OCULI IS PUTTING THE "HUMAN EYE" IN AI

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Company

Oculi® is a deep-tech, fabless semiconductor company - spinout of Johns Hopkins University - that produces the OCULI SPU™ (Sensing & Processing Unit), a novel architecture and product in the world of AI and vision technology. The OCULI SPU is the only single chip Software-Defined Vision Sensor™ that delivers **Real-Time Vision Intelligence** (VI) at the edge.

OCULI SPU™
(Sensing & Processing Unit)

IntelliPixel® combines sensing + pre-processing at the pixel to deliver real-time Vision Intelligence.

Up to 30x better in energy / time with added privacy
- The most efficient vision architecture for power, latency, processing, bandwidth, size, and/or cost.
- Eliminates privacy concerns with vision technology.

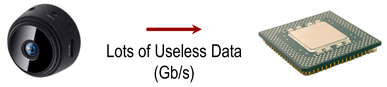
Proven technology with well protected IP
- Functioning chips that have been delivered to partners for evaluation.

Why Machine Vision Remains Inferior?

Machine Vision, when compared to human vision, is inefficient and slow. This challenge will persist if sensors and processors continue to be developed independent of each other and for different purposes.

MACHINE VISION

Dumb Sensing → **Perception**

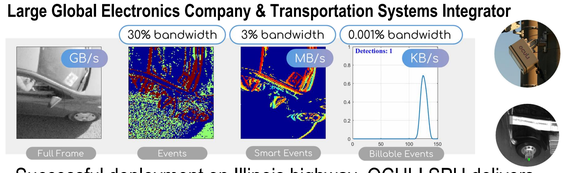


The fundamental limitation is the data deluge, and the root cause is the architecture, where and how the "smarts" are deployed between the signal and action. Imaging sensors generate lots of data to be moved and processed without any selectivity, costing both latency and power. Most of this data could be discarded at the pixel without any loss of useful information. The current architecture is also rigid, limiting the ability to adapt or optimize dynamically.

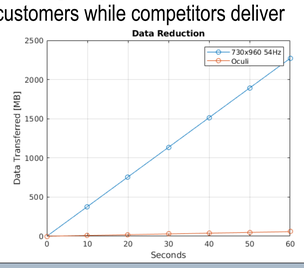
Field Deployments

Mobility

Large Global Electronics Company & Transportation Systems Integrator



- Successful deployment on Illinois highway. OCULI SPU delivers >99% accuracy required by customers while competitors deliver only 80-90%.
- OCULI SPU reduced data bandwidth by 97.4% when compared to a 730x960 conventional imaging sensor running at 54 FPS standalone.

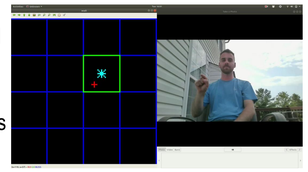


Paid Pilots

Smart Interactive Displays

Very Large Global Electronics Company

- Demonstrated efficient eye-tracking, face detection, and anonymous user analytics
- Demonstrated near-zero lag touchless control for displays



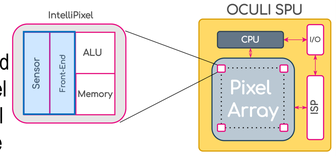
Oculi Technology

OCULI SPU™

The OCULI SPU (Sensing & Processing Unit) provides a disruptive architecture inspired by the eye:
- Integrated sensing + processing
- Parallel sensing + processing
- Saliency/features (smart events) output
- Sparse processing
- Bi-directional communication

IntelliPixel®

The OCULI SPU being fitted with the patented IntelliPixel technology includes in-pixel digital processing to reduce latency down to <uSec and bandwidth/external post-processing by up to 99%.

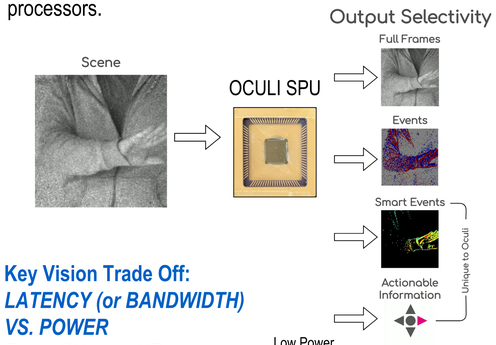


Sensor Agnostic

The OCULI SPU works with conventional CMOS, DVS, infrared, depth/TOF, and multi-mode

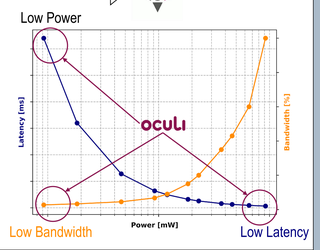
Software-Defined Vision Sensor™

Under software control, the OCULI SPU can switch from full frames to smart events and actionable signals to deliver more information with less data. The output is a fully formed signal that is compatible with standard AI algorithms and general-purpose processors.



