INSIDE...

Pyxalis' advanced CMOS image sensor designs

Pyxalis specializes in designing advanced custom CMOS image sensors for use in medical, industrial, machine vision, security, and consumer applications—catering to both niche and high-volume markets.

Pyxalis is a design house that specializes in advanced custom CMOS image sensors. Based in Grenoble, France, Pyxalis was founded in 2010 to address the growing need for advanced CMOS image sensors for applications with demanding requirements that traditional image sensors just can't meet.
During the past three years, Pyxalis has primarily focused on machine vision, industrial, medical, and security applications. They also work on consumer applications such high-end photography as well.

The company designs custom CMOS image sensors for its clients, who then either rely on internal manufacturing or outsource the assembly and test of the sensors. Pyxalis also provides support during the "industrialization phase" between the prototype and manufacturing services.

"We're a pure design house—fabless, but with a strong industrial leaning," explains Philippe Rommeveaux, Pyxalis' CEO. "We have a partnership with TowerJazz, a wafer fab in Israel, but also have designs done or running at other foundries when it makes sense."

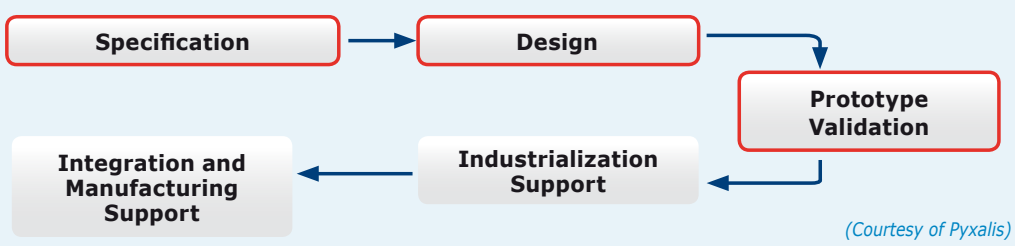
Pyxalis' design portfolio

Rommeveaux describes Pyxalis' core strengths as: the team's extensive industrial experience, in-depth application knowledge, optimized design methodologies, an extensive IP portfolio, as well as significant innovations in pixels, analog design, on-chip image digital control and processing.

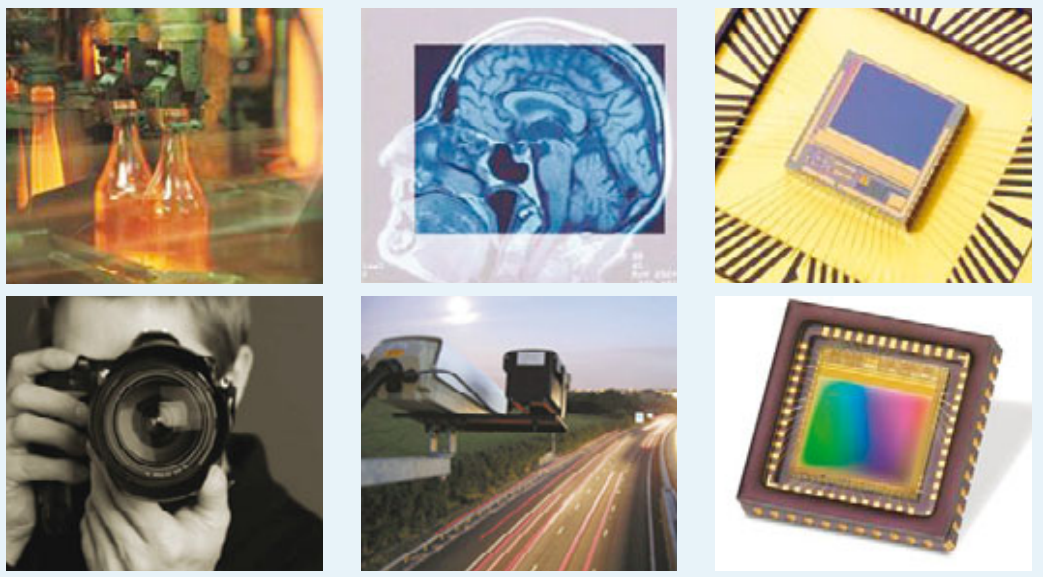
Pyxalis' leading-edge CMOS image sensor design portfolio includes work and intellectual property in the high dynamic range to capture both the very bright and dark portions of images; global shutter or rolling shutter pixels for capturing fast-moving objects; high-speed imaging; low-light imaging and near-infrared (NIR) sensitivity; embedded image processing; very large area image arrays with only one chip per wafer for use in medical and nondestructive testing applications; and high-performance analog-to-digital conversion (ADC) parallel or column architectures with up to 14-bit resolution.

"In terms of technology development, we're focusing on innovative and distinct features at the image sensor levels and, for example, provide a range of high-performance fast ADCs with high resolution—ranging from 8 to 14 bits now, and we'll expand that range in the future," says Rommeveaux.

