

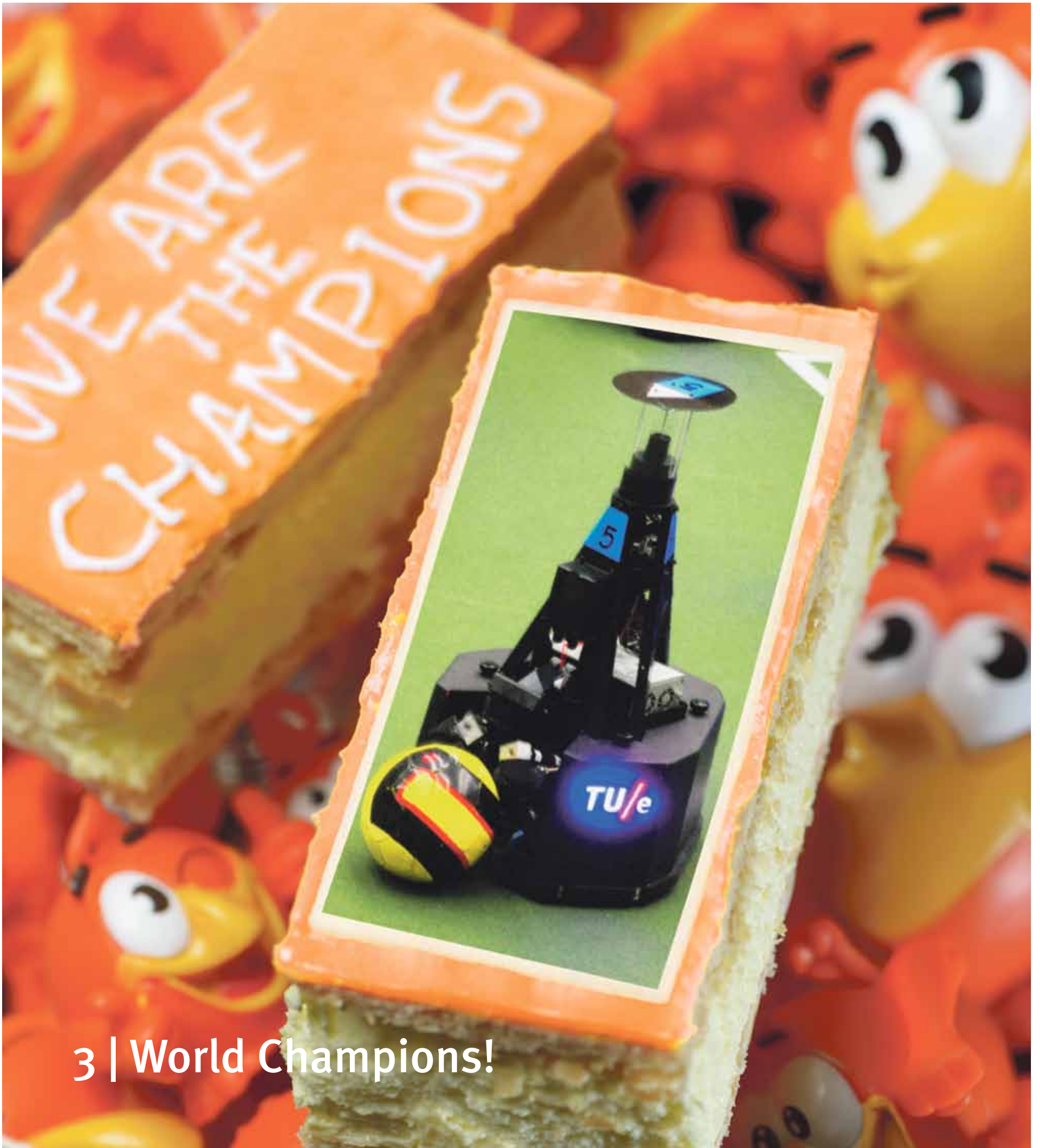
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# Cursor

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## 3 | World Champions!

3 | Who is skimming our data?

4 | Healing plasmas

20 | University news



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flowers. It was time for our heroes of flesh and blood and of bolts and screws to be hailed at Eindhoven's city hall. The event received quite the media attention: our public relations officer's calculation on the back of a case of cigars proved that no less than 4.2 million people saw at least part of the Mexico-City event on TV. It's good to hear, especially thinking about all the free publicity that pesky Delft sun buggy receives every time it goes cross-country down under.

