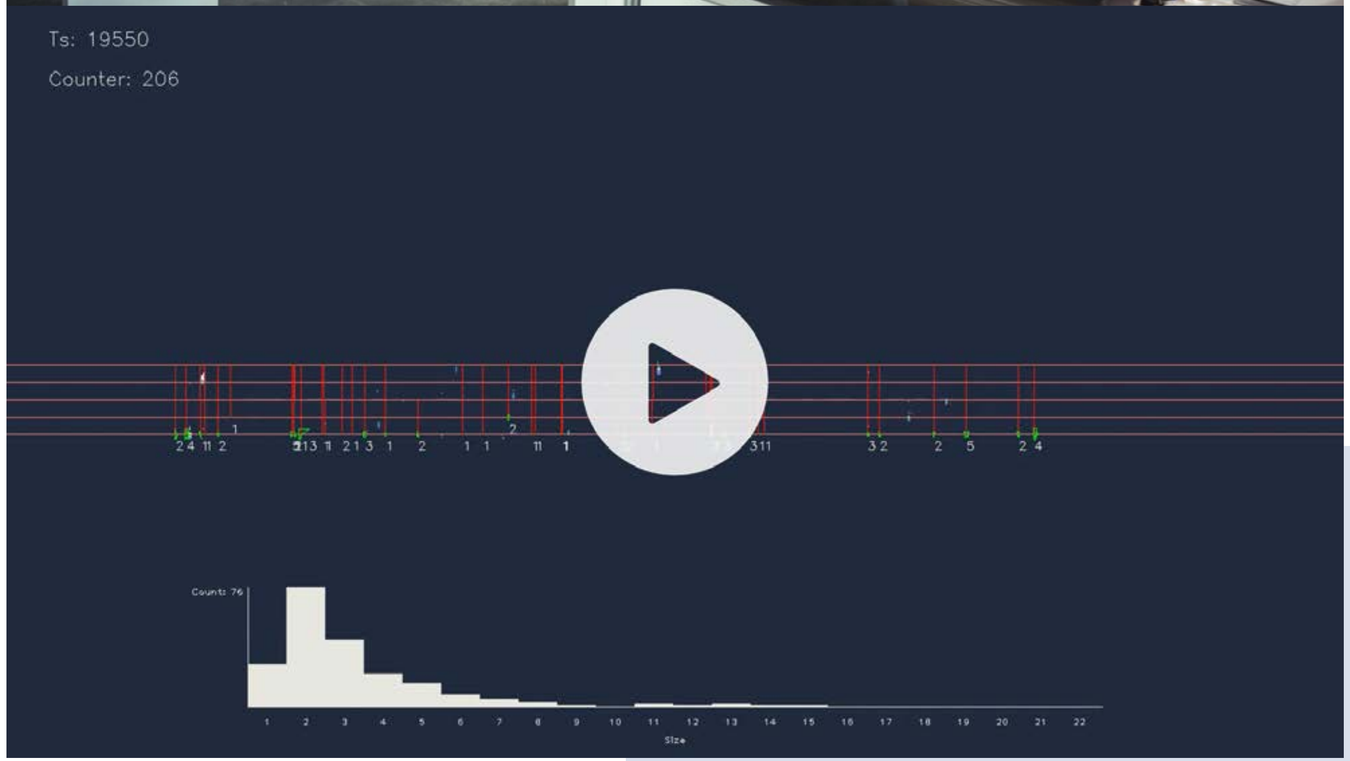
Monitor vibration frequencies continuously, remotely, with pixel precision, by tracking the temporal evolution of every pixel in a scene.

VIBRATION & FREQUENCY MONITORING

From **1Hz to kHz** range
<0.1Hz Accuracy of measurements
1 Pixel Spatial accuracy
Non-intrusive, Non-contact, **Easy to setup**
Multi-point measure per FOV



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



DEFECT DETECTION

Run **high performance defect detection** applications **in real time**, at **low computational cost.**

