harvest imaging

Company Profile

Albert Theuwissen

Harvest Imaging bv
Witte Torenwal 8E, app. 2.1,
3960 Bree (Belgium)
mobile : +32-495-571431
e-mail : albert@harvestimaging.com
www.harvestimaging.com

MISSION

Harvest Imaging is delivering services, such as :

- **Teaching,**
- **Training,**
- **Coaching,**
- **Consulting,**

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

TEACHING

- **Teaching** of public and in-house courses, face-to-face or on-line. These courses are developed to :
  - Make the younsters 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 fast-evolving digital imaging technology.

- **Public courses** : 1- to 5-day courses organized by third parties (CEI : www.cei.se, FSRM : www.fsrm.ch, Framos : www.framos.com).
- **In-house courses** : fully tailored to the needs of the customer and organized by Harvest Imaging.

TRAINING

- **Training of more experienced imaging engineers by means of the most advanced imaging course available to the industry. This training includes hands-on evaluation of a camera as well as measurements of commercially available image sensors.**

- **These trainings are available as an in-class course as well as an on-line course.**

COACHING

- Coaching imaging engineers in their daily work :
  - Specification of sensors and cameras,
  - Design of image sensors,
  - Evaluation of sensors and cameras,
  - Qualification of sensors and cameras,
  - Technical project reviews,
  - Selection of specific design houses,
  - Selection of fab,
  - …

CONSULTING

- **Consulting to companies and institutes active in the field of digital solid-state image capturing :**
  - **Companies and institutes developing solid-state image sensors,**
  - **Companies and institutes applying solid-state image sensors in vision sytems.**

COMPLETED PROJECTS (1)

- Several Design Reviews of new image-sensor designs, dedicated for near-IR detection as well as for visible light detection,
- Brainstorm sessions involving technology and applications of a new imaging technology, including follow-up of action points,
- Project leader of EU-project : “High performance CCD imaging system intended for HDTV super-slow motion”, introduced at EURO2008 and the Olympics 2008,
- Forensic Investigation in a murder case,
- Yield Optimization of a CIS production process,
- Study of the relation between Specification and Cost Price of image sensors,
- Study of the Cost Breakdown of a custom-designed image sensor,
- Participation in Scientific Advisory Boards.

COMPLETED PROJECTS (2)

- **Patent** related work in search of patent infringement and sales/acquisition of existing patents,
- **Expert Witness** in patent litigation disputes,
- **IP Generation** to strenghten 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.

ALBERT THEUWISSEN (1)

- **EDUCATION :**
  - **1977 : MSc degree in Electrical Engineering (Univ. Leuven, Belgium) : "Hardware for Linear CCD Imagers", under supervision of prof. J. van der Spiegel (Em. Prof. Univ. Of Pennsylvania, Philadelphia),**
  - **1983 : PhD degree in Electrical Engineering (Univ. Leuven, Belgium) : "Indium-Tin Oxide and Polyimide Technology for CCD Imagers", under supervision of Em. Prof. G. Declerck (retired CEO of IMEC, Leuven, Belgium),**

- **INDUSTRIAL CAREER :**
  - **Philips Research Labs, Eindhoven (the Netherlands) : 1983 member of the scientific staff, 1985 projectleader CCD for SDTV, 1988 projectleader CCD for HDTV, 1991 head of Image Sensor R&D,**
  - **DALSA Corporation, 2002 CTO of DALSA Corp., 2004 Chief Scientist of DALSA Semiconductors,**
  - **Harvest Imaging, founder and CEO since Oct. 1st, 2007.**

ALBERT THEUWISSEN (2)

- **MAJOR TECHNICAL ACHIEVEMENTS :**
  - CCD and CMOS on a single chip (1985),
  - Two dimensional stitching for large-area imagers (1988),
  - Local W-interconnect to strap CCD gates (1989),
  - Wafer-size CCD imager with 66 Mpixels (1993),
  - Aspect ratio switching by Dynamic Pixel Management (1996),
  - Imager with 2.4 µm pixel pitch (1998),
  - Imager with 1 Mframes/s (2001),
  - World record low dark current for imagers (2004),
  - Multi-slope, multi-ramp column-parallel ADC (2006),
  - Image sensor with 0.7 electrons of noise (2011),
  - World record low noise : 30 µV (2017).

ALBERT THEUWISSEN (3)

- **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",**
    - **Fei Wang : "Linearity Research of a CMOS Image Sensor",**
    - **Accel Nicolas Abarca Prouza : "In-Pixel Temperature Sensors for Dark Current Compensation of a CMOS Image Sensor",**
    - **Xiaoliang Ge : "Temporal Noise Reduction in CMOS Image Sensors".**
  - **PhD students :**
    - **Weihan Hu,**
    - **Jaekyum Lee.**

ALBERT THEUWISSEN (4)

- **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",**
    - **Fjola Osp Snaevarsdottir : "CMOS Image Sensor Design Methodology Applied to Optical Tomography and Neural Networks",**
    - **Periklis Stampoglis : "The Design of a High Speed CMOS Image Sensor".**

ALBERT THEUWISSEN (5)

- **SCIENTIFIC CAREER (1) :**
  - Over 250 technical publications and 24 patents,
  - Author of the textbook : "Solid-State Imaging with Charge-Coupled Devices" (1995),
  - IEDM Technical Committee member : 1988-89, 1995-95, 2020-21, and IEDM Subcommittee Chair in 2022,
  - Co-editor of IEEE Transac. on Electron Devices, special issues on Image Sensors : 1991, 1997, 2003, 2009, 2016,
  - General Chair International Image Sensor Workshop 1997 (Bruges, B), 2003 (Ealmau, Germany), 2009 (Bergen, Norway), 2015 (Vaalsbroek, the Netherlands),
  - Founder of the Walter Kosonocky Award,
  - IEEE Distinguished Lecturer 1998-99 and 2015-16,
  - Award for Best ISSCC Evening Session in 1998 and 2008,
  - ISSCC Technical Program Committee Member from 1999 till 2010, Member ISSCC Exec. Committee from 2001 till 2006, Vice-chair and Chair of the ISSCC International Technical Program Committee for ISSCC2009 and ISSCC2010,
  - Organizer of 10 one-day ISSCC forums on various imaging topics,

ALBERT THEUWISSEN (6)

- **SCIENTIFIC CAREER (2) :**
  - **Co-founder and President of the International Image Sensor Society from 2017 till 2021,**
  - **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 form the International Image Sensor Society,**
  - **2014 : SEMI Award for the combination of training and entrepreneurial activities,**
  - **2019 : Life Fellow IEEE.**

ALBERT THEUWISSEN (7)

- **SCIENTIFIC CAREER (3) :**
  - **Organization of the yearly Harvest Imaging Forum, a 2-days technical event :**
    - **2013 : ADCs for CMOS Image Sensors, by Marcel Pelgrom,**
    - **2014 : Advanced Digital Image Processing, by Majid Rabbani,**
    - **2015 : 3D Imaging with Time-of-Flight, by David Stoppa,**
    - **2016 : Robustness of CMOS Technology and Design, by Harry Veendrick,**
    - **2017 : Low Noise Analog Design, by Christian Enz,**
    - **2018 : Deep Neural Networks for Imaging Applications, by Marian Verhelst, and Data/Image Fusion, by Wilfried Philips,**
    - **2019 : On-chip Feature Extraction, by Makoto Ikeda, and Direct Time-of-Flight, by Matteo Perenzoni.**

"There's More To The Picture Than Meets The Eye"

(Neil Young, 1978)