I couldn't resist googling our beaten opponent. It was striking to find out MRL uses their research results for the construction of rescue robots that can be used after earthquakes. There's no need for those in the Low Countries. We need robots to help curb our healthcare costs in the future. Playing soccer will be out of the question by then.

### Champs

World cup finals were starting to become a bit of traumatic experience for our dribbling little robots, but last weekend they finally hit the jackpot. Their Iranian nemesis MRL - an acronym for the highly imaginative team name Mechatronic Research Laboratory - didn't stand a chance and lost 4 to 1. Time to pop corks and bring out the

### Vacation fever

So here it is, the very last edition of Cursor before the summer break. Our plans are set already: we'll be grabbing a few weeks of sun here and there, but other than that, we'll be grinding away at the new website that will be launched at the start of the new academic year. Until then, we'll be updating you on all the latest news at [www.cursor.nl](http://www.cursor.nl), of course. For me, the summer break marks the end of my temporary editorship. I've really enjoyed combing campus in search of great stories, but in September Judith will happily take over again.



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## ◀ Rewwwind www.tue.nl/cursor

Our Rewwwind feature provides you with snippets of last week's news. What happened online after the previous Cursor magazine was published?

### Soccer robots TU/e win world cup in Mexico

25 June, 2012 - On Saturday, June 23, the soccer-playing TURTLEs of TU/e's Tech United team won the robot soccer world cup. In the final, the Eindhoven robots beat Iranian team MRL 4 to 1.



### Spinoff TU/e launches SmartGoals

22 June, 2012 - The Eindhoven SmartGoals, a TU/e spinoff, will be launching the innovative soccer training system SmartGoals this week. The system works with three intelligent, wirelessly communicating pylons that indicate which wicket the

ball or player should pass through by means of lights. The SmartGoals are pretty high-tech, but they're very easy to use, for example for training reaction, reading the game, and technique.

### Eindhoven Friend Medal for Harry Roumen

15 June 2012 - Harry Roumen, TU/e's university secretary since 1988, received a Friend Medal from the city of Eindhoven at his farewell last Friday, June 15. Mayor Rob van Gijzel awarded the former secretary the (new) decoration in the Auditorium for Roumen's 'great merit to Eindhoven'.



Photo | IEC Archive

## ◀ Flashback

### Warm meal 1984 versus 2012

Until ten years ago, TU/e students craving a warm meal went to the Mensa (Latin for table) located in the Bunker. Unfortunately, not even a proper redecoration back in 1998 - or makeover, as we'd call it today - was to save the student facility. In early 2002, the Executive Board pulled the plug, ending the resident cafeteria's era in the characteristic building at the Kennedylaan.

The three social associations ESC, SSRE and Demos are still housed in the Bunker, and in 2007 all cultural associations found shelter there, too. In 2013, ESC will be leaving the building for a historical edifice in the city center's Ten Hagestraat. SSRE is also looking for a suitable location in the city center. Today, students can get their warm afternoon and evening meals at the Auditorium, where they can choose from several dishes. It's especially foreign students and PhD students who opt for our meals, and unfortunately for most of them, Dutch cooking proves an acquired taste. (HK)



Photo | Bart van Overbeeke

## ≡ Clmn Letter from the past



This summer I will receive my Master's degree, so it's time to stop and look back for a moment. I decided to reread the motivation letter I had written as part of my TU/e application. I wasn't surprised to realize I have achieved all goals stated in that letter. I wanted to learn about modern control engineering by applying it at a major Dutch company, and I wanted to work with international colleagues. I did it all. However, the letter also revealed that studying here has changed me. I would describe this change by a single word - maturity. Indeed, I was a very

naïve young man with overrated expectations, oblivious to potential problems. Although I was ambitious and passionate, I didn't really apply any self-management and I wasn't very determined. This ignorance came at a price. Frustration, disappointment, despair, regret - all these and other strong emotions used to get me down daily. Fortunately, I was not alone during my journey. People at TU/e challenged me, but were supportive at the same time. Teachers and supervisors showed me alternative directions for my personal development. Colleagues shared their professional experience. Friends fed me with positive emotions and provided moral support. All these people activated my dormant abilities and helped me rediscover myself. This combination of pain and pleasure definitely matured me. And because of this newfound maturity I now approach my future more realistically, seeing both negative and positive aspects of any life project. Although I didn't mention this skill in my motivation letter as a main goal, I am very happy my time in Eindhoven has bestowed such an invaluable gift on me.

