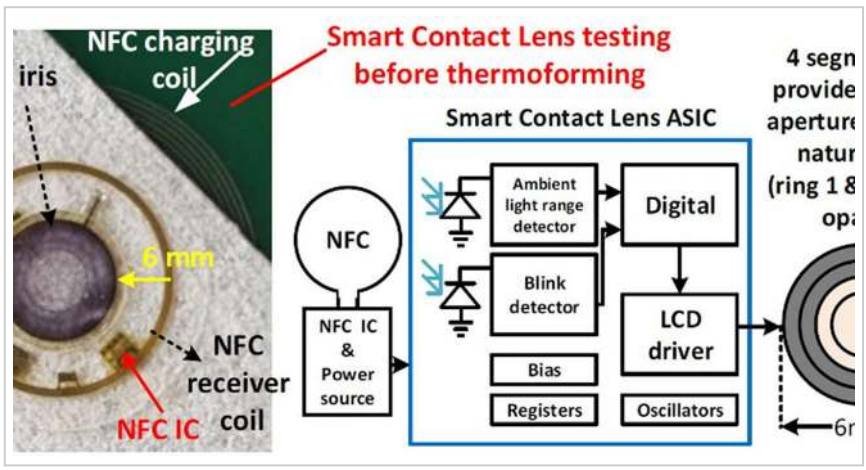
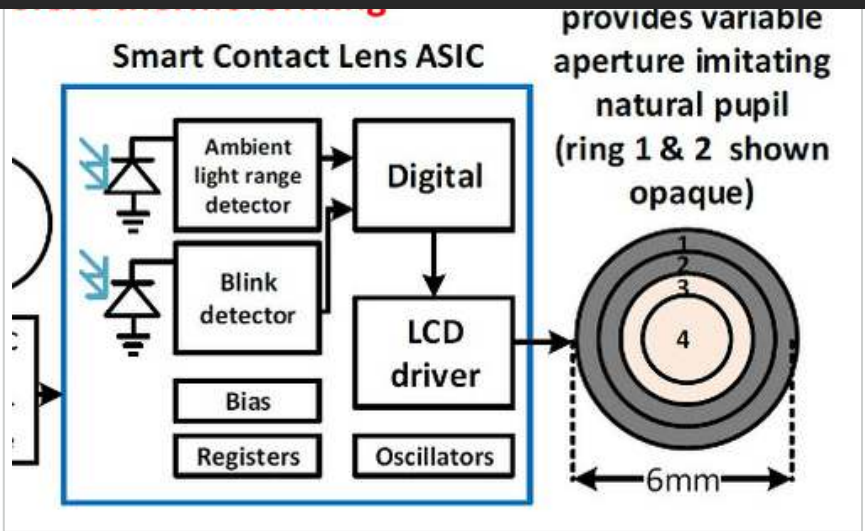
By David Manners 7th September 2020

Imec develops artificial iris

Imec and CMST (an Imec-affiliated research group at Ghent University), together with their partners the Instituto de Investigación Sanitaria Fundación Jiménez Díaz and Imec's Holst Centre have developed an artificial iris embedded in a smart contact lens.





'We are convinced that this artificial iris prototype has all the potential to become a game changer in ophthalmic treatment," says Imec CEOmLuc vsn den hove, "therefore, we have launched an incubation project together with imec.xpand to fully support the team's ambition to mature and validate the technology and support their efforts to commercialize via a strong business case as a spin-off."

The iris aperture is tunable through concentric rings on an integrated liquid crystal display (LCD). The smart contact lens is designed to operate for an entire day thanks to an ultra-low power design, offering a practical solution for people who suffer from human eye iris deficiencies like aniridia, high order aberrations like keratoconus, and light sensitivity or photophobia.

The iris can expand the visual sharpness, decrease optical aberrations and reduce the amount of light entering the eye in a dynamic manner. The prototype will be further developed into a medical device within the framework of the spin-off incubation initiative Azalea Vision, from imec and Ghent University.

The human iris controls the pupil size in response to light, hence regulating the amount of light that reaches the retina. Patients suffering from human eye iris deficiencies like

patients with chronic migraine, and Dry-Eye Syndrome (DES) could use this platform inside a contact lens. The prevalence for these groups adds up to more than 20 million patients.

Current solutions such as contact lenses with a fixed iris, artificial iris implants or glasses with variable transparency, do not entirely mimic the normal functionality of the iris. For example, they do not affect the depth-of-focus, hence impeding a sharp vision. The artificial iris lens is capable of dynamically changing the pupil size, bringing back two levels of functionality of the eye, being light adaptation and expanded depth-of-focus.

Currently the Azalea Vision team is focused on validating this device with patients and volunteers under clinical investigations in order to provide a functional, robust and safe device for diverse eye disorders with light sensitivity and lack of visual sharpness.

“By combining our expertise on miniaturized flexible electronics, low-power ASIC design and hybrid integration, we have demonstrated the capacity to develop a solution for people who suffer from iris deficiencies, higher order aberrations and photophobia, a common yet debilitating symptom seen in many neuro-ophthalmic disorders”, says researcher Professor Andrés Vásquez Quintero, “our smart contact lens can control the level of incoming light mimicking a human iris and offering a potential solution to vision correction – by expanding depth-of-field with automatic control of pupil size. This way, our approach can surpass current solutions to combat human eye iris deficiencies. Its beneficial optical effects will be further clinically validated and developed into a medical device.”

“It is imec’s aim to create added value for the society and bring our research to the market”, said Luc Van den hove, president and CEO of imec. “We are convinced that this

launched an incubation project together with imec.xpand to fully support the team's ambition to mature and validate the technology and support their efforts to commercialize via a strong business case as a spin-off."

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