

# GLOBE



The  
**XX**  
factor

Why ETH Zurich  
needs more women

PAGE 14

ETH juniors: 20 years  
of serving industry  
PAGE 34

A self-driving car  
on the race track  
PAGE 38

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## WOMEN AT ETH

Only one in ten ETH professors were women when I joined ETH Zurich in 1997 as the first female professor at the Department of Civil, Environmental and Geomatic Engineering. Today, 13.6 percent of all ETH professors are women, and we still have a long way to go.

I wish that more young women would commit to studying STEM subjects and enrol on a course at ETH Zurich. The portraits of women in this issue of *Globe* provide wonderful examples, illustrating that ETH is a great place for them to acquire knowledge and achieve their full potential.

Families, schools and society play a role in encouraging women to find their way to ETH and contribute to science, business and society, and ETH Zurich must do its part too. The university has undertaken several measures to attract more women, and continues to expand them through its [Gender Action Plan](#): calls for application for professorships actively target outstanding women. Women professors with newborn babies are given additional time during their tenure procedure. Childcare places at, or near to, ETH help mothers and fathers to balance family and career, and mentoring offers support for female students and young researchers.

[Networks](#) are really important too. The student associations, such as Ladies in Mechanical & Electrical Engineering (LIMES), the Computer Science Network of Women (CSNOW) and Women in Natural Sciences (WiNS), help to motivate young women, and the ETH Women Professors Forum (WPF) offers a pool of excellent and recognised experts. I know from my own experience how important networks are when pursuing a career: the first female Rector of ETH Zurich, Professor Heidi Wunderli-Allenspach, paved the way for other women to reach executive level, as did some solid networking.  
I hope you enjoy this issue!

Sarah M. Springman, ETH Rector

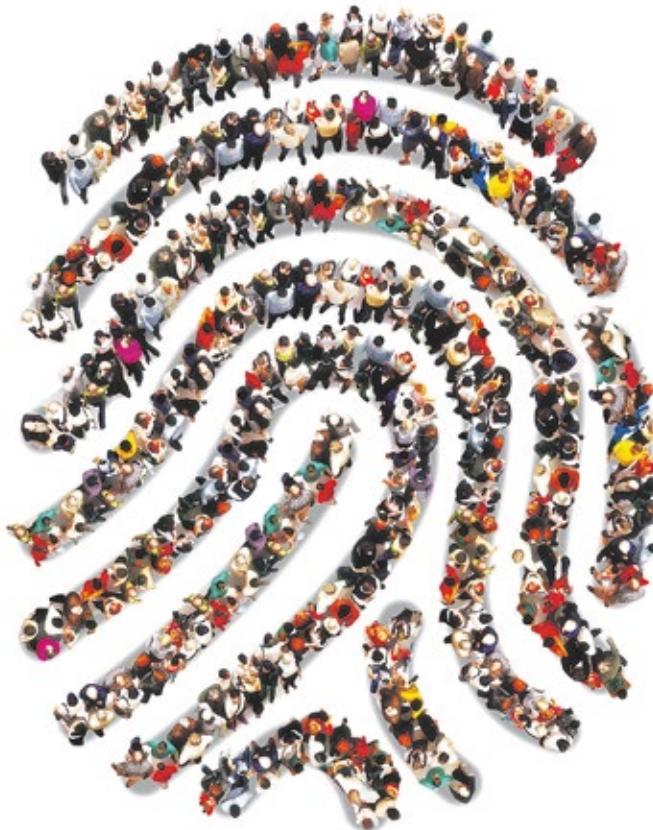


*Sarah M. Springman,  
Rector of ETH Zurich*

ETH women share  
why they participate in  
networks (page 16)

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## CONTENTS

### NEW AND NOTED

- 7 News from ETH Zurich
- 8 When solar drones meet Arctic glaciers
- 10 The secrets of reinforced concrete



*As a concrete element deforms, it begins to crack and spall. – Page 10*

### FOCUS

- 16 Networks, role models and dedication  
ETH women report on their experiences and on what they're doing to encourage other women.
- 20 Where are the women?  
Why it will still be a while before more women teach and study at ETH
- 24 Three women, three careers  
A talented young scientist, a spin-off founder and a professor
- 30 Female engineers wanted  
One department has truly excelled at implementing the Gender Action Plan.
- 31 ETH's women pioneers  
Facts from the history of women at ETH



*One last look at the computer before they can finally get out on the track. – Page 38*



### COMMUNITY

- 33 Connections to ETH
- 34 20 years of ETH juniors
- 37 Column

### REPORT

- 38 Bringing smart algorithms to the Hockenheimring  
Globe accompanied the ETH team and its self-driving race car at the Formula Student competition for a day of testing.

### CONNECTED

- 42 Encounters at ETH
- 44 Agenda

### PROFILE

- 46 At home in Singapore  
Despite living in Asia, alumnus Hans Jäger remains in close contact with ETH Zurich.

### 5 QUESTIONS

- 50 Niko Beerewinkel  
The Professor for Computational Biology always seeks to learn from others.