For image processing, Pyxalis integrates an on-chip very efficient 32-bit microcontroller. "By using the microcontroller to do preprocessing on chip, it means that signal conditioning and calculations—as well as image quality improvements—can be done directly on chip," explains Rommeveaux. "So it makes sense to do part of the work directly on the image sensor, and then use the general system CPU for higher-level calculations."



(Courtesy of Pyxalis)



From the top left to the bottom right : Machine Vision application, Medical radiology, CMOS image sensor at prototype stage, Digital photography, Traffic control camera, Image sensor product for machine vision application (Courtesy of Pyxalis)

Pyxalis uses pixels ranging from 100 to 200µm for medical applications; pixels ranging from 3 to 6µm for machine vision applications; and pixels that are on the order of 2µm pitch for some consumer applications.

"We cover a broad range of pixel sizes, but use many of the same skills and technologies for each of these different applications," Rommeveaux says. "We're able to put a high level of digital integration on Pyxalis' sensors, which also provide desirable levels of analog noise and pixel characteristics. This combination is probably unique."

Minalogic member, FUI grant recipient

Pyxalis is a member of Minalogic, the microelectronics technology hub in Grenoble. "Being a member of Minalogic provides us with a great local network and gives us access to local R&D and partners. Many companies and universities in the area focus on imaging, so this 'Imaging Vallée' is a great location for us," notes Rommeveaux.
The company recently was awarded a grant from the Single Interministerial Fund (FUI), which is partially funded by the French government, to work on developing an image sensor with very low noise to be used in extremely demanding applications like industrial spectroscopy, biology, and astronomy. "This collaborative program will help us diversify into new areas and expand our IP portfolio," says Rommeveaux.

Goals ahead

Pyxalis' goal for the next few years is to continue its growth trajectory and to be a long-term design house. "We currently have 15 employees, and our target is to grow by 2x during the next three to four years," says Rommeveaux. "And we intend to continue innovating in the CMOS image sensor design field, with a strong commitment to quality service and time-to-product."
www.pyxalis.com

REVERSE COSTING

A new microinverter from Power-One

Despite difficult market conditions for solar technologies, there seems to be a budding opportunity for microinverters. Although they represent only a few percent of the global solar inverter market, their market share is growing every year.

Technology analysis

Upon opening the product, two things are evident: one, the microinverter is not filled with resin; and two, there's only a silicone paste between the two housing covers to assure the microinverter's seal.
The microinverter holds one electronic board, with an RF module (IEEE 802.15.4/ZigBee 2.4-GHz) directly soldered to it. The microinverter is powered by two microcontrollers from Texas Instruments and Atmel, and the main power semiconductors are MOSFETs provided by different manufacturers such as Infineon, STMicroelectronics and Fairchild Semiconductor.

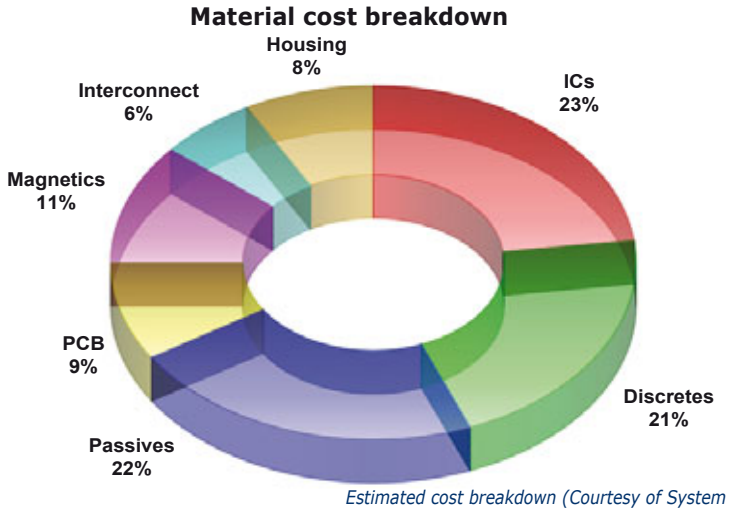
The Power-One microinverter's electronic board (Courtesy of System Plus Consulting)

The product also contains two Cree-manufactured 1200V 5A Silicon Carbide (SiC) Schottky diodes and two 600V 4A SiC Schottky diodes. These components are expensive, but they improve the microinverter's electrical performance.

Power-One's Aurora MICRO-0.25-I is an "electrolyte-free" power converter. This means it uses film capacitors instead of electrolytic capacitors, which increases product lifetime and comes with a 10-year warranty.

Cost analysis

The microinverter's complete bill of materials includes more than 675 electrical and mechanical components; note that microinverters previously analyzed by System Plus Consulting had "only" 400 - 500 parts. Each of the Aurora MICRO-0.25-I's parts is assembled by Power-One in Italy. A full reverse costing report, including a technological analysis of the device and detailed manufacturing costs, is now available.



Estimated cost breakdown (Courtesy of System Plus Consulting)