Sultan Imangaliyev, from Kazakhstan, is a student of Systems & Control, Department of Mechanical Engineering. This is his last column. We are looking for a new columnist in the English section. Are you interested? Send us an e-mail: [cursor@tue.nl](mailto:cursor@tue.nl)



Prof. mr. dr. Jan Smits, full professor of Law & Technology,  
Department of IE&IS

## Should TU/e switch to GoogleApps as well?

Last week, half of all Dutch universities switched from Microsoft to GoogleApps. TU/e decided against that and kept e-mail, planners, and word processing stored on local servers rather than the cloud for now. Main concern is the security guarantee. After all, how can we be sure that somewhere in the US people won't be skimming our data? Still, does security outweigh the Google system's benefits? And is TU/e population even worried about their data being jeopardized?

"I think it's wise to wait a while before switching to GoogleApps. We need to know exactly what we're signing up for first", says an outspoken Jan Smits, full professor of Law & Technology. As an expert in the field of international data traffic, he has his eye on this affair. On top of that, Smits is part of a group that's working on TU/e's digital visibility.

"Our current mail server stores its data locally, meaning we have control. Google, on the other hand, stores our data wherever there's free space. We don't really have a say in that. However, the root of the problem lies with the US government. They have the right to inspect international documents. Should an institution like the CIA demand access to certain Google documents, they have to oblige. And they won't be letting you know, either..." "There are many plus sides to using GoogleApps, of course. It's very attractive financially, for example. I'm sure for many universities that aspect played a major part in making the switch. What's more, you can log in anywhere and you have access to all of your data, all the time; everything is synchronized. It's really convenient, of course, but the reason the system runs so smoothly is because we have

no control over it whatsoever. If for any reason they decide to pull the plug, we'd be offline completely and have lost everything. Still, security remains my main concern. A lot of information about us is stored, more than we know. Imagine an Iraqi scientist at TU/e asking his students to do an assignment on the Sharia - the religious law of Islam - and receiving all papers through e-mail. I don't think he'd be entering the US smoothly after that. But the same goes for normal students who use Dropbox or Hotmail; they too leave a digital footprint. These are terrifying developments. On top of that, many e-mail inboxes contain legal junk. Students tend to do things they're not supposed to do: hacking and downloading torrent files for example, during which



Jan Smits. Archive photo | Bart van Overbeeke

you're also uploading illegally. All of that is stored, and you should know that IT does not forget." "I don't feel it's a hot topic within the TU/e community. It's a complex problem that's hard to influence on your own. The effects of technological developments are usually overestimated in the short run, but underestimated in the long run. That's exactly the paradox we're facing right now. GoogleApps may seem great now, but we should think about the future as well: do we want to depend on others and lose control of our data? Google doesn't care whether or not TU/e is in. Only then will they have to start thinking about their reputation

if all universities in Western Europe refuse to participate: 'Academic freedom isn't safe with Google, apparently?' So, it's a good thing we find out how GoogleApps works exactly first. Of course, TU/e will never beat a giant like Google, but should we be facing each other in the future, it's a good thing we'll have kept our wits about us." (NT)

