

Miniaturized Stereoscopic Distal Imaging Sensor for Minimally Invasive Surgery ("MiniSurg")

- new beyond the state-of-the-art Stereoscopic imaging technologies
- next front in Minimally Invasive Surgery

February 2010





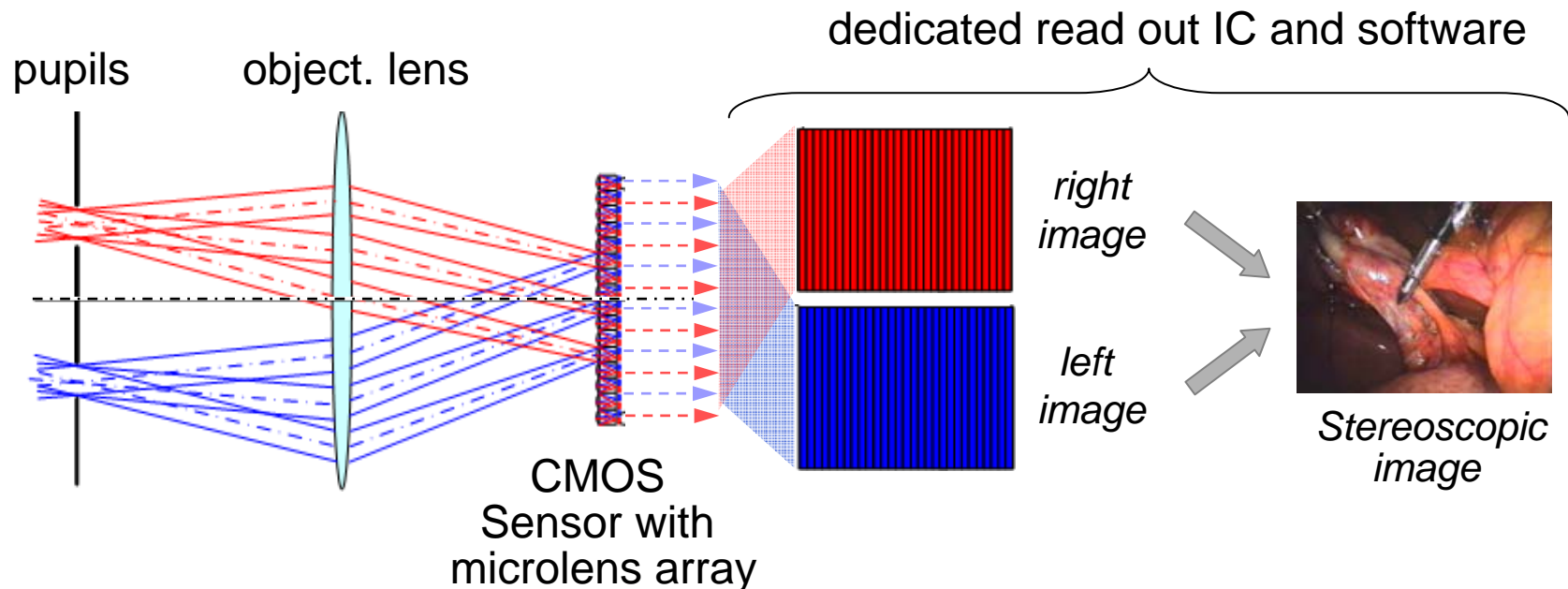
The Consortium

The partners:

- 1. Visionsense Ltd. (“Visionsense”) – Israel
- 2. Interuniversitair Micro-Electronica Centrum vzw, (“IMEC”) – Belgium.
- 3. AWAIBA Consultadoria, Desenvolvimento e Comércio de Componentes Microelectrónicos, Lda (“Awaiba”) – Portugal
- 4. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (“IMS”) – Germany.
- 5. Institut de Recherche contre les Cancers de l'Appareil Digestif (“IRCAD”) - France

Low cost stereoscopic & CMOS based imaging sensor for Minimally Invasive Surgery:

- **small sensor:** 7.5 mm in diagonal
 - **high resolution**
 - **smart microlens design** to provide high quality stereoscopic image
 - **solving, sensitivity, distortions and noise issues**
- } small pixel width : $\sim 2.7\mu$





Technological main challenges

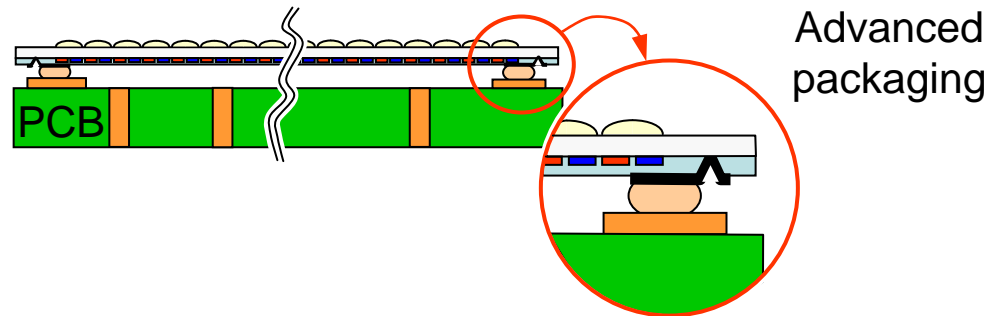
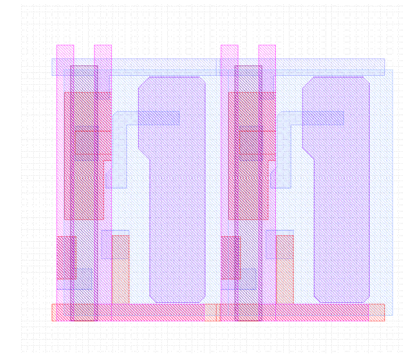
1. Small sensor that provides Stereoscopic Imaging for Minimally Invasive Surgery.
2. CMOS solution will allow various novel packaging as well as low cost solutions.
3. Low cross talk in CMOS $<10\%$.
4. High resolution of 1850 x 925.
5. System and technologies integration.

Major achievements Major objectives (cont.)

(in 6 quarters)

1. Research & Development

- A. System Architecture
- C. Optical performance simulation
- D. Definition of packaging options
- E. Sensor design layout.
- F. 1st Sensor Iteration in FAB.
- G. Initial wafer fabrication.



Future Potential - research challenges – Neurosurgery

- Neurosurgery standard of care practice involves a big craniotomy:
- Minimally Invasive Surgery eliminates the need for big craniotomy
Present 2D endoscopes don't provide the stereoscopic vision the surgeons are used to / need, thus sets high barriers in MIS Neurosurgery:

MIS Neurosurgery demands a miniature stereoscopic microscope

*** The challenge in CMOS Stereoscopic for Neurosurgical imaging sensor application is to achieve miniaturized size sensor (5 mm or less).

Further related research challenges

- To reduce cross talk below 5%.
- To increase resolution for at least 2300 x 1150.
- To miniaturized the camera diagonal into 5 mm or below for neurosurgical purposes.
- To develop robotic micro mechanic tools and imaging sensors to facilitate and efficient Minimally Invasive Surgery operations.
- Integration of the above technologies and methods.

Thanks You

www.Minisurg.org

