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SOCIETY FOR INFORMATION DISPLAY

SID-ME Chapter Spring 2006 Meeting and SID-MEC General Meeting

“Electronic Paper, 3D Displays, Flexible Displays and Display Signal Processing”

High Tech Campus Eindhoven, March 9-10, 2006

Philips Research at the High Tech Campus Eindhoven organized the SID-ME Chapter Spring 2006 meeting on “Electronic Paper, 3D Displays, Flexible Displays and Display Signal Processing”. At the High Tech Campus, initiated by Philips, a number of high tech companies cooperate in the development of new technologies in the area of micro-systems, embedded systems, devices, signal processing and nano-technology.

Gerrit Oversluizen, vice-chair of SID-MEC, together with a group of display-expert co-chairs from Philips Research organized the meeting. Peter Wierenga, senior vice president of Philips Research and manager of the lighting and visual experiences program, opened the conference. In his welcome examples of display activities in Philips research and the so-called open innovation approach of the High Tech Campus were addressed. Sharing world quality infrastructure and collaboration with top class external partners from all over the globe is key in this open innovation approach.

The conference comprised 22 oral presentations, the SID-MEC general meeting, the SID-MEC Student Award, a tour of the MiPlaza clean room facilities with new display demonstrations, and a visit to OTB Company. More than 160 people, a SID-MEC record, attended the meeting.

Session 1, March 9, afternoon Electronic Paper: session chair Mark Johnson

Jacques Angelé (Nemoptic, Magny-les-Hameaux, France) talked about the “Development of 5.1-inch High Speed SVGA Bistable BiNem® LCD for Electronic Paper Applications”. A fast, 240 ms, updateable black and white 200 dpi prototype display with a contrast ratio of 6:1 and a brightness of 31% has been realized. Market introduction is scheduled for late 2006. Mike Ryan (NTERA Limited, Dublin, Ireland) presented

“Experience the brighter world of visual DNA™”. Advantages of the discussed nanochromics technology include high brightness, high resolution, and paper like appearance. NTERA cooperates with Seiko Epson on the development of inkjet printing of materials and active matrix prototypes. When questioned it was stated that the stability of the viologen material is no issue; a UV blocking layer is applied.

Rob Hayes (*Liquavista, Eindhoven, The Netherlands*) discussed “Video-speed electronic paper based on electrowetting”. It was explained that the electro-wetting display technology is a fast switching bright reflective option for very light and energy efficient displays. The technology combines a paper like appearance with a contrast of 60% (B/W) and video speed. Some first samples of small black and white and monochrome colour display were shown.

Alex Henzen (*Irex, Eindhoven, The Netherlands*) gave a presentation entitled “A new generation of e-readers takes off”. Technical advances have resulted in improved e-readers with more greyscale and a reflectivity greater than 35%. Also enablers such as content and connectivity progress continuously. An illustrative example is the “iLiad” an e-reader recently introduced by iRex that will be applied in an electronic newspaper try out by the Belgium newspaper publisher “de Tijd”.

Kimiya Takeshita (*Mitsubishi Chemical, Japan*) discussed “A Computer Simulation and material for Electrophoretic Displays”. B/W-displays with a high reflectivity of 55% and a high contrast ratio of over 200 have been developed using a model with hydrodynamic and electrostatic interactions as well as clever chemistry for electrophoretic suspensions.

Session 2, March 9, afternoon 3D Displays: session chair Marc op de Beeck

Klaus Hopf (*Fraunhofer Institute for Telecommunications, Berlin, Germany*) talked about “Novel autostereoscopic displays with user interaction”. Using a quick eye tracker and repositioning of a lens plate, a display technology has been developed that provides free positioning of a single viewer within an opening angle of 60 degrees. Also a control option can be integrated that allows manipulation of the displayed 3D-objects with hand gestures.

William Hopewell (*NewSight Corporation, New York, USA*) discussed “Optimisation of wavelength selective parallax barrier plates”. It was explained how the structure of the applied wavelength selective filter can be optimised with regard to the intended application considering the trade-offs between resolution, number of views and brightness.

Paul May (*Ocuity Limited, Oxfordshire, UK*) reviewed the “Design of wide viewing freedom flat panel 2D/3D displays”. It was

stated that the mass-market opportunity for 3D displays requires a high quality 2D performance with 3D function. A display architecture with polarisation-activated micro-lenses delivers advantages, particularly for minimizing nominal viewing distances in high pixel density panels.