Key Vision Trade Off: *LATENCY (or BANDWIDTH) VS. POWER*

The OCULI SPU is a software-defined architecture that delivers flexibility to operate and optimize in this trade space, enabling economies of scale. Same hardware product can be used for multiple markets.



Customer Projects Demonstrating Unique Oculi Value

SMART INTERACTIVE DISPLAYS, GAMING & AR/VR

Oculi helps to solve low sensor speed and high external processing limitations by enabling near-zero (~ms) lag performance with an embedded solution for eye & gesture tracking, face detection, and anonymous user analytics.

GESTURE CONTROL

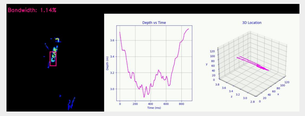
Real-time Gesture Recognition

The smart event output of the OCULI SPU can be used to generate metadata, in this case it is detecting the swiping motion of left, right, up, & down.

Foreground Extraction at the Pixel

Oculi's smart event mode outputs intensity value of pixels that are relevant for the application. In this case it is used to extract the hand.

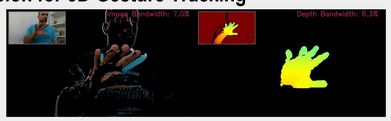
High Speed Depth Sensing with Stereo Vision



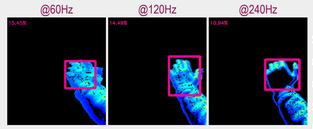
Two OCULI SPU's can be used to compute depth with a frame rate of >300Hz enabled by high dynamic range, high speed sampling and tight synchronization which are key aspect of our technology.

In-pixel Sensor Fusion for 3D Gesture Tracking

Oculi IP enables in-pixel Sensor Fusion & Smart Selectivity for efficient 3D Imaging applications.



Remove Motion Blur with Programmable Sampling Rate

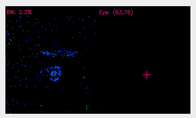


In addition to no upper limit on sensor speed, the programmability of the OCULI SPU allows for dynamic adjustment of the sampling rate to compensate for motion blur without increasing bandwidth.

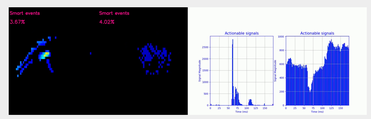
EYE TRACKING

Real-time Eye Tracking

OCULI SPU outputs event information with just 3% bandwidth of the full frame alternative image enabling efficiency in time, energy, and cost.



Efficient Blink Detection



OCULI SPU can be programmed to output various actionable signals and detect rapid movements such as eye blinks while keeping the bandwidth low to KB/s

HEAD TRACKING & FACE DETECTION

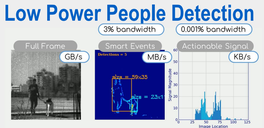
Low Power Face Detection

The smart events of the OCULI SPU enable a single chip complete vision solution to identify, track, and output face position.

IoT

Oculi enables a new class of IoT applications using extremely low power, wireless edge vision AI with strong cost advantages

Low Power People Detection



Always-ON People Counting

Fast Moving Vehicle Detection

BionicVision®

The OCULI SPU is the first practical silicon that closely mimics biology in selectivity, parallel processing, and efficiency but outperforms in speed to ultimately deliver BionicVision

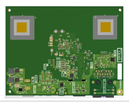
Business Model

Oculi is unique in its offering; we are the only company at the intersection of sensing & processing. Oculi engages with OEMs and Tier1's to sell high-volume chips and modules by Developing key partnerships to incorporate OCULI SPU in modules or end-products and by forming strategic partnerships with OEMs and Tier 1's including IP licensing.

Vision Intelligence Platforms & Software Toolkit

Oculi VI P11/P11B

Stereo Vision Platform



GUI	Interactive GUI to collect data and visualize output from the OCULI SPU in various modes.
SDK	Libraries (C++), code samples (C++/Python), and documentation
DEMOS	Comprehensive, out of the box demo applications

Heritage & Oculi Team

Charbel Rizk, PhD
Founder CEO of Oculi

Dr. Rizk spent his industry and R&D career as a consumer of imaging sensors for autonomy and AI with common challenges: latency, power inefficiencies and lack of flexibility (hardwired, single point solution). Since 2002, he's been advocating the need to optimize the vision architecture, the image processing chain from capture (sensor) to perception (processor).

Oculi Team has significant experience to commercialize the proven technology and has charted a well-defined roadmap to ultimately achieving BionicVision in the foreseeable future.

Registration & Trademark

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