3TU.Newsletter

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Update.

In this newsletter: an update on some exciting 3TU research areas, an interview with Arjan Houtepen on the nanocrystal breakthrough in solar cells, the latest on the robotics platform in the Netherlands and lots more...

Picture © Sam Rentmeester/FMAX.

Centres of Competence and Centres of Excellence

The 3 TUs have set up five Centres of Competence in recent years to promote coordination and cooperation. In each of these centres a basis is laid for a shared Centre of Excellence, which will establish new research groups and bring fresh momentum to innovative research in the respective Centre of Competence. Business plans have been drawn up and a one-off government grant of 50 million euros has been awarded for 2007-2011.

Robotics platform in the Netherlands

The three TUs want to further expand robotics research in the Netherlands, particularly in humanoids and the use of robotics in medicine. The 3TU Centre of Competence for High Tech Systems intends to set up the national RoboNed platform in 2009. Hopefully, joint applications for subsidies, amongst others, will enable Dutch robotics to strengthen its position in Europe. The platform will also serve as a discussion forum and, when necessary, as a means of coordinating robotics research in the Netherlands. Eventually, it could develop into a National Robotics Institute along the lines of the IRT in Japan.

Interview with... Arjan Houtepen

A.J. (Arjan) Houtepen gained his MSc and PhD at the University of Utrecht. He is assistant professor at the Faculty of Applied Sciences at TU Delft and is currently engaged in ground-breaking research on carrier multiplication in semi-conductor nanocrystals at the 3TU Centre for Sustainable Energy Technology. Carrier multiplication occurs when a single photon releases multiple carriers. This increases the photocurrent and enhances efficiency.

What is the aim of the research?

"The guiding principle for this research is to develop new concepts for third-generation solar cells, in collaboration with the other TUs. So, the aim is not to develop existing types of solar cells any further, but to find new ones. We are exploring the potential of semi-conductor nanocrystals, because carrier multiplication in semiconductor nanocrystals could significantly lower the costs and improve the efficiency of solar cells."

What are the research results so far?

"Despite the doubts raised recently in the literature, it has now been irrefutably demonstrated for the first time that carrier multiplication occurs in lead selenide nanocrystals. So the research has already delivered results within a year. That's pretty fast. And it's all because people with the right background and expertise are working together; people with knowledge of nanocrystals and laser physics."

How can solar energy benefit from carrier multiplication via semiconductor nanocrystals?

"First, nanocrystals can help to lower the costs of solar energy. We can design the nanocrystals so precisely that we can find the optimal colour for maximum light absorption. We can attach nanocrystals to silicon. Nanocrystals absorb the light more efficiently and transfer it to the silicon. Only a thin film of silicon is needed. And that lowers the costs."

Is carrier multiplication already being applied in solar cells?

"No, not yet. It is theoretically possible, with carrier multiplication, to make solar cells which have a higher efficiency than silicon solar cells. But that isn't necessary. If the costs are low, ten percent efficiency is cost-effective. The research would take another step forward if we were to join forces with other research groups in Eindhoven or Twente to, for example, make solar cell prototypes."

Remote Robotics

Remote Robotics is just one example of a project involving both the business community and the universities. The partners are CCM, Frencken, KMWE, Philips AppTech, Philips Medical Systems and the three TUs. The mission is to develop remote-controlled robot systems for medical use.

Events

26 and 27 November 2008 Precision Fair 2008, Veldhoven

The three TUs shared a stand at the Precision Fair 2008 in Veldhoven. They participated in the 'Technology Hotspot', which gives universities and research institutes an opportunity to showcase their research in precision technology and associated fields. The walking robots at the 3TU stand were certainly eye-catching.

3TU and ESI partnership

The 3TU Federation and the Embedded Systems Institute (ESI) are gearing up for joint research on embedded systems. Recently, ESI director Ed Brinksma, and members of the 3TU Executive Board signed a partnership agreement for a 'Joint Research Unit (JRU) for Embedded System Engineering'. The partners hope that pooling their strength will win them more prestige in Europe and enable them to reel in major international projects.

ADEM for sustainable energy

The three TUs are collaborating with ECN on the ADEM project (Advanced Dutch Energy Materials Innovation Lab) in the 3TU Centre of Competence URGENT (University Research Group on Sustainable Energy Technologies). ADEM will support the regular sustainable energy programmes and thus pave the way for new technological developments. The project has been awarded a grant of 30 million euros, half the amount that was initially requested (58 million euros). The money will be used for ADEM-1, which consists of themes that are covered by ECN and the three TUs. Hopefully, the rest of the grant will be awarded for ADEM-2 (in which other universities are also important players). If everything goes according to plan, ADEM-1 will be up and running in the spring of 2009.

Note to the reader

3TU Newsletter is published by the 3TU Federation (www.3tu.nl) and is sent to the personnel and external relations of Delft University of Technology, Eindhoven University of Technology and the University of Twente.
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3TU-research

ICT for kids

The PuppyIR project – a STREP project in the EU 7th Framework Programme (STREP=small or medium-scale focused research project) – is scheduled to start in the spring of 2009.

The project will build an open-source platform for developing information services specially designed for children. New models for web-based interaction, support for building a safe digital social network via internet, techniques for automatic tracing, summarisation and structuring of textual and multimedial information and child-friendly evaluation methods are being explored.

The results of the project will be demonstrated in scenarios that focus on children who are confined to bed and users of library services for children. System developers can use the PuppyIR platform to choose from different interaction types and service combinations. The platform can also be used in combination with an array of information sources, services and languages. This is one of the first FP7 projects to be carried out under the auspices of the 3TU Centre of Competence, the Netherlands Institute for Research on ICT (NIRICT). The other consortium members are Emma Kinderziekenhuis AMC, the Association of Public Libraries, KULeuven, the University of Glasgow, the University of Strathclyde and Atos Origin.

3TU Ethics and Technology carves out a position

It is the ambition of 3TU Ethics to realise research projects on ethics, which are related to technological research at the other Centres of Excellence. In January 2009 3TU Ethics and Technology and 3TU NIRICT launched a research project entitled 'Communication support and its ethics to improve patient-centred healthcare'. Another two projects 'The story of recycling nuclear waste, accompanying risks and associated values' (TUD) and 'A sustainable ethics for future energy systems' (TU/e) have been started with the 3TU Centre for Sustainable Energy Technologies. 'Carebots and the good life' (UT) has been started with the 3TU Centre for Intelligent Mechatronic Systems.

Point-One Association

The decision to merge the activities in the Programme for High Tech Systems (PHTS) with the activities in nano-electronics and embedded systems (formerly the Point-One Programme) led to the establishment of the Point-One Association in October 2008. The aim of Point-One is to invest in R&D by combining strengths and to become a relevant player on a global scale in some promising markets. The Point-One Association has been granted an extra subsidy of 153 million euros from the Ministry of Economic Affairs, seventeen million euros of which are earmarked for the 'Emerging Technology Agenda' (ETA). ETA was set up specifically to promote longer-term research and to strengthen collaboration between universities and industry. The high tech systems research (system control technology, mechatronics and robotics and automotive) at the three TUs coincides perfectly with the industrial activities in this area in the Netherlands. This research ranks among the best in the world and is firmly embedded in High Tech Automotive Systems (HTAS) and the PHTS.

The next 3TU Newsletter features, amongst others, the '3TU strategic vision for 2009-2012'.