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# NEW AND NOTED



## Mit uns in die Zukunft.

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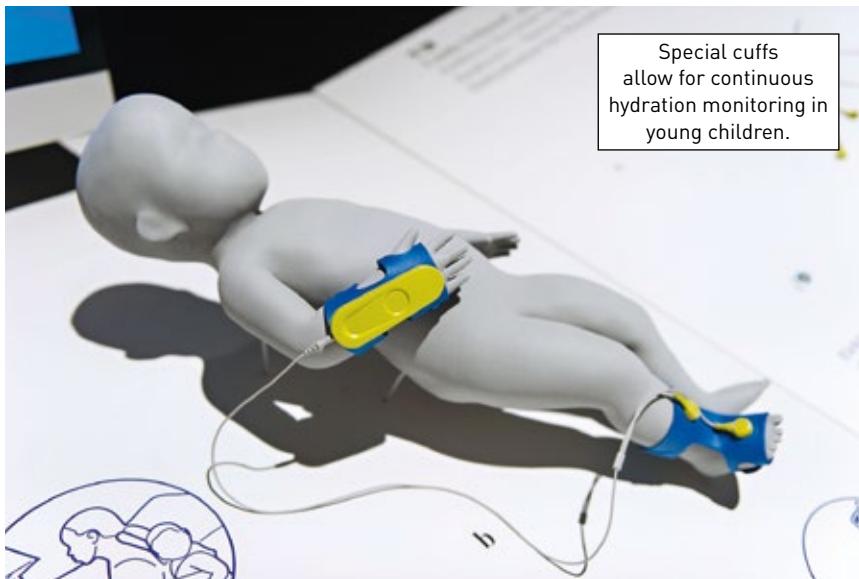
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*Health sciences*

## PREVENTING DEHYDRATION

Dehydration is one of the most common causes of death among young children in developing countries. Now, ETH researchers are developing a mobile and affordable solution that will help non-experts treat dehydration more effectively. A sensor installed in a wristband displays red and green dashes to indicate whether body water content is increasing or decreasing, sounding an alarm when the situation becomes critical. The sensor can display, store, and analyse data, and forward it to other devices.

*Microbiology*

## STABBING AMOEBAE WITH DAGGERS

Bacteria have to watch out for amoebae. Hungry amoebae hunt them, catching them with their pseudopodia to absorb and digest them. However, some bacteria know how to defend themselves.

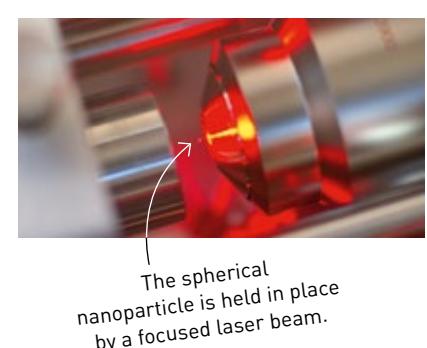
One of these is *Amoebophilus*. Together with researchers at the University of Vienna, scientists from ETH Zurich have now found a mechanism that they assume is crucial for the survival of *Amoebophilus* inside amoebae.

The bacterium has micro-daggers that it can use to pierce the amoeba from inside and thus escape digestion. The shooting mechanism consists of a spring-loaded sheath that contains the micro-dagger. When the sheath contracts, the dagger is shot outwards extremely quickly through the bacterial membrane.

*Photonics*

## ULTRA-SENSITIVE

ETH researchers have developed an ultra-sensitive sensor designed to accurately measure extremely small forces or the tiniest of electric fields. To achieve this, the researchers trap a spherical nanoparticle of silicon dioxide using a focused laser beam. Now, if a force acts on the sphere, it will move from its resting position – a movement that can also be measured using a laser beam.



The spherical nanoparticle is held in place by a focused laser beam.

*Sun2ice*

## WHEN SOLAR DRONES MEET ARCTIC GLACIERS

Many ocean-terminating glaciers from the Greenland ice sheet are experiencing thinning and rapid retreat, which in turn contribute to sea-level rise. ETH Zurich's Sun2ice project aims to use a state-of-the-art, solar-powered unmanned aerial vehicle (UAV), the *AtlantikSolar*, to conduct multi-day surveys of glaciers in the Arctic and monitor iceberg calving. The midnight sun in polar regions offers unique conditions for perpetual solar-powered UAV flights.

This "drone" was taken in June 2017 during Sun2ice's first fieldwork in the sky over Qaanaaq, Greenland, which at 77 degrees north is one of the northernmost villages in the world. Flying an experimental solar-powered UAV in Arctic conditions was very challenging due to the low sun inclination, the extreme climatic conditions, the weakness of the magnetic field used for the compass, and the absence of smooth grass-covered terrain to land a fragile airplane. Despite all these difficulties, the fieldwork demonstrated the potential of the *AtlantikSolar* to operate energetically perpetual flights in the Arctic region, emphasising the potential of such a technology for monitoring the cryosphere with a space resolution and a frequency not achievable by satellites.