Oscar Willemsen (*Philips Research, Eindhoven, The Netherlands*) presented “Uniformity improvements through fractional view systems”. The design of a 4 inch 5 view lenticular based 2D/3D display for mobile applications was discussed. It was shown that the well-known issue of dark banding under large viewing angles is resolved by the introduction of fractional viewing, where the pixel pitch is a fraction of the lens array pitch.

Tibor Balogh (*Holografika Kft, Budapest, Hungary*) explained “True 3D displaying with the Holovizio system”. Fundamentally, true 3D displaying systems must use more pixels or higher speed components than current 2D displays. The applied technology uses a specially arranged array of optical modules and a holographic screen. Performance results were described for the 10M-pixel desktop and the 72 inch 50M pixel display that are currently on the market.

Session 3 March 9, afternoon SID-ME Chapter Student Award

This year's award was granted to Tom Bert ((*TFCG Microsystems group, Ghent University, Belgium*) for his contribution to a “Model for the properties and behaviour of electronic paper”. A model has been developed that can simulate the time and voltage dependence of the optical and electrical properties of electrophoretic image displays. With this model the correspondence between display characteristics and parameters like viscosity, particle density and particle mobility can be explored. The presentation was very well received and stimulated a lively discussion. Afterwards many people from audience congratulated the award winner with his performance.



The 2006 SID-ME Chapter Student Award winner Tom Bert (left) and Prof. Norbert Fruehauf (right) from the award committee.

Conference dinner

The SID-MEC conference dinner event took place in restaurant “The Lounge” at the Strip, the central conference facility of the High Tech Campus. Following SID-MEC tradition the dinner was tasteful and beautifully arranged in a setting enabling a strengthening of existing relations and the making new acquaintances. During dinner a cartoon artist sketched his views of the networking and the images were displayed on a large TV. This activity aroused much speculation on possible differences between the image perception and reality. Clearly, a subject of natural interest for most display workers.



Patrick Vandenberghe (new SID-MEC chair, left) and Herbert De Smet (SID-MEC secretary, middle), and Jutta Rasp (SID-MEC treasurer, right). In the background the cartoon artist is seen and the inset shows the cartoon of the new SID-MEC chair.

Session 4, March 10, morning Flexible Displays: session chair Eliav Haskal

Nicholas Colanery (Flexible Display Center, Arizona State University, Phoenix, USA) presented “TFT Backplanes on Flexible Foils: A Status Report”. At the FDC a-Si TFT matrices are made on a 6-inch wafer pilot line at process temperatures sufficiently low for plastic substrates. In recent months carrier mobility has improved markedly. A main issue in current devices, made at 170 °C, is the threshold instability associated with a high trapping density in the low temperature gate nitride.

Francois Templier (CEA-LETI, Grenoble, France) talked about “Inorganic LTPS TFTs on metal for flexible AM-OLED displays”. Four level LTPS TFT's with properties comparable to those made on a conventional glass substrate are made on stainless steel foil using plasma deposited SiO₂ as a thick insulator. Due to the allowance for high process temperatures, 450 °C or higher, high performance devices can be made. These maintain their good characteristics while bended.

Gerwin Gelinck (Polymer Vision, Eindhoven, The Netherlands) gave a presentation on “Organic transistors and their application in active-matrix displays”. Rollable active matrix electronic displays are suited to solve the mobile display size problem. Using

a flexible electrophoretic display laminated on top of an organic TFT matrix on a flexible substrate the world's first rollable display device, the Readius™, was realized.

Dirk J. Broer (Technical University Eindhoven, The Netherlands) gave a lecture on “Polymers behind the scenes: on how structured polymers enhance your displays”. Many examples were discussed. For instance, polymers have become essential as polarizers in LCD's. Control of the order parameter provides ultra thin high contrast polymers. More recent developments that were also explained include photo-embossed mirrors for reflective displays, polymerisation induced diffusion for paintable displays, and photo-enforced stratification for inkjet printed LCD's.

SID-MEC General Meeting

Norbert Fruehauf (SID-MEC director) chaired the SID-MEC general meeting, where the status of the chapter was reported, and the election of the officers of the SID-ME chapter for the coming period took place. Kent Skarp, the abdicating Chair, was thanked for his contribution to the society. Patrick Vandenberghe (Barco) was the nominated new chair. The other officers volunteered to run for another term, and the proposed candidates were elected unanimously. The new Chapter committee is now composed as follows: Patrick Vandenberghe (Chair), Gerrit Oversluizen (Vice-Chair), Herbert De Smet (Secretary), Jutta Rasp (Treasurer).