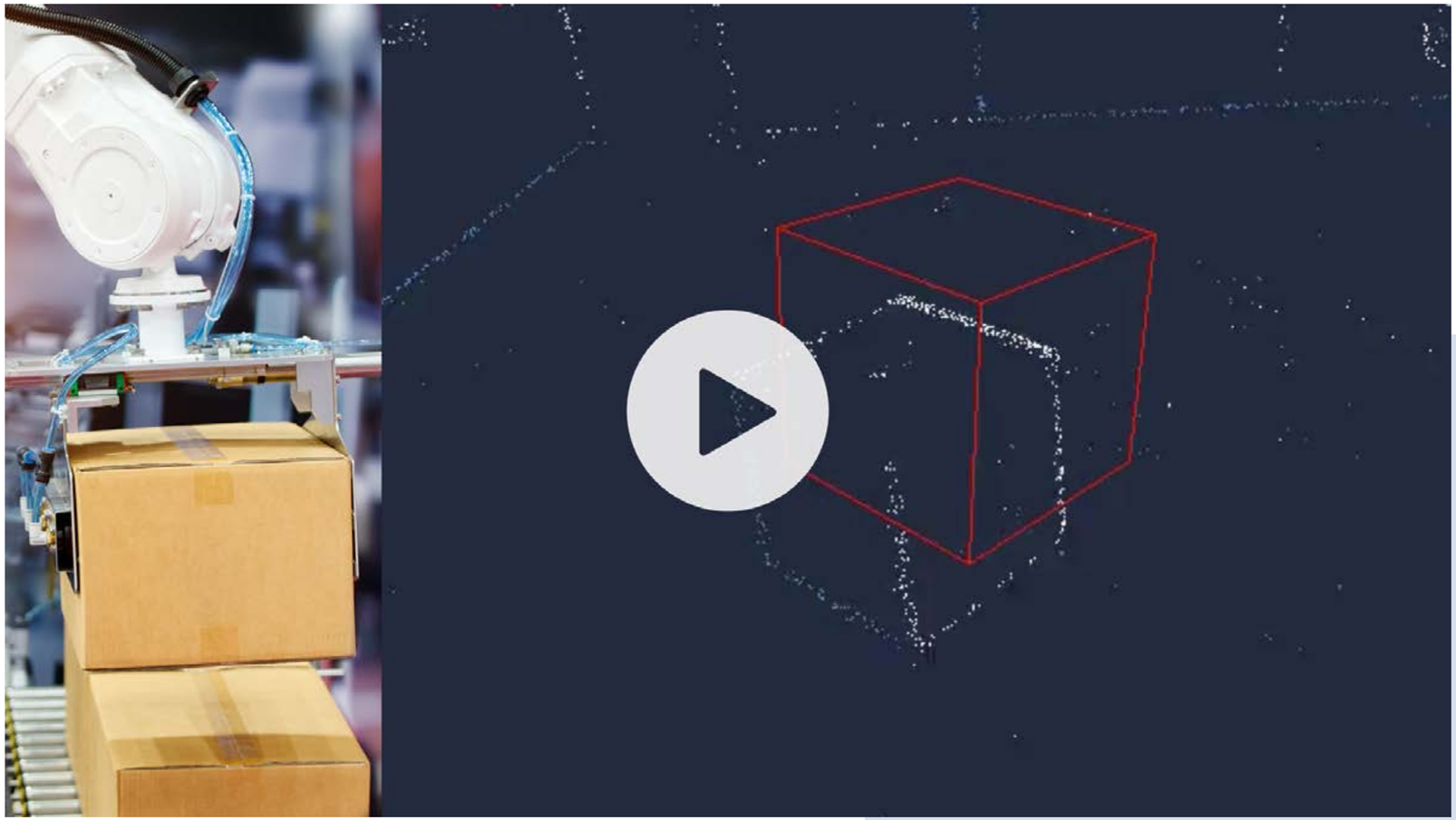
Streamline your setup by **removing strobing LED setups** and **traditional exposure time constraints.**

Detection accuracy: **99%**
Size accuracy: **4% or 2px**
Throughput: **1000 defects/sec** and more

Typical use cases: *Quality control for continuous process (glass manufacturing, plastic film production...)*