Project overview:  
[→ www.sun2ice.ethz.ch](http://www.sun2ice.ethz.ch)



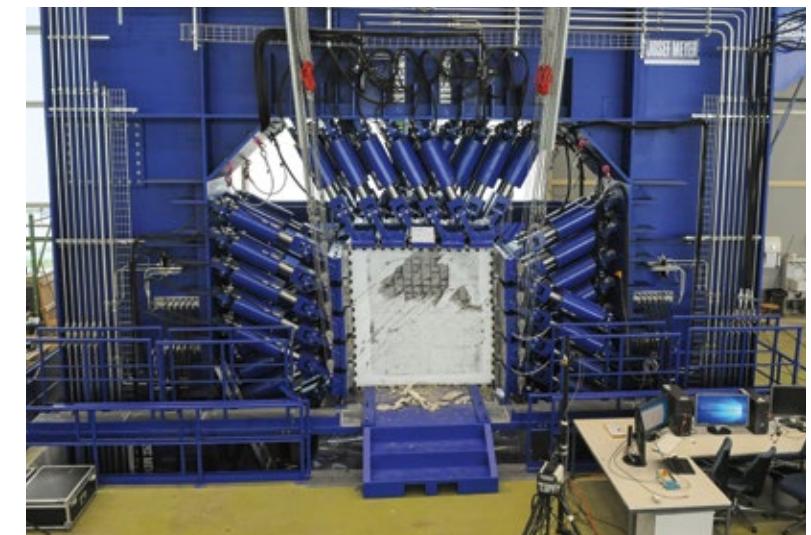
*Fiercely guarded*

# Uncovering the secrets of reinforced concrete

Concrete has a lot to withstand – which makes it all the more astonishing how little we know about this material's mechanical properties. This is set to change with ETH Zurich's Large Universal Shell Element Tester (LUSET).

Around two out of three bridges in Switzerland are more than 35 years old. Built to accommodate that era's needs and according to that era's standards, today they are exposed to entirely different loads. Lorries of 40 tonnes in weight thunder over structures that were originally designed for 16 or 28 tonnes. Do we now need to strengthen or even replace them all? "That wouldn't be sustainable or indeed financially viable," says Walter Kaufmann, Professor of Concrete Structures and Bridge Design at ETH Zurich. "We need to improve our understanding of reinforced concrete's mechanical properties so that we can assess which bridges are in need of strengthening." This is the question he is now seeking to address with his testing facility for massive structures, the Large Universal Shell Element Tester (LUSET).

**The secrets of reinforced concrete**  
Reinforced concrete has been in use for more than 150 years – which makes it all the more astonishing how little we know about the forces at work in all but the simplest of cases. Thousands of experiments have been conducted worldwide on scenarios with simple loads, but there are only a very small number of experiments addressing what is known as combined stress – which is when a structure is exposed to a combination of simultaneously acting forces such as shear, compression, pulling, bending and twisting. The previously conducted



*The Large Universal Shell Element Tester (LUSET) in pilot testing: The concrete element cracks, deforms and begins to spall.*

tests were mostly carried out in the 1960s and 1970s to ensure the safety of new motorway bridges. In order to ensure smooth operation and avoid brittle fracture, a generous margin was factored into the calculations. The resulting design rules, which form the basis of today's standards, are therefore of limited use in judging a structure's load-bearing capacity: "We have lots of structures that shouldn't really still be standing according to today's calculations, and yet have been there for 40 years," says Kaufmann. In order to shed some light on the matter, he wanted to build a testing facility that would allow him to apply all the forces at work – or subject elements to general loading, as he puts it. This he was able to complete thanks in no small part to a generous donation by cemsuisse, the Association of the Swiss Cement Industry.

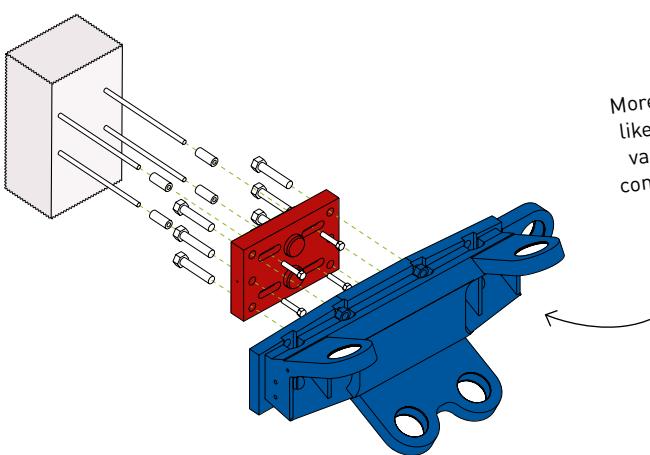
**The LUSET design**  
The result is a testing facility some ten metres in height and width that Kaufmann planned and built together with his doctoral students Alexander Beck and Demis Karagiannis, actively supported by Dominik Werne, Laboratory Manager at the Institute of Structural Engineering, and other staff.

LUSET makes it possible to test concrete elements of 2 by 2 metres in length and up to 40 centimetres in thickness. Twenty yokes (coloured blue in the graphic) exert massive forces on the concrete elements, for instance up to 30 meganewtons (MN) of pressure, 22MN tensile force, 11MN shear and 4 meganewtonmetres of bending moment. Twenty individual blocks (coloured red in the graphic) are placed along the edges of the element and transfer the load from the yokes to the concrete. The blocks are attached to reinforcing bars, to which the researchers apply glass fibres. They can then use the optical reflection in the fibres to continuously monitor the strain of the rebars along their entire length. The measurement technology is complemented by a digital image correlation system that makes it possible to measure the entire surface in 3D. Combining measurement results enables direct conclusions as to the structure's mechanical behaviour, for instance with regard to the forces transferred via cracks in the concrete. "As far as I know, we are the first in the world to be pursuing this approach," says Kaufmann.