Kent Skarp also abdicated from the SID-MEC Student Award Committee and his replacement by Herbert De Smet was approved. The SID-MEC Student Award Committee now consists of Norbert Fruehauf, Herbert De Smet, and Gerrit Oversluizen.

SID-MEC membership has appeared to increase slightly, while some Asian chapters, Korea and China, show a substantial growth. The February '06 SID-MEC membership number was 617, and the SID-MEC chapter remains the second largest chapter. This SID-MEC'06 spring meeting scored a record of over 160 attendants. The consistently high attendance at the biannual SID-MEC spring and fall meetings indicates a continued active participation by the members.

The treasurer's report shows financial stability with a cash account of 24988.65 Euro. The healthy financial condition results from sound management and companies and universities organizing the chapter meetings thus saving cost.

Also the upcoming meetings were announced. The Fall'06 SID-MEC meeting is on October 9 and 10 at the Fraunhofer Institute for Applied Polymer Research in Potsdam, Germany. Further, a joint meeting of the Int.Thin-Film-Transistor '07 Conference and SID-MEC Spring'07 is planned at the end of January'07 in Rome; see also below.

Session 5, March 10, morning Display Signal Processing: session chair Michiel Klompenhouwer

Richard Salmon (BBC, Tadworth, UK) discussed “The impact of new display technologies on HDTV broadcasting in Europe”. LCD and Plasma are fuelling a massive increase in the average TV screen size. Larger screen sizes require higher resolution and this is the trigger for the introduction of HDTV services, while the availability of HD DVD and the coming world cup provide a push from the content side. An overview of the HDTV launch status in Europe was presented. Also remaining issues with the new technologies and the problem of finding of an adequate replacement for the CRT reference screen were addressed.

Petri Nenonen (Nokia, Tampere, Finland) presented a talk on “Mobile Display Signal Processing). The mobile display size is small, yet high quality images are expected. Specific signal processing is obligatory for viewing content, while enhancements of colour, contrast, sharpness and motion bring added value. The demands for the algorithms involve optimisation of quality, power, implementation and cost considering the complete chain from encoding to viewing.

Erno Langendijk (Philips Research, Eindhoven, The Netherlands) discussed “Design consideration of field sequential displays”. Several architectures were evaluated with respect to resolution, gamut, and colour breakup. It was concluded that full colour sequential displays with no colour filter suffer from colour breakup and need technological breakthroughs, while a two colour sequential two filter system also offers considerable front of screen improvement with limited colour breakup, and using existing technology.

Gerben Hekstra (Philips Research, Eindhoven, The Netherlands) talked about “Display system architecture for LCD-TV”. A LCD-TV with better motion fidelity, higher dynamic contrast and wider colour gamut results from considering all components of the display including backlight, driving and video processing.

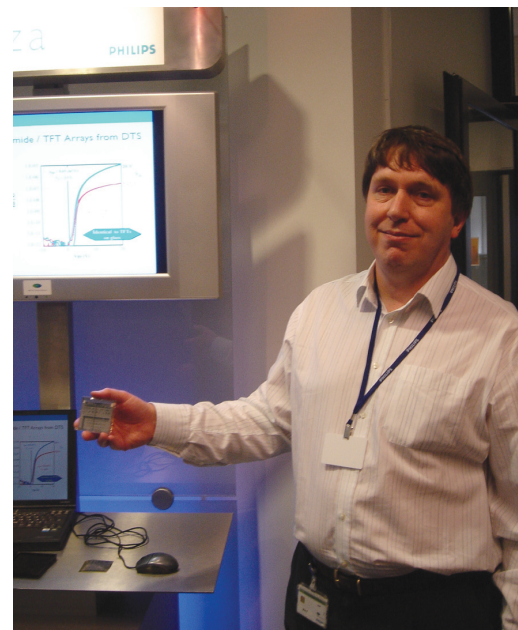
Pierre Boher (ELDIM, Herouville St Claire, France) gave a talk on “Precise measurement of the light emission temporal behaviour of flat panel displays”. The LC's transient response is an important characteristic for TV performance. A new ELDIM instrument called 'Imaging Optiscope' was explained that manages measurement and analysis of the temporal behaviour with a maximum of accuracy.

