

Company Profile

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Harvest Imaging is delivering the services, such as :

- teaching,
- training,
- coaching,
- consulting,

to people, institutes and companies active in the field of digital imaging.

Teaching : public and in-house courses, developed to :

- make the youngsters familiar with solid-state image sensors and digital camera systems,
- bring the experienced engineers up-to-date with the state-of-the-art of the imaging technology.

Public courses : 1 to 5-day courses organized by CEI (www.cei.se), FSRM (www.fsrn.ch), Framos (www.framos.eu).

In-house courses : fully tailored to the needs of the customer and organized by Harvest Imaging.

Training of more experienced imaging engineers by means of the most advanced imaging course available to the industry, this training includes hands-on evaluation as well as measurements of commercially available image sensors and cameras,

Public training : 2- or 3-day training organized by CEI (www.cei.se),

In-house training : fully tailored to the needs of the customer and organized by Harvest Imaging.

Coaching imaging engineers in their daily work :

- specification,
- design,
- evaluation,
- qualification,
- technical review,
- selection of design house,
- selection of fab,
- ...

Consulting to companies and institutes active in solid-state imaging :

- companies and institutes developing solid-state image sensors,
- companies and institutes applying solid-state image sensors in the vision systems.

- Several **Design Reviews** of new image-sensor designs, dedicated for near-IR detection and for visible light,
- **Brainstorm** involving technology and applications of a new imaging technology, including follow-up of action points,
- **Project Leader** of MEDEA+ project : “High performance CCD imaging system intended for HDTV super-slow motion”, introduced at EURO2008 and Olympics 2008,
- **Forensic Investigation** in a murder case,
- Optimization of the yield of **CIS production process**,

- **Study** of the relation between specification and cost price of image sensors,
- **Study** of at the cost breakdown of a custom designed image sensor,
- **Patent** related work in search of patent infringement and sales/acquisition of patents,
- **Expert witness** in patent litigation disputes,
- **IP Generation** to strengthen the customer's patent position,
- **Strategy brainstorm meeting** in search of new digital imaging markets,

- **Advisory Role** during specification, design, lay-out and evaluation of a new high-end image sensor,
- **Presentation** at several technical sales seminars, to high-light a specific imaging technology,
- **Advisory Role** during sensor selection for the development of a new high-end camera and imaging system,
- **Evaluation of quotations** submitted to perform a custom-designed image sensor.

EDUCATION :

- **1977** : MSc degree in Electrical Engineering (Univ. Leuven) : “Hardware for Linear CCD Imagers” under the supervision of prof. Jan van der Spiegel (now at Penn State Univ., Philadelphia),
- **1983** : PhD degree in Electrical Engineering (Univ. Leuven) : “Indium-Tin Oxide and Polyimide Technology for CCD Imagers”, under the supervision of prof. Gilbert Declerck (retired CEO of IMEC, Leuven, Belgium).

INDUSTRIAL CAREER :

- Philips Research Labs, Eindhoven (the Netherlands) :
 - 1983 : member of scientific staff,
 - 1985 : projectleader CCDs for SDTV broadcast,
 - 1988 : projectleader CCDs for HDTV broadcast,
 - 1991 : head of Image Sensor R&D group,
- DALSA Corporation, Eindhoven (the Netherlands) :
 - 2002 : CTO of DALSA Corp.,
 - 2004 : Chief Scientist of DALSA Semiconductors,
- Harvest Imaging, Bree (Belgium) since Oct. 1st, 2007.

MAJOR ACHIEVEMENTS :

- CCD and CMOS on a single chip ('85),
- Two dimensional stitching for large-area imagers ('88),
- Local W-interconnect to strap CCD gates ('89),
- Wafer-size CCD imager with 66 Mpixels ('93),
- Aspect ratio switching by Dynamic Pixel Management ('96),
- Imager with 2.4 μm pixel pitch ('98),
- Imager with 1 M frames/s ('01),
- World record dark current for imagers ('04),
- Multi-slope, multi-ramp column-parallel ADC ('06),
- Image sensor with 0.7 electrons of noise ('11),
- World record low noise : 30 μV ('17).