Kaufmann wanted to be able to combine all the forces in any configuration. That's why the LUSET actuators are not perpendicular to the edge, but rather fixed at a gradient of 1:2. To achieve this, the yokes had to be nested within one another. LUSET was completed in June, and pilot tests have proven that it works. The first test series using the facility will be conducted by the two doctoral students heavily involved in its design. Demis Karagiannis will be testing a combination of shear and transverse bending forces, which play a significant role in bridge design. The work is motivated by a commission from the Swiss Federal Roads Office (FEDRO), which is interested in finding out whether webs need to be strengthened when a bridge is widened. Alexander Beck will be conducting shear tests on elements with little vertical reinforcement and forced longitudinal strain. "There's been hardly any testing on this, and only a few models," explains Kaufmann. Requests have also already been submitted from abroad for tests in the facility.

New materials bring with them whole new questions. The behaviour of ultra-high performance fibre-reinforced concrete, for instance, has hardly been researched at all. "Here too, there's practically no one apart from us who can conduct robust trials with a full range of forces," says Kaufmann. He is convinced that LUSET's unique capability will help to further reinforce ETH's position in the field of structural engineering. — Roland Baumann

More than 20 yokes like this one apply various forces to concrete elements.



Information on the LUSET project:  
→ [www.ethz.ch/luset-en](http://www.ethz.ch/luset-en)



In future, filmmakers could use drones to film dramatic productions such as action scenes.

#### *Functional materials*

### ECO-FRIENDLY ROOM COOLING

Researchers at ETH Zurich have developed a membrane that has a cooling effect. It consists of a layer of hydrophilic (water-attracting) polymer sandwiched between two layers of hydrophobic (water-repellent) polyurethane. Since the outer layers are covered with holes of about one micrometre in diameter, water can pass from the middle layer into the environment.

The water evaporation involved requires energy. In the process, heat is extracted from the air, the temperature falls, and the humidity of the surrounding area rises. Conventional humidifiers work in the same way, but they need a lot of electricity. The system developed by the ETH researchers, on the other hand, is passive: the sunlight that falls through a window onto the cooling curtain is sufficient to provide the energy

necessary for this type of air conditioning to function.

In a departure from what usually happens in industrial processes, the different layers are not combined into one material by gluing them together. Instead, they are placed on top of each other in a suitable solvent, whereby the outer layers dissolve slightly and bond with the middle layer. This is the only way the researchers can ensure that the outer material of the membrane remains porous.

Before the new system can be commercialised, there are still some questions that have to be resolved. For example, researchers will need to determine how the material behaves microbiologically, since high temperatures and humidity form the ideal breeding ground for the growth of bacteria and fungi. To prevent this, the outer layer might have to be replaced in future with antiseptic materials.

#### *Efficient algorithm*

### SPECTACULAR SHOTS

Filming spectacular action scenes is expensive, and the options for creativity are often limited. In collaboration with international colleagues, researchers at ETH have developed an algorithm that allows drones to take charge of composing the shots desired – precisely as directors and camera crews imagine them. ETH Zurich has already applied to patent the algorithm.



*Skewered by spines: This tobacco hawkmoth caterpillar didn't survive its search for food here.*

#### *Crops*

### OBSTACLE COURSE FOR CATERPILLARS

Spines and thorns keep hungry mammals at bay, and ETH researchers have now shown that spiky growths on plants make life difficult for caterpillars too. This finding could be important for crop breeding, as caterpillars are a major problem for agriculture.

#### *Replacement organ*

### PUTTING ARTIFICIAL HEARTS TO THE TEST

Scientists from ETH Zurich have developed a flexible artificial heart, created from soft silicone using 3D printing. The heart weighs 390 grams and has a volume of 679 cm<sup>3</sup>. Just like a real human heart, this artificial heart has a right and a left ventricle. But instead of a septum, they are divided by an additional chamber. This inflates and deflates by pressurised air, and is necessary to pump blood out of the chambers, thereby replacing the muscle contractions of the human heart.

This project is part of the Zurich Heart project, which combines the expertise of several institutions. The Zurich Heart project is generously supported by donors. The ETH Zurich Foundation and the UZH Foundation are supporting the Zurich Heart project in partnership building.



*The ETH laboratory's flexible artificial heart.*

#### *Renewables*

### THE PROBLEM OF ONE-SIDED PLANNING

The expansion of renewables is coming under fire because of how heavily energy generation depends on the weather. However, a study by ETH Zurich and Imperial College London shows that this is less to do with the weather itself and more about how renewables planning fails to consider weather conditions across Europe as a whole. When it comes to the expansion of wind energy, for instance, several European countries are simply following their own national strategies.

Wind parks are currently concentrated in countries bordering the North Sea. So if wind conditions there are calm due to a stable area of high pressure, Europe's whole wind energy production plummets. If European countries could cooperate to determine the future location of wind parks based on the overall weather situation, these fluctuations could be counterbalanced.

Potential locations include the Balkans, Greece, the western Mediterranean and northern Scandinavia. These are all places where the wind is still strong enough when a high-pressure front has calmed the North Sea. To compile their study, researchers took European climate data from the past 30 years and then compared it with wind and solar energy production data.

