Free Student Membership

Currently, Student Membership of the UK & Ireland Chapter is free for all full-time students who are registered for a degree in the UK & Ireland. Benefits include receiving SID Journal and Information Display Magazine as well as receiving information on local and international SID meetings and conferences. Student members are eligible for student rates at all SID meetings and conferences.

It is planned to have details and application forms available in relevant university departments. Details can also be obtained from the Membership Secretary, Pat Crofts.

Accommodation for EuroDisplay2005

Online registration for accommodation for EuroDisplay 2005 is now closed. Applications can be made by email to conventions@conventionedinburgh.com. Help with travelling and accommodation can also be obtained at www.expedia.co.uk.

All information for EuroDisplay 2005 can be found at the SID website www.sid.org.

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CONFERENCE PROGRAMME

Date	Conference	Contact
19-22 Sep 2005	**EuroDisplay 2005, Edinburgh, Scotland**	www.sid.org
6-7 Oct 2005	12th Annual Symposium on Vehicle Displays, Dearborn, Michigan, USA	www.sid.org
10-14 Oct 2005	Advanced Display Technologies, Crimea, Ukraine	www.sid.org
24-27 Oct 2005	Americas Display Engineering & Applications Conference, Portland, USA	www.sid.org
7-11 Nov 2005	13th Color Imaging Conference 2005, Scottsdale, AZ, USA	www.sid.org
6-9 Dec 2005	IDW/Asia Display '05, Takamatsu, Japan	www.sid.org
5-6 Apr 2006	SID UK & Ireland Chapter AGM and two-day technical meeting, Knebworth Parks, Stevenage, UK	J_and_K_Mansell@compuserve.com
11-13 Apr 2006	British Liquid Crystal Society Annual Conference, York, UK	www.-g.eng.cam.ac.uk/photonics/blcs
4-9 Jun 2006	SID 2006, San Francisco, USA Call for papers	www.sid.org

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SOCIETY FOR INFORMATION DISPLAY
UK & IRELAND CHAPTER

Number 40 **NEWSLETTER** August 2005

A WORD FROM THE CHAIRMAN

Ian Sage

Hopefully it will not come as a surprise to many of you, that EuroDisplay 2005 is almost upon us. This is Europe's foremost arena for presenting the latest developments in display science and technology, and is returning to the UK for the first time since 1996. If you have not already done so, now is the time to make your booking for the meeting, to be held in Edinburgh from the 19th to 22nd of September.

We confidently expect EuroDisplay 2005 to be the biggest and best yet and it will benefit from being held in the splendid facilities of the Edinburgh International Conference Centre. If you have visited the EICC previously, you will know that the lecture rooms and other meeting facilities are all of an extremely high standard in terms of comfort and convenience as well as practical aspects of layout and audio-visual quality.

Ian Sage

One of the great plusses of the EICC is the range and flexibility of the rooms and theatres available under one roof, which allows us to accommodate an excellent programme of plenary and keynote presentations – headed by a plenary presentation by Professor Sir Richard Friend – and then reconfigure the space into smaller venues for the principal technical sessions. Although our intention was originally to run the conference with two parallel sessions, the number and quality of the papers submitted has led us to expand the meeting to a third parallel session for much of the conference duration. All of the other traditional features of an SID conference, such as author interviews and a very high-quality set of poster submissions are also very well catered for, while the open areas of the conference centre provide plenty of space for informal discussions, and a large hall will accommodate the accompanying exhibition.

Edinburgh is a vibrant city which boasts everything you would expect of a national capital, while retaining its own style and atmosphere. It is also a city with a human scale; most points within the heart of the city, including the conference centre, hotels, shopping facilities and an astonishing range of restaurants and other eating places are within walking distance of one another, making Edinburgh an ideal place to unwind after the technical sessions, or to continue business into the evening. One thing you should not miss is the conference special event, which will be a banquet held in Edinburgh Castle. Delegates will be able to enjoy tours of the castle, including the state rooms, the Scottish crown jewels and the stone of destiny, as well as a programme of entertainment. The organising committee are particularly grateful for generous sponsorship from Sharp to support this special event.

The real success of any conference comes from the active participation of the delegates. I firmly believe that all scientists and engineers interested in displays will find a stimulating and exciting programme at EuroDisplay 2005 and cordially invite you to join us in Edinburgh in September.