COMPUTER VISION 3D

EDGELET TRACKING

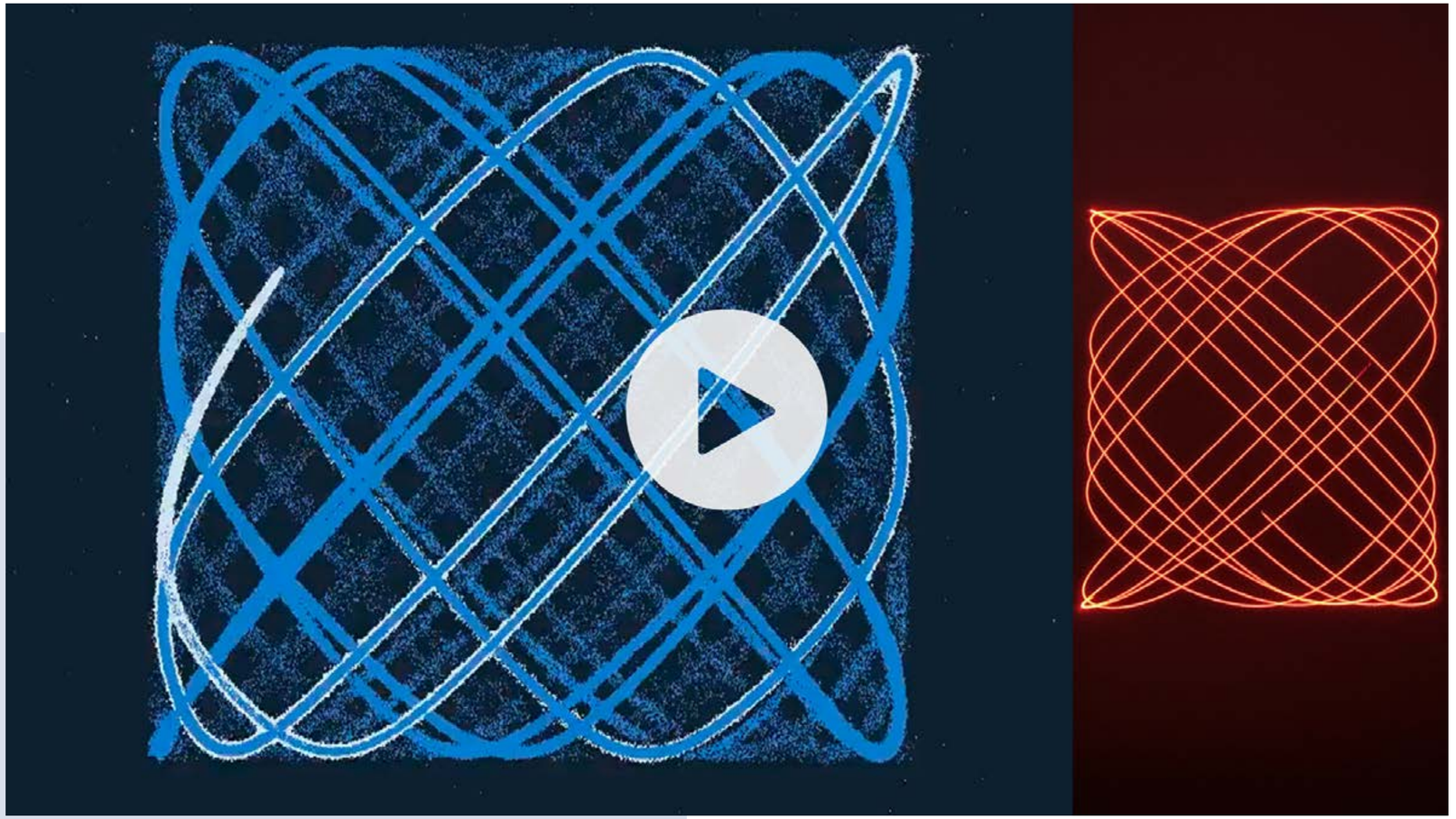


Track 3D edges and/or Fiducial markers for your AR/VR application. Benefit from the high temporal resolution of Events to increase accuracy and robustness of your edge tracking application.

Automated 3D object detection, with geometrical prior
3D object real-time tracking

Typical use cases: Parcel tracking, Warehouse automation, High speed location, Guiding and fitting for pick & place

ULTRA SLOW MOTION



Slow down time, down to the time-resolution equivalent of **over 200,000+ frames per second, live**, while generating orders of magnitude **less data** than traditional approaches.

Understand the **finest motion dynamics** hiding in ultra fast and fleeting events.

Up to **200,000 fps** (time resolution equivalent)

Typical use cases: Kinematic Monitoring, Predictive Maintenance

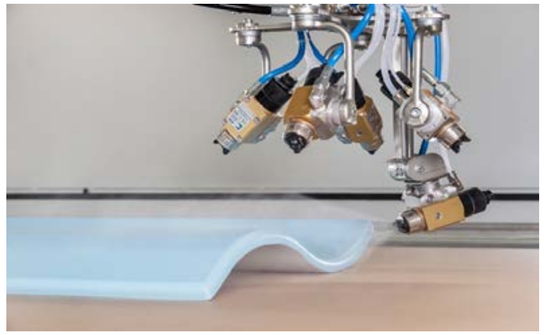
HIGH-SPEED PLUME MONITORING (Aerosols-Spray)