For more information on this and other research news from ETH Zurich, please visit → [www.ethz.ch/news-en](http://www.ethz.ch/news-en)

# More women in science!

Admittedly, universities are no longer the sole preserve of men. Nevertheless, women remain under-represented in science, particularly in technical subjects. In this issue of *Globe*, you can read about how and why that should change and what ETH is doing to make it happen.

## In 2013, 7 European countries

*(Bulgaria, Croatia, Denmark, Ireland, Latvia, Lithuania and Macedonia)*

**had more women than men working as scientists**

**and engineers.**  
**(Switzerland: 32%)<sup>1</sup>**

**17% of the top 200 universities in the world are led by women.<sup>2</sup>**

## Female peer mentors

**early on at university increase women's positive academic experiences and retention in engineering.<sup>3</sup>**

**Between 2010 and 2013, 9% of patent**

**applications in the EU registered a female inventor.<sup>1</sup>**

**The presence of women in corporate leadership positions improves firm performance.<sup>4</sup>**

**Astronomy publications with female**

**lead authors received 10% fewer citations than similar papers with male lead authors.<sup>5</sup>**

References:

<sup>1</sup>European Commission [2016], She Figures 2015; <sup>2</sup>THE World University Rankings 2015-16 [2016]; <sup>3</sup>T. Dennehy & N. Dasgupta [2017], PNAS;

<sup>4</sup>M. Noland, T. Moran & B. Kotschwar [2016], Is Gender Diversity Profitable? <sup>5</sup>N. Caplar, S. Tacchella & S. Birrer [2017], Nature Astronomy.

# Networks, role models and dedication

What helped me advance my career? And how can I support others? ETH women report on their experiences in the scientific arena and what they're doing to ensure that more women find their path to science and thrive.

EDITORS Simone Gohl, Isabel Nägele IMAGE Victoria Loesch & Christian Gerber



**LISA POULIKAKOS,**  
*doctoral student in the Department  
of Mechanical and Process Engineering*

Women make up half of the population and should have equal opportunity to shape the frontiers of science and technology. This was a motivation for me to co-found LIMES (Ladies in Mechanical and Electrical Studies) in 2010, an organisation for female students in the Departments of Mechanical and Process Engineering as well as Electrical Engineering and Information Technology. LIMES' goals include building a network among female students and future employers, and sharing our enthusiasm for engineering with female high-school students at our annual national outreach event. Being a part of LIMES has been a valuable and enriching experience and I have benefited greatly from the LIMES network. During my doctoral studies we launched LIMES researchers, our sister organisation for scientific staff, where we support women in their research careers. As a Master's student I also participated in the career building program Femtec, which opened up interesting professional perspectives. I can only recommend taking advantage of such opportunities.

**BIRGIT KESSLER,**  
*Head of the Office  
for Faculty Affairs*



The Office for Faculty Affairs supports the President of ETH Zurich in implementing measures to increase the number of women among the professorial staff. For instance, the departments are instructed to identify suitable female candidates early on in the recruiting process and to actively approach them. Moreover, women are explicitly encouraged to apply, and in the job announcements, it is emphasised that ETH Zurich is a family-friendly employer and is responsive to the needs of dual-career couples. To that end, in case of maternity, an extra year is granted in the tenure process, and age limits are handled more flexibly for female assistant professors with children. Furthermore, care is always taken to ensure the principles of equal opportunity, and that women are represented in important committees or are given appropriate consideration for award nominations.

**RIMA ALAIFARI,**  
*Assistant Professor  
in the Department of Mathematics*

**"My doctoral supervisor was a mother and successful mathematician. That is motivating."**

I find informal mentoring to be the most effective type of support: fostering scientific cooperation between senior and junior scientists. Not only was my doctoral supervisor a woman and a mother of two, she is also an extremely successful mathematician. That is incredibly motivating for me and shows me in a very hands-on way that, yes, it is possible to have both an academic career and a family. A lot of things are conceivable in theory, but when you have a living example right in front of you, and you collaborate with them for years, you not only know that it works, you also learn how to make it work. In my opinion, that's why we need a balanced share of men and women among lecturers and researchers who lead the way by setting a practical example.