CONTENTS

OPTICS OF DISPLAYS

Two-day meeting at Knebworth Park, 6 & 7 April 2005

Report by Grant Bourhill

The meeting, held in the Conference Barns at Knebworth Park, was attended by about 80 delegates and the first day began with the Chapter AGM.

Following the AGM, the focus for the technical session on the first day was LCDs, with the first presentation being given by Klaus Wammes from Advis. He described his company's fluorescent light sources for LCD backlights, highlighting the performance differences between fluorescent backlights and LED backlights. Klaus described that fluorescent sources still outperform in terms of dollars per lumen. Their latest fluorescent tubes have outside diameters as small as 300µm and some offer 92% PAL colour Gamut.

This was followed by a presentation by Kai Wang from UCL. Kai described his work with David Selviah designing novel holographic backlights. The motivation was to realise an LCD backlight that allowed the removal of the LCD colour filters, thus increasing illumination efficiency and reducing LCD cost. Further, the backlight would be designed to nominally collimate the light incident on the LCD, thus improving display contrast. Kai described his modelling results with a grating backlight coupled with a microlens array to collimate the diffracted first order and direct the collimated light through the correct LCD sub-pixel. The efficiency of the backlight is reduced due to a reflected first-order component. Kai described modelling results of backlight designs aimed at recapturing and reusing some of the reflected first-order component.

Steve Elston from Oxford University gave the next presentation. He summarised the optical performance of TN and STN modes and further described improved viewing-angle properties of IPS and MVA modes. Steve then overviewed methods to model more complex LCDs such as those containing surface relief structures.

Karl Skjonnemand from Merck gave an excellent overview of reactive mesogen optical elements for LCD-TVs. Karl described the basic structure of reactive mesogens. He then described the potentially low-cost manufacturing route and highlighted the flexibility for fabricating a wide range of optical geometries. For LCTVs, Karl described how reactive mesogens can compensate non-ideal crossed polarizers and wide view angle LC modes.

The first talk after lunch was from Adrian Geisow from HP Labs. He described the fabrication route to a 2 inch prototype full plastic printed bistable display. Currently bistability is achieved using plastic pillars with a pitch of approximately 1.5µm. Niall Gallen from Screen Technology described the company's tiling technology using an array of 15 inch LCD panels as input. The 5x5 pixel arrays are homogenised at the output by an injection-moulded channel. Niall described results in achieving angular independent colour and luminance across tiled boundaries.

Ian Underwood from Microemissive Displays described their activity in developing p-OLED based microdisplays for high-volume supply to consumer products such as electronic viewfinders. Ian summarised the advantages of p-OLEDs in this market, including their self-emissive (rather than backlit) nature. He then overviewed the (sometimes conflicting) factors that need to be considered to take the technology to high-volume mass manufacture.

Steven Wedge described his project with Bill Barnes at Exeter University on improving light efficiency of OLEDs using wavelength scale structures. Theoretical and experimental results were presented highlighting the significant improvements that can be made by reducing the loss inherent in conventional planar OLEDs due to surface plasmon polaritons.

The penultimate speaker on the first day was Colin Roscoe from Abertay University who described his work with Colin Cartwright on the human factors issues for medical displays. He described the importance of the display luminance minimum and maximum values in the efficiency of the grey-scale mapping. He further described the importance of the ambient illumination in display perception.

A busy first day was concluded by an excellent talk by Hans Hoffman of the European Broadcasting Union. Hans summarised image-quality issues associated with changing from interlaced SDTV broadcast to progressive HDTV broadcast. Hans received the SID best paper award for this presentation.

The 20th Anniversary of the formation of the Chapter was celebrated with a dinner which was held at the Cromwell Hotel, Stevenage in the evening. After the dinner, Tony Lowe gave a brief address.

The technical focus for the morning of the second day was projection displays. Tim Wilkinson from Cambridge University discussed the holographic projection system being developed commercially by Light Blue Optics. Currently an F-LCOS microdisplay is used in co-operation with a new fast hologram algorithm that Tim stated could easily be implemented in hardware. The resulting display image is less than 50% brightness due to hologram symmetry and the non-perfect phase hologram resulting in zero order loss. A stated attraction for this technology is the move away from the resulting images being composed of a fixed number of pixel elements.