ULTRA-SLOW MOTION

OPTICAL FLOW

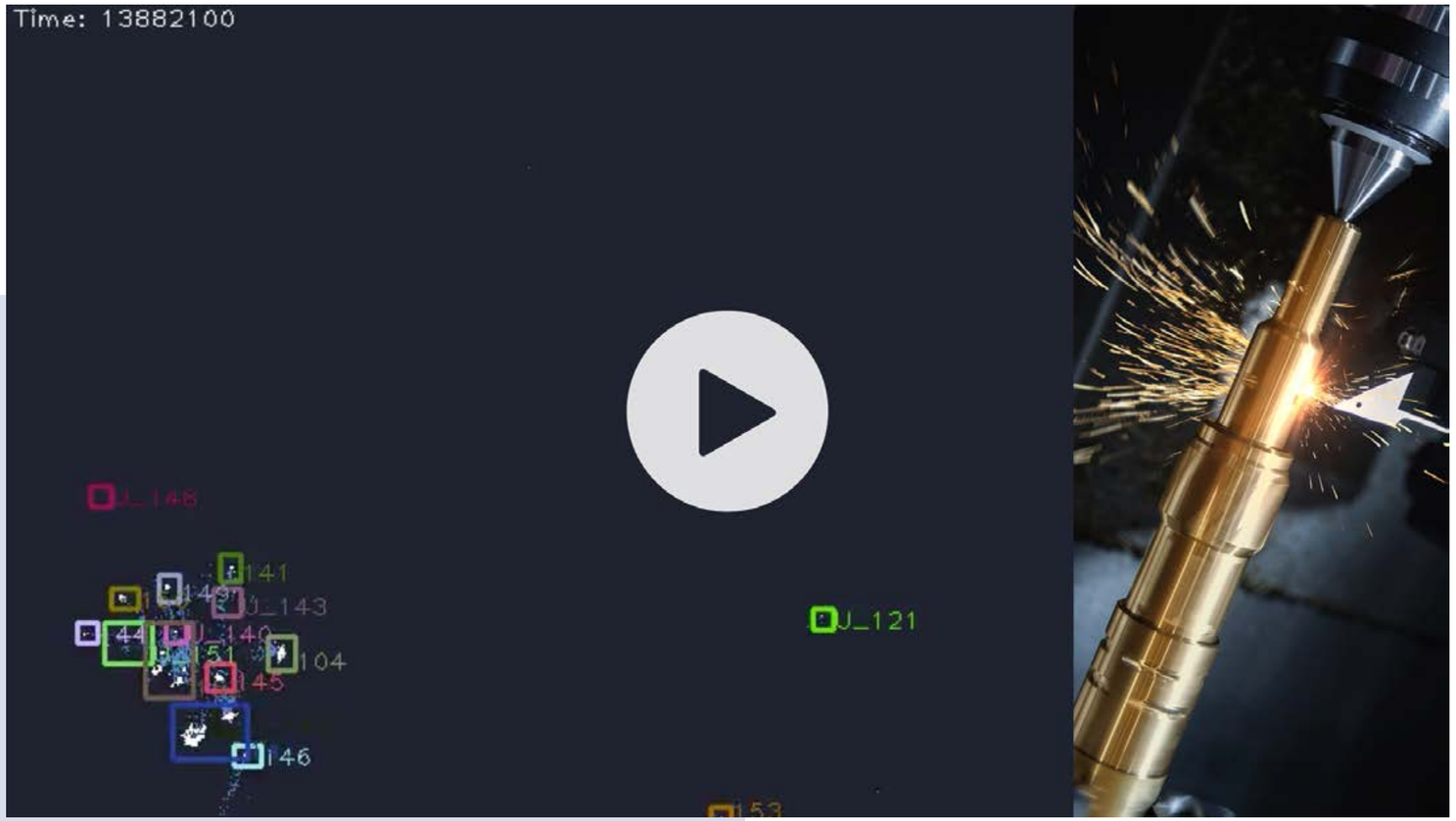
Real time analysis and monitoring of spray dispensing of fluids.

Ultra slow-motion view (200.000 equiv. f/s) for homogeneity and optical flow for direction and velocity of plume & PIV.



Typical use cases: Dispensing uniformity & Coverage control, Quality & efficiency of dispersion, Fluid dynamics analysis for inline process monitoring