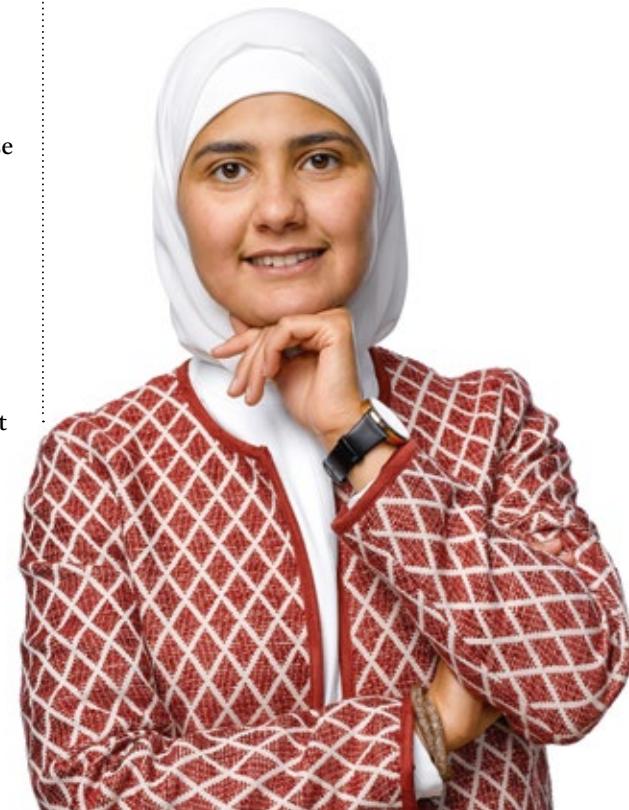
Image: Courtesy of Birgit Kessler

**URSULA KELLER,**  
*Professor in the  
Department of Physics*

My best decision, after completing my degree, was to attend Stanford University and then go to work at Bell Labs in the US. I enjoyed a great deal of support there – something that I haven't experienced in Switzerland to this day. I would like more women to play a role in determining our future through their work in the natural sciences. As long as the share of women in mathematics, computer science, natural science and technology professions remains below



30 percent, we need accompanying measures to ensure that these women can work successfully and that more women are motivated to specialise in these fields. Successful women should join forces to define specific measures. That was my motivation for founding the ETH Women Professors Forum, which was the first step in actively countering structures that hinder us and improving corporate governance.





## FOCUS

**TATJANA BRÜLSAUER,**  
student in the Department of Computer Science

**"At the start of my studies I sometimes felt intimidated among so many men."**

I have been an active member of CSNOW, the Network of Women in Computer Science, since my second year of study. We have organised a variety of events with the aim of making computer science studies more accessible to female school-leavers and connecting female students with each other and with companies. Personally, my membership really helped

me to get to know my fellow female students in various semesters and to pick up valuable tips. This is important because particularly at the start of my studies, as a woman I sometimes felt intimidated among so many men. It can be helpful to talk with other women in the same situation. I think diversity is very important in general, since people of different genders, ages and backgrounds contribute different ideas and perspectives to discussions.

**SUSANNE ULRICH,**  
Professor in the Department  
of Environmental Systems  
Science

I benefited from a doctoral supervisor and postdoc environment that gave me a lot of freedom regarding the content and structure of my work. This enabled me to have a family as well as a professional life. Women face the challenge of managing their research careers alongside their role as mothers. In German-speaking countries, there is a cultural aversion to the delegation of family responsibility. I was able to learn a great deal from other cultures and role models in this regard, and apply it within a partnership that was not afraid of following an unconventional path. In my research group, I try to talk about remaining in research after starting a fam-



ily as a matter of course, so that female researchers do not feel pressured either to delay starting a family or else feel as if they have to choose between research and family.

**HEIDI WUNDERLI-  
ALLENSPACH,**  
first female Rector of ETH  
Zurich, Society in Science

The Branco Weiss Fellowships, of which I am privileged to be a co-director, are a great opportunity for young scientists. Since 2010, of the total of 54 fellows, 29 are women, and of these, more than half have children. This encouraging result is likely due in large part to the generous conditions of the fellowships: five



years as a postdoc with CHF 100,000 per year in a research field of the recipient's choice at a recognised institution anywhere in the world. The procedure for awarding the fellowships is extremely competitive, so a successful application decisively boosts the winners' self-confidence, and their courage to take on responsibility grows. The Branco Weiss Fellowships cultivate a culture of enablement, which also benefits young women in particular. This is very important as, like men, women need to take on responsibility, and they can make an important contribution to solving problems "from a slightly different perspective".

## FOCUS

**"Having more women in science helps by giving girls role models they can relate and aspire to."**



**MARYAM KAMGARPOUR,**  
Assistant Professor in the Department  
of Information Technology & Electrical  
Engineering

During my PhD studies in the USA, I volunteered weekly in several public elementary schools to teach engineering to girls. The girls I taught loved learning how rockets, calculators, robots and other things work. They were excited to build simple models of them too. Isn't it strange that only a small fraction of these girls will pursue this interest and choose engineering as a career? Having more women in science can help. It helps by giving girls role models they can relate and aspire to. It also helps by diversifying the work environment such that girls feel more confident and comfortable to be the whole of who they are while pursuing their scientific talents. At ETH, the classes I teach have less than ten percent female students. I like to share the joys and possibilities that my career brings me with my students. I hope this inspires them to explore their full potential in an engineering or an academic career and to persist in the face of challenges.

**ASSOCIATIONS FOR WOMEN  
AT ETH ZURICH:**

- Network of Women in Computer Science (CSNOW), D-INFK
- Ladies in Mechanical and Electrical Studies (LIMES), D-MAVT and D-ITET
- The Society for Women in Natural Sciences (WINS), D-CHAB
- BauingenieurinnenFORUM, D-BAUG
- Network of female water engineers (NeWI), D-BAUG
- Parity Group (AAA), D-ARCH
- EqualiTee team, D-ERDW
- Phimale, D-PHYS and D-MATH
- Women Professors Forum (WPF)

[→ www.ethz.ch/equal-associations](http://www.ethz.ch/equal-associations)

# Where are the women?

ETH Zurich goes to great lengths to recruit and retain women. And yet it will still be a while before the number of female students and professors at ETH increases. Renate Schubert, Associate Vice President for Equal Opportunities, and Betty Friedrich, a doctoral student in the Department of Biology, discuss why this is so.