## We are the champions

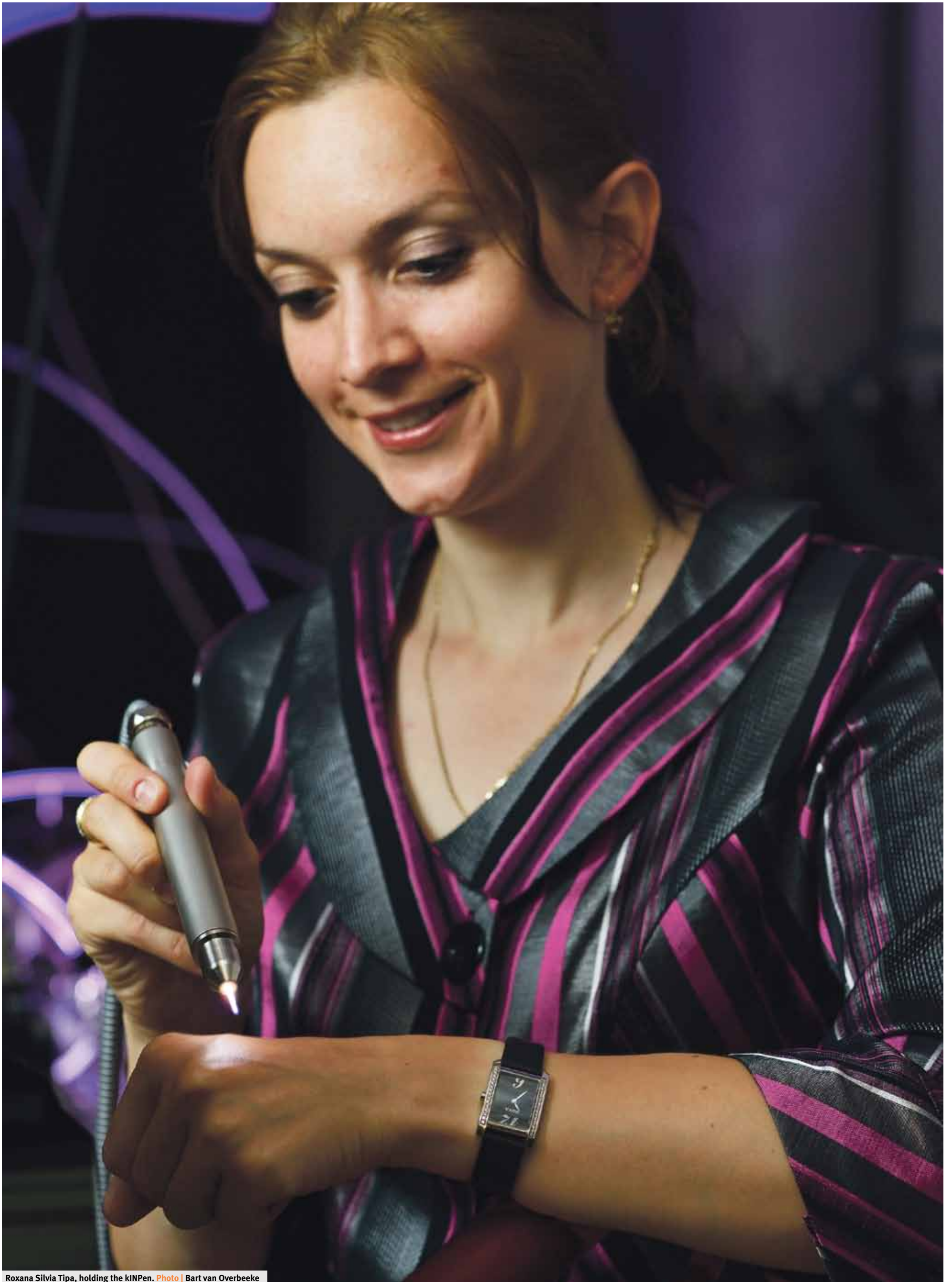


Photo | Bart van Overbeeke

For the World RoboCup, a group of **35 Tech United people** traveled to Mexico, where a total of **45 countries** were to compete in various leagues. **3 TURTLES** made the trip stored in carry-on luggage, but the other soccer robots, care robot AMIGO, and humanoid Tulip already arrived prior to the team, after a **30-day** boat trip.

In the past years, TU/e's team Tech United came in second place **4 times** at the world cup. In Mexico, they finally managed to win the competition by beating Iran **4 to 1**. In total, the soccer robots played **10 games** during the world cup, scoring a total of **36 goals**. The soccer robots committed **2 fouls** and suffered **4 injuries**. Care robot AMIGO reached **7th place** in the @Home competition. Tulip came in **4th** in the Humanoid League. (MvdV)





Roxana Silvia Tipa, holding the kINPen. Photo | Bart van Overbeeke

# The healing powers of plasmas

**Plasmas play an important role in high-tech industries and nuclear fusion experiments. A less well-known fact is that plasmas also have an antiseptic effect, and exposure to plasma could promote wound healing. Romanian PhD student Roxana Silvia Tipa treated bacteria, cell cultures and pieces of human skin with plasmas. Last Friday, June 22, she defended the dissertation containing her findings.**

In plasma, collisions create all kinds of charged particles, reactive molecules, and ultraviolet light. These plasma products can be used for applying thin layers, as a lithography light source, and for surface cleaning. But it doesn't end there: over the past years it's been proven that plasmas are also beneficial in medicine. Bacteria that are exposed to plasma die within the minute. On top of that, research indicates plasma treatment promotes the healing process of wounds. Still, that doesn't mean we understand these processes, says PhD student Roxana Silvia Tipa. "The big question within plasma medicine for now is: how does it work? What ingredient from the plasma's particle cocktail is responsible for what effect? And why do two cell types react differently when exposed to plasma?" Doing various experiments, Romanian Roxana managed to unravel bits and pieces of the mystery. She used two devices that generate so-called cold atmospheric plasmas. For high-tech uses, plasmas are usually created in vacuums and at very high temperatures, but that doesn't really work for medical implementations, of course. "If you want to treat a patient's wound, the plasma temperature should be below forty degrees Celsius, or you'll damage the surrounding tissue. And treatment has to be carried out in the open air as well, not in a vacuum." Tipa tested two different plasma sources: a Plasma Needle developed by TU/e's Equipment & Prototype Center (EPC), and a commercial version,