MiPlaza, display demonstrators and OTB Company

Friday afternoon started with an introduction by *Gerjan van de Walle* and *Hans Naus (Philips Research, Eindhoven, The Netherlands)* on “MiPlaza and open innovation”. Microsystems Plaza (MiPlaza), part of Philips Research, provides shared use-

and access to state-of-the-art industrial research infrastructure and services to enable the execution of research and development programs of organizations that are leading in innovation. Access to world-class clean room facilities (2650 m², class 100-10000), test & measurement labs, support in the design and realization of electronic hard- and software prototypes, services for thin-film process- and device development, materials analysis and reliability testing are offered by a staff of 250 engineers and experts. Next to the research groups of Philips also other organizations are supported in their research programs. As an example in the domain of new display principles, the role of MiPlaza for the development of a rollable display was presented.

Next a lab tour around MiPlaza, several display demonstrators and sponsor booths from OTB and Orgatronics was organized. The demonstrations included: a 16 gray-level rollable display from Polymer Vision, the Iliad e-reader from IRex, e-wetting displays from Liquavista, 3D displays from 3D Solutions, and a spectrum sequential LCD and an EPLaR active matrix on a plastic substrate, both from Philips Research.



Ian French explaining the EPLaR (Electronics on Plastics by Laser Release) processing.

Finally there was an opportunity to visit the PLED display manufacturing line at OTB Company in Veldhoven. Here the world first fully automated in line PLED production system was demonstrated. This system combines dedicated vacuum transport equipment with optimized processes that include inkjet printing of the polymers, fast cathode deposition and thin film encapsulation. The need for clean room operation is eliminated. The enthusiast crew of developers provided an inspiring example of a high tech industry with a bright future in a knowledge economy.



The inline PLED display manufacturing system at OTB Company.

Closing remarks

This SID-ME chapter meeting was the best attended ever. The interest for, and the quality of, the display research demonstrated at this SID-MEC both indicate the strength of the current and future display activities at Philips Research, the High Tech Campus and in Europe. It was a successful meeting that stimulated new contacts and new business!

Gerrit Oversluizen



SOCIETY FOR INFORMATION DISPLAY

Coming Events:

SID MEC Fall'06 Meeting

9-10 October 2006,

**Fraunhofer Institute for Applied Polymer Research, Potsdam,
Germany**

**Special Topics: New Material Developments for
OLEDs, New Materials for LCD, New Driving
Technologies for Display Development.**

**Visit the website for latest information: access via
<http://www.iap.fraunhofer.de/SID/>.**

International TFT Conference'07

In conjunction with
SID MEC '07 Spring Meeting

25-26 January 2007,

CNR Headquarters, Rome, Italy

Topics: LTPS TFT ,Organic TFT, Amorphous silicon TFT, TFT circuits, Display and other system based on TFTs, AM backplane for AMOLED, TFTs on flexible substrate.

**Visit the website for latest information: access via
<http://www.cnr.it>.**

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SID payment.

The SID annual membership fee amounts US\$ 75. Please note that the membership is now a rolling membership, which means that it runs 12 months from the month in which the payment was made. For more information see the SID website www.sid.org.

We encourage our members to pay directly to SID-HQ in the USA, but if they want to pay to the ME-Chapter directly the annual fee should be EUR 70 **with all bank fees covered by the member !**

Please note that due to the change in the US dollar/Euro exchange rate SID-MEC has re-evaluated the membership fee. In case of direct payment to the SID-ME Chapter the payment in EURO should be done to

Account no.: 206 020 1104

at: Berliner Sparkasse, Berlin, Germany

Bank code: BLZ 100 500 00

Account name: Frank Rochow, SID-ME

Please indicate your name on the remittance papers.

The Newsletter.

If you want to place an article in the Newsletter, which is interesting for the European display society, please send it to:

G. Oversluizen, fax: +31 40 274 6321,

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SID-ME Chapter Student Award

Call for SID-ME Chapter Student Award

The SID-ME Chapter Student Award is given for an outstanding scientific or technical achievement in, or contribution to, research on information display. The applicant is a student at a university/institute in the SID-ME region. The award amounts to 1500 Euro, with the obligation to present the contribution at the SID-MEC meeting where the award is presented. The conference fee is waived. The applicant must be a member of SID. For information on student membership, see below. The application deadline for the Spring'07 meeting in Rome is December 1, 2006.

Application for SID-ME Chapter Student Award

Name: _____

SID Membership No.: _____

Institute/University: _____

Address: _____

Title of contribution: _____

Abstract (100- 150 words): _____

References (SID-ME member): _____

The application should be submitted to the award committee consisting of:

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SID Student Membership:

At <http://www.sid.org> you find information on SID student membership. Note the favourable offer of \$5.00 per year for student members.