SPATTER MONITORING



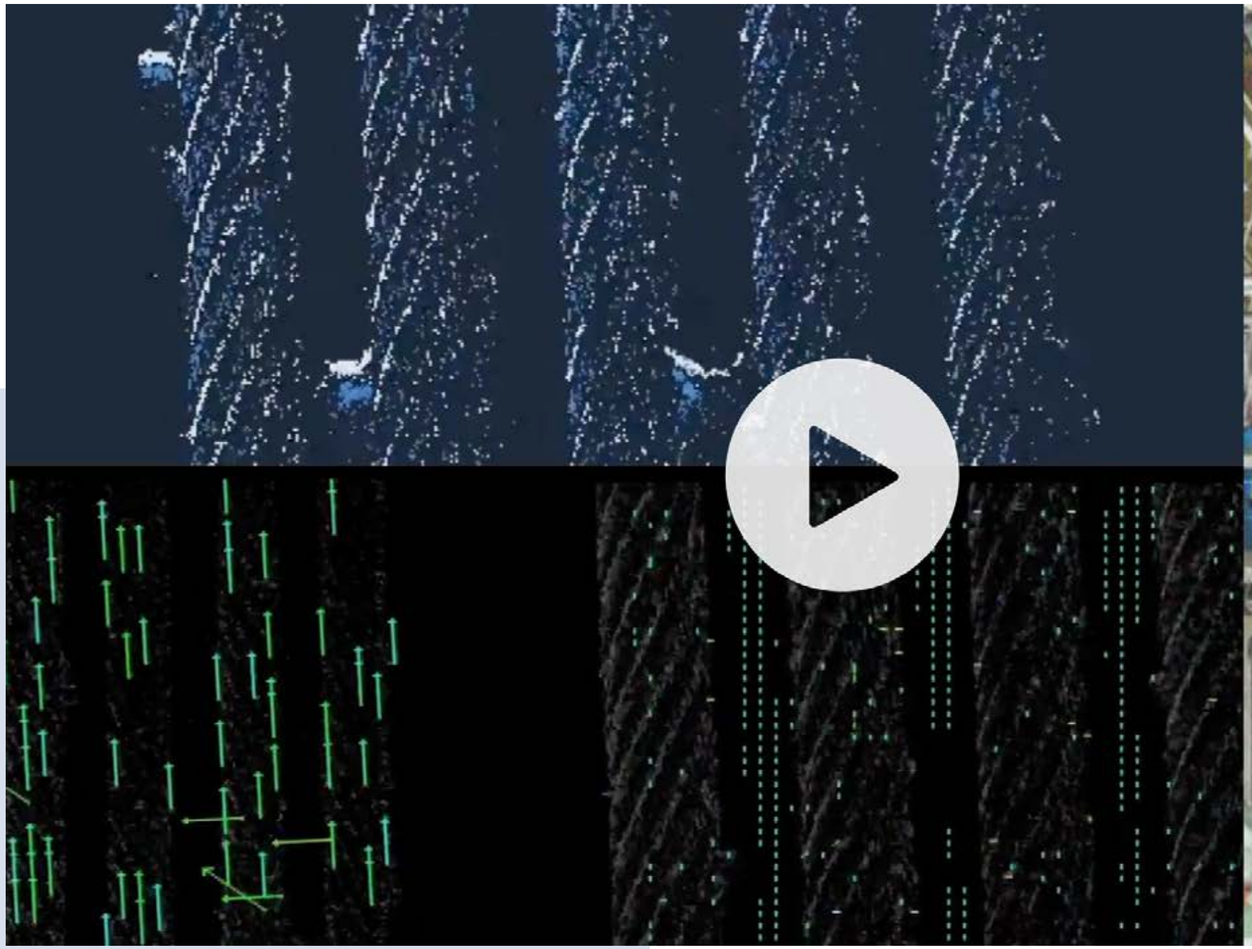
Track small particles (typ. size 10pixels) with spatter-like motion.

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

Typical use cases: Traditional milling, laser & process monitoring, Quality prediction

CABLE / YARN VELOCITY & SLIPPING MONITORING



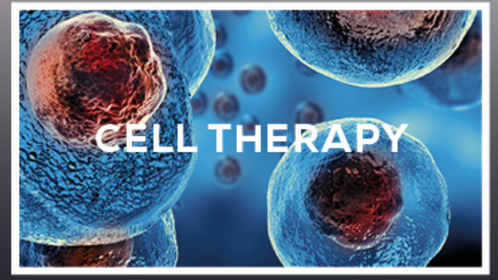
Typical use cases: Yarn quality control, Cable manufacturing monitoring

VELOCITY &
FLUID DYNAMICS MONITORING

Typical use cases: Fluid dynamics monitoring, Continous process monitoring of liquid flow

PROPHESEE

INVENTORS COMMUNITY



cambridge consultants

WESTERN SYDNEY UNIVERSITY

NUS National University of Singapore

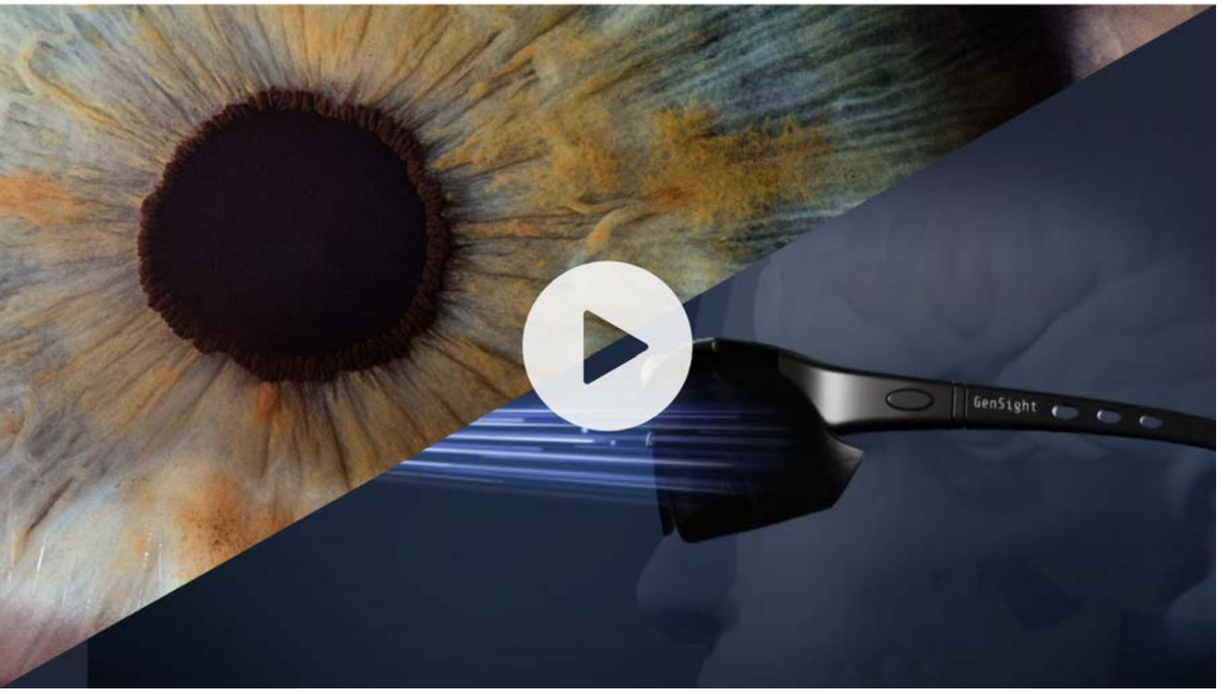
University of Glasgow | HERIOT WATT UNIVERSITY | University of Strathclyde Glasgow

