Live Demonstration: Front and Back Illuminated Dynamic and Active Pixel Vision Sensors Comparison

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***Abstract*— The demonstration shows the differences between two novel Dynamic and Active Pixel Vision Sensors (DAVIS). While both sensors are based on the same circuits and have the same resolution (346x260), they differ in their manufacturing. The first sensor is a DAVIS with standard Front Side Illuminated (FSI) technology and the second sensor is the first Back Side Illuminated (BSI) DAVIS sensor.**

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I. DEMONSTRATION SETUP

The demonstration shows the difference in performance of two novel Dynamic and Active Pixel Vision Sensors (DAVIS). This sensor, also known as silicon retina, combines the capability to obtain intensity readouts (frames) together with a continuous stream of events encoding for positive or negative logarithmic changes in luminosity [1].

A Back Side Illumination (BSI) DAVIS shows the potential to increase the small 20% fill factor of the complex Front Side Illumination (FSI) DAVIS pixels. This increases the Quantum Efficiency (QE) from 24% to 93%. While this improves the sensitivity of the sensor, other features, such as the Modulation Transfer Function (MTF) degrade due to pixel crosstalk and parasitic photocurrent. The latter induces more "leak events" and thus more noise. Overall, the BSI DAVIS is 4 times more sensitive than the FSI DAVIS, showing possible advantages in low light applications such as shown in previous works on neural imaging of [2][3].

The demonstration setup is shown in Fig.1: the two DAVIS sensors stream in real-time the frames and events generated in response to the scene stimuli. The scene stimulus are different charts, video streaming on a monitor or live scene. The output from the two sensors are visualized on a laptop computer running jAER [4], the open-source JAVA-based software used to process event-based data.

II. VISITORS EXPERIENCE

Visitors can directly interact and manipulate the two sensors in order to observe their behaviours under a wide range of conditions and stimuli.

A series of filters can be applied in jAER in real-time to process the event-based data in order to quantify the performance of the sensors.

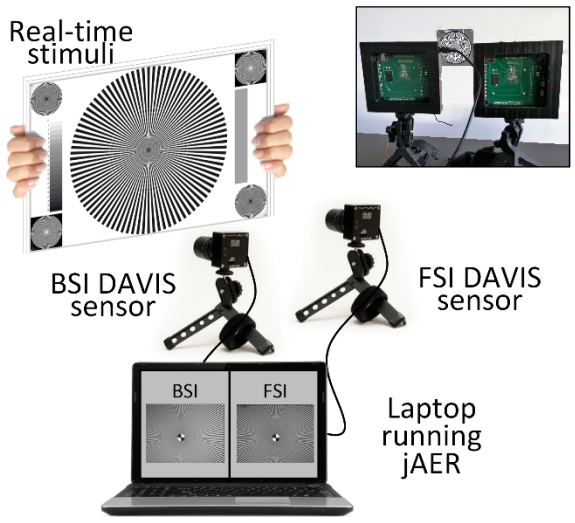

Fig.1 Demonstration setup to compare the performances of Front- and Back-Illuminated DAVIS sensors.

REFERENCES

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