ACADEMIC CAREER (1) : Since 2001 part-time professor at the Delft University of Technology, Delft (the Netherlands) :

- Completed PhD projects :
 - Martijn Snoeij : “Analog Signal Processing for CMOS Image Sensors”,
 - Xinyang Wang : “Noise in sub-micron CMOS Image Sensor Pixels”,
 - Padmakumar Rao : “Device Physics Aspects of CMOS Image Sensors”,
 - Mukul Sarkar : “Biologically Inspired CMOS Image Sensor”,
 - Yue Chen : “High-Performance CMOS Image Sensor for Radio-Molecular Imaging”,
 - Ning Xie : “Low Noise, Low Power CMOS Image Sensor”,
 - Jiaming Tan : “4T CMOS Active Pixel Sensors under Ionizing Radiation”,
 - Yang Xu : “Fundamental Characteristics of a Pinned-Photodiode CMOS Pixel”.
- PhD students : X. Ge, F. Wang, W. Hu, A. Abarca Prouza, Arnaud Defernez.

ACADEMIC CAREER (2) :

- Completed MSc projects :
 - Ning Xie : “CMOS image sensor in 0.18 μm technology for a micro-digital sun sensor”,
 - Kejia Ruan : “A novel readout architecture for a CMOS linescan image sensor”,
 - Yang Xu : “Charge domain interlacing CMOS image sensor design”,
 - Cheng Ma : “Pixel ADC design for hybrid CMOS image sensors”,
 - Jia Guo : “A DLL based single slope ADC”,
 - Yang Liu : “Design of a HDR CMOS Image Sensor in 110 nm Technology”,
 - Xiaoliang Ge : “Design of a Global Shutter CMOS Image Sensor in 110 nm CMOS Technology”,
 - Qiang Yao : “The design of a 16x16 pixels CMOS image sensor with 0.5 e^- rms noise”,
 - Jiaqi Zhu : “The design of a stitched high dynamic range CMOS particle sensor”,
 - Jules Markenhof : “Integrating a Temperature Sensor into a CMOS Image Sensor”,
 - Ruijun Zjang : “A 1-Mega Pixel HDR and UV Sensitive Image Sensor with Interleaved 14-bit 64Ms/s SAR ADC”,
 - Utsav Jain : “Characteristics of CMOS Image Sensors”.

SCIENTIFIC CAREER (1) :

- Over 190 technical publications and 20 patents, 4 patents pending,
- Author of textbook : "Solid-State Imaging with Charge-Coupled Devices" (1995),
- IEDM Technical Committee member : '88-'89, '95-'96,
- Co-editor of IEEE Transactions on Electron Devices, special issues on Image Sensors : '91, '97, '03, '09,
- General Chair International Image Sensor Workshop '97 (Bruges), '03 (Elmau), '09 (Bergen), '15 (Vaalsbroek),
- Founder *Walter Kosonocky Award*,
- IEEE Distinguished Lecture '98-'99 and '15-'16.

SCIENTIFIC CAREER (2) :

- Award for Best ISSCC Evening Session '98 and '08,
- Technical Program Committee ISSCC from '99 till '10,
- Executive Committee ISSCC from '01 till '10,
- Secretary, vice-chair and chair of the European ISSCC committee from '01 till '06,
- Vice-Chair and Chair of ISSCC International Technical Program Committee for ISSCC2009 and ISSCC2010,
- Organized 10, 1-day ISSCC forums on various imaging topics,
- **IEEE Fellow**, member of SPIE, member editorial board "Photonics Spectra"

SCIENTIFIC CAREER (3) :

- 2008 **Fuji Gold Medal** for research, development and education in the field of solid-state image capturing,
- Editor of textbook (in cooperation with Peter Seitz) : “Single-Photon Imaging”, (2011),
- 2011 **Electronic Imaging Scientist of the Year**,
- 2013 **Exceptional Service Award**, received from the International Image Sensor Society,
- **SEMI Award** for the combination of training and entrepreneurial activities,
- Started in 2013 with a yearly, 2-days Harvest Imaging Forum.

**“There’s More To The Picture
Than Meets The Eye”**

(Neil Young, 1978)



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