

pmTUC RESEARCH NEWS

pmTUC at the world-wide leading trade fair drupa in Düsseldorf

drupa is known as the most important trade fair of the print and media industry world-wide. Since 1951, drupa takes place in Düsseldorf every 3 to 5 years. This year, around 315,000 visitors from more than 130 different nations came to see this exceptional trade fair with 1,850 exhibitors. The Institute for Print and Media Technology (pmTUC) was among this impressive range of companies and representatives of the printing industry. At the booth of Windmüller und Hölscher (W&H) pmTUC presented current research results from 3 to 16 May 2012.



Especially the printed loudspeakers and solar tree – specifically designed for drupa – captured public attention and showed an astonished crowd. More than 50 electricity-producing solar cells in shape of leaves were attached to the tree. Because of its impressive appearance, the solar tree attracted many interested visitors who could direct their questions to

the institute's competent assistants present at the booth. The loudspeakers were installed in a sound cube in which curious visitors could walk in to hear the sounds of the institute's new image video. Besides these highlights, other research results like the printed humidity sensor and printed circuits were also exhibited. Printed electroluminescent lamps and various greeting cards with printed functions completed the manifold exhibition portfolio of pmTUC.

Next to prominent visitors who came to see pmTUC's booth like the mayor of Düsseldorf, Dirk Elbers, and the president of Messe Düsseldorf, Werner Matthias Dornscheidt, were also many professional visitors, students and numerous journalists from around the globe. All of them enjoyed the presentation of the current developments by pmTUC. The media cover-

age prior to the start of drupa caused an immense interest in pmTUC's research work, even beyond borders: A guest visitor from the Netherlands, for instance, visited the booth and presented an article from the biggest net newspaper nu.nl about printed loudspeakers.



On May 8th, a special occasion took place: students from pmTUC visited the booth of their home university for lively discussions with members of the institute and several alumni. With more than 100 employees on site, W&H staff members also visited the booth together with their partners.

All in all, drupa was and always will be a fantastic experience for everyone interested in the world and research in print and media technology. pmTUC is proud to have been part of this outstanding trade fair. *MI*



Printed loudspeakers on paper

At drupa 2012, the first printed loudspeakers on paper were presented to the public, leading to an amazing response from industry representatives, the press, students and other interested parties. The printed paper speakers are one of the current R&D topics at the pmTUC and were developed within the project "Plastic Acoustics (PACU)", funded by the German Federal Ministry of Education and Research (BMBF). The main goal of the research project is to develop printed acoustic systems with sufficient robustness and performance in order to establish the basis for ultra-flat, flexible and low-cost acoustic systems for the application on curved surfaces with distribut-



ed single components. The joint research project aims at the cost-effective production of flexible acoustic systems based on organic functional materials with special electric and piezo-electric characteristics. Mass-printing technologies are used for production. Our project partners are Robert Bosch GmbH, Heraeus Clevios GmbH, X-Spex GmbH and Fraunhofer ENAS.

The main focus is on piezoelectric speakers. First samples could be fully printed using flexography. Many challenges have to be met, such as the optimisation of required materials and the printing process as well as acoustical and electrical requirements. The approach to print loudspeakers on standard paper substrate opens new application fields, as highly flexible, very thin, low-cost acoustic systems can be produced on cheap and eco-friendly paper substrate. Another important goal is the integration of speakers into systems, especially into other printed components, like circuitries, solar cells, sensors, batteries and displays. The combination of components allows for a variety of novel multifunctional systems. Integration is the major focus of our current project FLEXIBILTiy, which aims at significantly advancing the competitiveness of Europe in the area of multifunctional, ultra-lightweight, ultra-thin and bendable OLAE (Organic Large Area Electronics) systems. *MB*

STUDENT NEWS

The Indian food experience

When talking about food, the six of us have opposing opinions. Coming as double degree students from Chemnitz University in Germany, one half of us likes the Indian food a lot and is open to try new and exotic kinds of food. The other half eats Indian food but still prefers German dishes. And there's me, Juliane, who has to limit herself to a small range of dishes because of the dominating spiciness in all meals.

To cook for ourselves is not an issue since we do not have any cooking equipment nor are there any kitchens in the hostels. Therefore, we have to choose between two big food courts and various messes, where one dish costs between 35-100 rupees (50 cents – 1.50 Euros) or a restaurant, where you can get a meal between 95-300 rupees (1.50 – 4.60 Euros) including soup, starter, main dish and a drink.

Traditionally, the people in India do not use any cutlery. They only eat with their right hand for sanitary reasons. If you are not used to eating with hands, you can ask for cutlery. Although most restaurants will provide some, do not expect any knives. For us, the spoon got a new significance. Thinking of beer or other alcoholic drinks, you better banish that. They are permitted but viewed as taboo. In general, Indians tend to enjoy their meals with the result that it can last for one or two hours.

When finally ready to order, you can choose from a variety of soups, starters and main dishes. There are vegetarian and non-vegetarian dishes. Most of the main dishes are gravies, a thick sauce with meat or vegetables, traditionally served with bread – Roti, Naan or Chapati – or different sorts of rice. Usually, the spiciness of the dishes ranges from medium hot to hot which is fine for us. Nevertheless, after spending six months in India, we are looking forward to the traditional food in Germany. *JH*



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