GenSight BIOLOGICS

4,000+
COMMUNITY MEMBERS

PUBLIC

GIVING SIGHT BACK TO THE BLIND

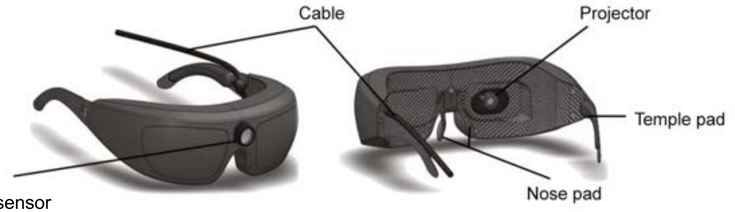


Courtesy of Gensight

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.**



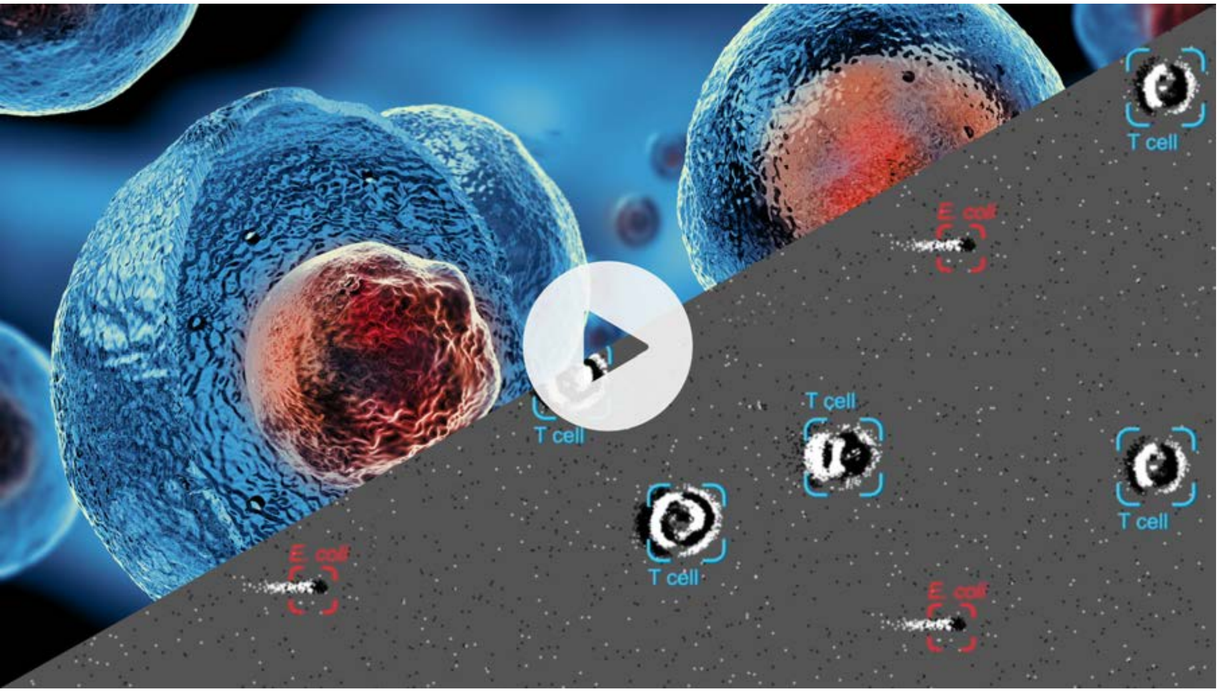
Metavision sensor

PUBLIC

UNLOCK NEXT GENERATION CELL THERAPY

cambridge consultants
Part of Capgemini Invent

METAVISION® BY PROPHESEE



Courtesy of Cambridge Consultants

Standard 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 contaminants, **Cambridge Consultants** was able to **give automated contamination feedback in milliseconds.**