INTERVIEW Martina Märki and Nicol Klenk IMAGE Daniel Winkler

**P**rofessor Schubert, the proportion of female students at ETH has remained stagnant for years, at around 30 percent, despite all efforts to improve things. That must be frustrating for you as Associate Vice President for Equal Opportunities. When were you last tempted to throw in the towel?

Renate Schubert – Never! Equal opportunity is an exciting subject, but it was clear to me from the start that it would demand patience. Our predecessors paved the way, and we are moving forward in a promising direction. All the same, we keep looking for good ideas on how to speed up the process.

*What's your view of the situation at ETH as a doctoral student, Ms Friedrich?*

Betty Friedrich – Women are better represented in biology than in other disciplines. Still, when I applied to study at ETH, I understood there are fewer female students here than at other universities.

*Why does ETH have a poorer track record?*

Schubert – For one, ETH Zurich has a strong focus on natural sciences and technology. Another impediment is that, unlike American universities, we cannot choose which students are admitted to our Bachelor's degree programmes. If we were entitled to, we could take deliberate steps to enrol more women. But for now, we simply must accept that fewer women than men will apply to study at ETH. All we can do is to ensure that the women who do come to ETH also remain here. And keep on trying to motivate as many young women as possible to take an interest in sub-

jects such as computer science, mechanical engineering, electrical engineering and physics – and choose to study at ETH. One complicating factor: subjects such as engineering and computer science are rarely taught in secondary schools.

*But that doesn't prevent boys from developing an interest in these subjects...*

Schubert – That is true. It is perhaps because boys tend to be somewhat more interested in all things technical. Girls, on the other hand, still often have to fight an uphill battle against gender stereotypes. Even nowadays, if a young woman wants to study physics, for example, she will raise a few eyebrows, especially among her family and friends. Until attitudes change, only the most self-confident girls will have the courage to follow their dreams.

Friedrich – My family regards science and technology as something positive. I was fortunate that nobody ever told me: "It doesn't matter if you're bad at maths; after all, you're only a girl." But I do know that such prejudices still exist. I think it is very important to break down stereotypes as early as possible. But I do not think that a selection procedure as mentioned by Professor Schubert would be very useful.

*So, you're not in favour of quotas for women?*

Schubert – I am not a huge fan of imposing quotas at all costs, but we do need to set targets. It is unacceptable that the student population comprises only 30 percent women on average. It would be a great leap forward if we managed to improve percentages in disciplines with high student numbers such as mech-

anical engineering, where men significantly outnumber women. I think ETH could reasonably aim for an overall target of 35 to 40 percent.

Friedrich – I can go along with that, but if there has to be a selection procedure, I still think university openings should be awarded based on merit, not gender. What I like, on the other hand, is that certain

departments keep "watch lists" of particularly promising female scientists. It makes sense to keep tabs on people that ETH would like to recruit.

*As for professorships, the proportion of women is even lower than for the student body. Are watch lists a sufficiently effective countermeasure?*

Schubert – It is important that all appointments committees have an explicit mandate to seek out qualified women. Unfortunately, women tend to limit their options by applying for advertised posts only if their profile exactly matches the published job requirements. That is why we encourage female postdocs to submit applications even if their qualifications don't tick all the boxes. Universities looking for new professorial staff should be able to pick from a pool containing as many talented individuals as possible, regardless of their gender. >



**"Our ideas will not work unless society is ready to accommodate them."**

BETTY FRIEDRICH-GRUBE

Betty Friedrich (left) and Renate Schubert discuss measures to improve gender equality.

*For many people, the situation can be summed up as “fewer female students, fewer female applicants, and hence fewer female professors...”*

Schubert – This is not a logical conclusion, and the statistics back this up. Many women drop out of the academic system at some point, which is known as the leaky pipeline effect. It is more pronounced in certain disciplines, such as biology, which a comparatively large number of women choose to study but many of whom then abandon.

*What stops these women from carrying on from their initial studies?*

Friedrich – One main reason is that it is difficult for women to balance career and family. In academic life, one must make certain compromises at the outset to succeed. Biology is a case in point, because a stay in the United States is more or less obligatory – with no assurance that a post will be waiting if you return to Europe. And if you have personal obligations, the cards are stacked against you from day one.

Schubert – Perhaps women should be more prepared to take risks. It is not impossible to have career ambitions and a family, but it takes good organisational skills and a supportive partner to succeed. You also need a lot of energy and the courage to say, “I don’t know which country or city my children will go to school in, but that’s OK.” It is not everyone who can embrace such uncertainty.

*Can people solve this by taking the matter into their own hands?*

Friedrich – No. Even ETH can offer only partial solutions as an employer. If, for example, the university made it possible for parents to split their parental leave, only a few people would profit from the arrangement. And if the other parent does not work for ETH, then the option does not apply anyway, because other Swiss organisations or companies do not offer this kind of arrangement. It is different in Germany, where parental leave is much longer and can be arranged in other ways. Switzerland is not the most family-friendly country, so no matter what ideas ETH tries to implement, they will not work unless society accommodates them.