the kINPen. Both devices generate cold microplasma with a diameter of several millimeters, which Tipa used to treat bacteria, living cells and pieces of skin. The commercial kINPen can be filled with helium, argon, or compressed air, whereas the Plasma Needle only works with helium. The PhD student's test material included human skin samples she received from the Burns Center in Beverwijk. She applied burns to these skin samples to study the healing process of the plasma-treated skin. It turned out that exposure to the Plasma Needle generated new skin cells faster than did the kINPen, but both devices accelerated the skin's healing process compared to untreated skin.

**"The big question within plasma medicine is: how does it work?"**

"The Plasma Needle uses a much bigger electric field than does the kINPen", Tipa explains. "That might explain the different effects of the two devices." She decided to have the EPC build another device that enables her to expose her samples to a random electric field. It turned out certain cell types, fibroblasts, do indeed grow twice as fast when exposed to an electric field with a threshold value upwards of 2 kilovolts per meter. Tipa says a substantial part of the

plasmas' healing effect on the wounds can be ascribed to the electric field generated by the Plasma Needle. "Fibroblasts play an important role in wound healing, so that's a good result. However, other cell lines don't seem to be responsive to electric fields at all, and bacteria don't seem to divide any faster, either. Anyway, electric fields are not harmful to living cells."

Tipa also studied the possible harmful effects of plasmas on living tissue. In collaboration with the UMC Maastricht, she researched DNA damage in cell lines grown in Petri dishes and treated with plasma. They showed that plasmas generated with the help of rare gases (helium, argon) are harmless to cells. And the patient won't have to suffer great discomfort either, Tipa says: "All they'd feel is the gas going down their skin, that's all".

Plasmas that are created in rare gases are relatively 'clean'. Harmful molecules like reactive oxygen and nitrogen compounds are byproducts of ambient air, so in plasmas made with compressed air (a mixture of nitrogen and oxygen), the concentration of these 'murderous molecules' is much higher. It didn't come as a surprise for Tipa, then, that plasmas from compressed air proved to be most effective by far in the fight against bacteria. "The electric fields and ion bombardments are the same in compressed air, argon, and helium. The main difference is the presence of especially ozone and nitric oxide. Those are particularly harmful to bacteria."

Bacterial infections are a serious risk for patients with open wounds, she stresses. "To prevent open burns to become infected, for example, the dressing must be changed frequently, and the wound must be treated with an antibiotic ointment. It's a time-consuming and painful process, not to mention the fact that more and more bacteria strains are resistant to antibiotics. Plasma treatment could

be a possible solution." Tipa tested *Pseudomonas aeruginosa* and *Staphylococcus aureus* cultures, two types of bacteria that can cause quite a lot of trouble in hospitals. It turned out that *S. aureus*, a Gram-positive bacterium with a relatively thin cell membrane, is more sensitive than the Gram-negative *P. aeruginosa*, which has a much more robust protection against the external world. "Apparently, the Gram-negative's thicker cell wall is better at keeping out the reactive plasma particles."

## Plasmas can prevent potential bacterial infections

The results suggest the cell membrane is the key element in the interaction between plasmas, and cells and tissues, Tipa believes. She feels it might also account for the effects of electric fields: "Electric fields influence the ion

transport through the cell membrane, and so the fission. Bacteria have a thicker cell wall, which could be why they're less susceptible to electric fields." The fact that human and animal cells are less likely to get hurt by plasmas than by bacteria is probably because bacteria DNA is relatively vulnerable to reactive molecules: bacteria DNA isn't stored in a safe nucleus.

Plasma medicine is an interdisciplinary expertise: Tipa will receive her PhD from Applied Physics, but conducted part of her research at Biomedical Engineering. She didn't mind, because in Romania she studied both biomedical engineering and physics. The researcher isn't done with this subject yet, and plans on applying for a Veni Grant. "Specifically, I want to know how electric fields help wound healing." She's optimistic about the future of plasma medicine: "There has to be a way for one machine to kill bacteria as well as promote wound healing". (TJ)



The Plasma Needle doing its job.