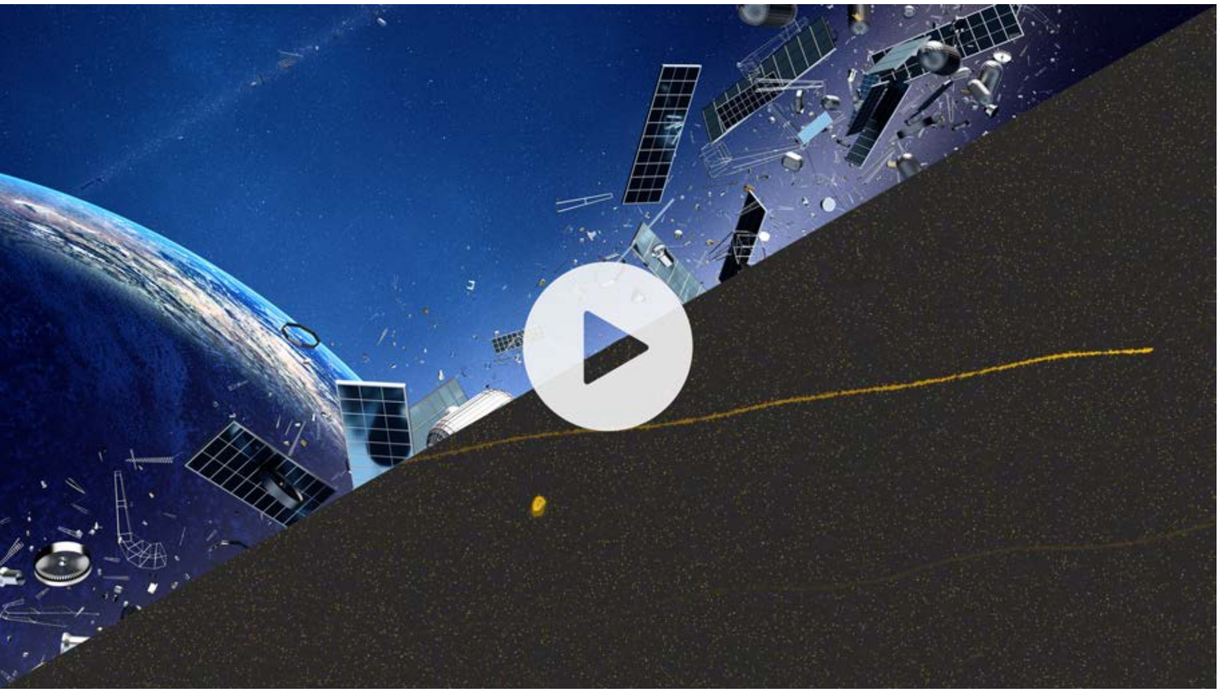
‹18ms detection time
Autonomous 24/7 monitoring
Single cell level detection
Non destructive test solution

PUBLIC

EXPLORE THE SKIES AND TRACK SPACE DEBRIS

WESTERN SYDNEY UNIVERSITY

METAVISION® BY PROPHESEE



Courtesy of Western Sydney University

Growing reliance on satellites has led to an **increased risk in collisions between space objects**. Accurate detection and tracking of satellites has become crucial.