Adrian Travis next described the wedge projection system from Cambridge FPD. He described the principle of the system as both a display and an imager. A 50 inch, 600 nit projection system has recently been shipped.

Continued on next page

BEN STURGEON AWARD 2005

The Ben Sturgeon Award for 2005 has been won by Graham Woodgate. Graham read physics at Bristol University achieving a first class honours degree in 1987. From here Graham went on to Reading University where he did an MSc in Applied & Modern Optics gaining a distinction and picking up the Pilkington Prize for top student in 1988.

Graham began his career as an Optical Engineer at Crosfield Electronics Ltd working on the development of a novel high productivity 6000 dpi scanner for the printing industry.

Graham Woodgate

After three years, he joined the newly set up Sharp Laboratories of Europe (SLE) in Oxford as Principal Researcher within the Imaging Optics Team. This very productive period saw Graham make a major contribution to Sharp's 3D imaging portfolio. This included the invention and development of several autostereoscopic 3D displays and led to Sharp producing the world's first switchable 2D/3D display cell phone. Sharp has gone on to sell 3 million units and the technology is now in laptops and LCD monitor products. In 1998, Graham was promoted to Manager of the Novel Projector Technology Group where he led the development of several novel technologies for LCD projectors.

He was responsible for around 20 granted US patents during his tenure at SLE.

In 2001 with Jonathan Harrold, he founded Ocuity Ltd in Oxford. Originally the company provided high-value technical consultancy services in optical and electronic projects for the electronic displays and fibre-optic telecommunications industries. After a short period Graham and Jonathan began their own internal research programme into new types of optical systems. This led to the invention and demonstration of a new class of optical architectures suitable for flat-panel displays. This new architecture is called *Polarisation Activated Microlens*™. This technology may be used for brightness enhancement which is particularly important for OLED and transflective displays as well as to produce very high quality, high efficiency, low cost switchable 2D/3D displays. This technology has been protected by a portfolio of 12 patents, the fundamental one of which has now been granted. The technology has recently been licensed to a major manufacturer in Asia to be developed for production. In addition, the work has also been published at the IDW03 and in IDW04 where it was the recipient of the *SID Outstanding Paper Award.*

Continuation of report on Optics of Displays

Ryan West from CRLO Displays spoke about the company's F-LCOS single microdisplay RPTV. He described LED illuminated F-LCOS systems where illumination modulation reduces sample-hold artefacts at the expense of brightness.

The last talk of the morning session was from Sharp. They described approaches to reduce the size and improve the efficiency of polarisation conversion optical systems within LCD projectors. One system resulted in almost an order of magnitude size reduction while offering improved polarisation conversion efficiency and thus increased brightness.

The first talk of the afternoon session was given by Jyrki Kimmel of Nokia. Jyrki presented an excellent overview of the display trends in mobile devices. The mobile market is still expanding and it is expected that there will be divergence in platform function going forward. LCDs are an obstinate incumbent in the mobile market. OLEDS may offer advantages in video quality and thickness, but display readability is currently inadequate in a bright environment. Flexible displays currently do not appear to have the resolution or temperature and humidity endurance for mobile applications. Autostereoscopic 3D displays open new opportunities for applications, without radically changing existing phone technology, but lack of content is currently hindering widespread adoption.

The next speaker was Norman Bardsley from Display Search who gave an excellent overview of the current status of display components.

Nicholas Walker from Microsharp discussed a more cost effective method to manufacture his company's nominally polarisation preserving diffusers. These diffusers operate through both a volume refractive index variation as well as surface relief structure.

Colin Cameron from QinetiQ described their multi-user multi-projector large area 3D technology. The target applications for this technology are automotive design and oil and gas exploration. Colin was questioned on uniformity of colour and luminance from one projector to another. In the following talk,

Phil Surman from de Montfort University described their multi-user tracked autostereoscopic 3D-TV display. The key to this technology is the steerable illumination of the stereo pair. In a similar way to the QinetiQ system, brightness and colour uniformity were discussed.

The final talk of the meeting was from Peter Vukusic from Exeter University who spoke on photonic systems in nature. This talk was presented with the SID Best Paper award for the second day of the technical meeting.