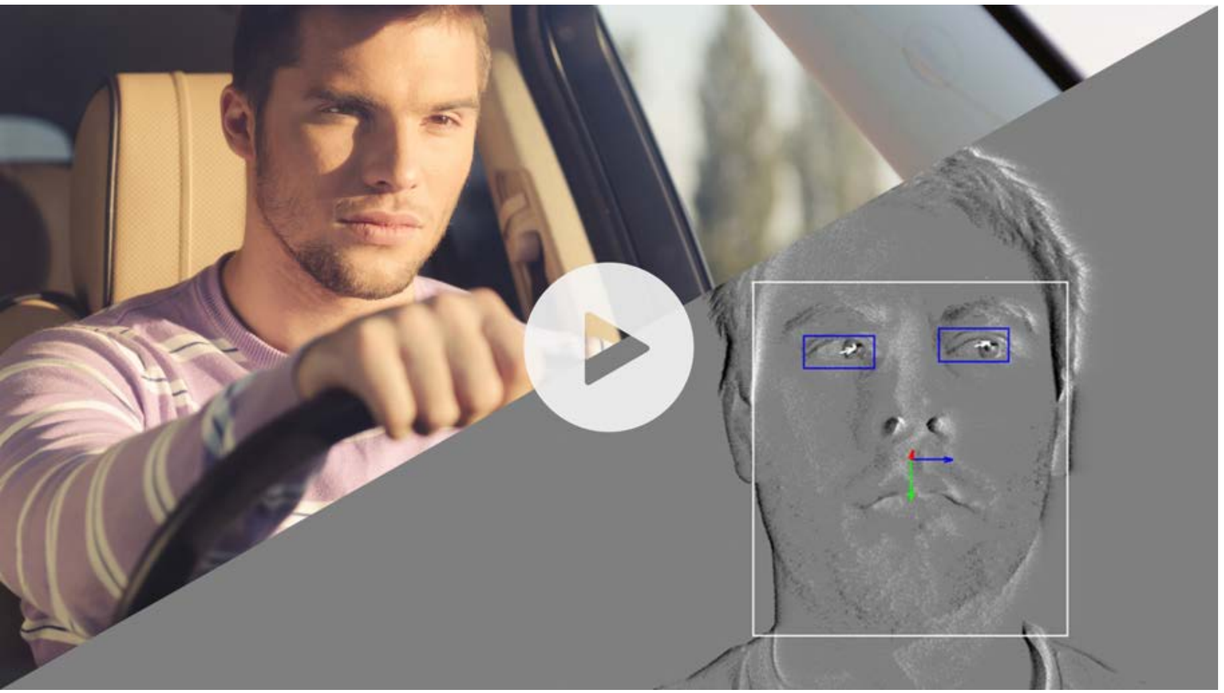
Astrosite, a world first neuromorphic-inspired mobile telescope observatory is using **Event-Based sensing as a more efficient and low-power alternative** for Space Situational Awareness.

Day & night high performance operations
No fixed exposure time

PUBLIC

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

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**.

This is a breakthrough in **next-generation in-cabin experiences and safety**.

PUBLIC

GIVE ROBOTS A HUMAN SENSE OF TOUCH

NUS National University of Singapore

METAVISION® BY PROPHESEE

Researchers at the University of Singapore are taking advantage of the benefits of Prophesee's Event-Based Metavision technology, in combination with touch, to build **new visual-tactile datasets for the development of better learning systems in robotics**.

The neuromorphic sensor fusion of touch and vision is being used to **help robots grip and identify objects**.

1000x times faster than human touch
0.08s rotational slip detection

Courtesy of National University of Singapore

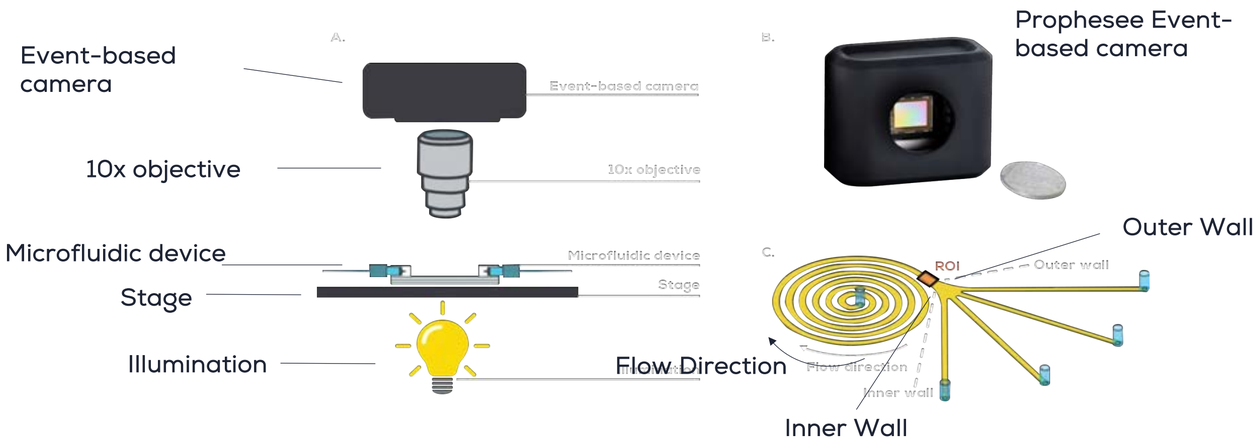
PUBLIC

DETECT AND TRACK PARTICLES AT HIGH SPEED

University of Strathclyde Glasgow | University of Glasgow | Heriot-Watt University | METAVISION® BY PROPHESEE

Researchers at the University of Glasgow, Heriot-Watt University and University of Strathclyde have discovered ways to leverage Event-Based Vision's **high-speed particle detection** capabilities to perform next-generation **microfluidic analysis**.

Down to 1µm size of particle detected
Up to 1.54 m/s fluid velocity
20k fps time resolution equivalent



Courtesy of University of Glasgow, Heriot-Watt University and University of Stratchlyde