Schubert – Social and cultural factors certainly play a key role. But when talking about jobs or careers in science, there’s another aspect that needs to be considered: there are an awful lot of people out there – especially overseas – who are competing for the same jobs, and would do anything to get ahead. It probably would not be too difficult for ETH to find the money to finance an additional year of parental leave; the more important question is what consequences this would have on our research and

teaching – in short, the scientific excellence of ETH Zurich.

*Ms Friedrich, you’re currently working on your doctoral thesis. Would you like to remain in academia?*

Friedrich – To be honest, family is important to me. Lots of travelling, being flexible, and planning my life around my career in the hope of one day being offered a professorship is not what I have in mind. The academic world, such as it is today, is not always motivating. But I do want to find a job in my field.

## “I wish young women had more faith in themselves.”

RENATE SCHUBERT

*What can ETH do to make it easier to balance work and family?*

Friedrich – The university is already doing a lot, for instance by expanding its day care facilities.

Schubert – We are doing the best we can to meet the needs of our students and employees. For example, the kizh Flex programme launched a year ago offers a child-minding service that people can book for even just half a day. It has proven to be a good solution, particularly for students.

*Female scientists also have other obstacles to deal with. Studies show that research papers published by women draw less attention and fewer citations...*

Schubert – The evidence is somewhat mixed, but the visibility and acceptance of women certainly is important. For decades, men have nearly always decided which areas of research are given the most attention. Women who propose research outside the mainstream often have their proposals rejected. Many women are interested in interdisciplinary subjects, which do not fit the traditional pattern. That is why I am so pleased that ETH systematically supports interdisciplinary research. Another point to note is that people, regardless of their own gender, generally use an entirely different vocabulary when writing performance assessments for women than they do

for men. Therefore I think it is important that members of tenure committees and the like are aware of such unconscious biases.

*ETH launched a Gender Action Plan in 2014.*

*What issues does it deal with?*

Schubert – The Gender Action Plan is an initiative of and strongly supported by the Executive Board. It focuses on four main issues: career planning and development in the academic world; the integration of gender aspects in teaching and research; ways of balancing family commitments with work or study; and addressing sexual harassment and discrimination. It is key that the Executive Board and the Office of Equal Opportunities are not solely responsible for implementing the appropriate measures – each department must play its part, too. It is above all a question of creating a culture of respect in which every man and woman at ETH has the same opportunities.

*Has the Gender Action Plan been a success?*

Schubert – We evaluated progress on the Gender Action Plan in 2016, and were pleasantly surprised to see how hard the departments had worked on it. One nice example is the family room created by the Department of Earth Sciences. It allows mothers and fathers who work or study in the department to bring their children along if their usual day care arrangements are temporarily unavailable.

Friedrich – The idea of a family room is great – the Department of Biology has not thought of such things yet. We obviously have some catching up to do. And we still have comparatively few female professors in relation to the high number of female students.

*Does the situation vary strongly among departments?*

Schubert – That is what our evaluation showed. Perhaps counter-intuitively, departments with a high proportion of female students do comparatively little, whereas departments with fewer women tend to be more actively engaged. The Department of Computer Science, for instance, has invested a lot of time and effort over many years to encourage more young women to study there – but the number of female students has remained very low. Maybe the university has reached the limit of what can be done on its own.

*What arguments do you use to convince people who think that equal opportunities for men and women in science are of secondary importance?*

Schubert – The chief argument for a university is that increasing the proportion of women improves the diversity of viewpoints and approaches to research.

This in turn augments the potential for making new discoveries. An organisation that wants to preserve its excellence needs to retain and make the best possible use of the available human capital.

*If a genie gave you one wish that would improve the status of female scientists, what would it be?*

Friedrich – Actually, we are making pretty good progress at ETH. We have our second female rector, and that is not a bad start. It would be even better if more women were appointed to the Executive Board.

Schubert – I wish young women had more faith in themselves, believed in their ability to realise their dreams, and understood that it is possible to balance career, family and anything else that is important to them. I sometimes get the impression that they lose heart without at least giving it a try. ◎

### RENATE SCHUBERT

Renate Schubert is a Professor of Economics at ETH Zurich. At the end of 2008 she was named Associate Vice President for Equal Opportunities and has since headed the ETH Office of Equal Opportunities.

### BETTY FRIEDRICH-GRUBE

Betty Friedrich is a doctoral student at the university’s Institute of Molecular Systems Biology. As Vice President of the Academic Association of Scientific Staff at ETH Zurich (AVETH), she represents the interests of all doctoral students.

# Three women, three careers

TEXTS Isabelle Herold, Felix Würsten, Corinne Johannssen

IMAGE Annick Ramp

24



*As an entrepreneur,  
Sabrina Badir has had  
to forge her own path.*

“Female students should see that there are women professors, too, in electrical engineering.”

GABRIELA HUG  
Professor of Electric Power Systems

25



**I**talented young scientist Laura Corman, spin-off founder Sabrina Badir, and professor Gabriela Hug: all three women work at ETH, but in many ways they couldn't be more different. What they do share, however, is a love of science, an urge to discover something new and to forge ahead as scientists or entrepreneurs. Here is a glimpse into their professional worlds.



## The up-and-coming researcher

**LAURA CORMAN** For most people, the world of cold atoms is likely to be somewhat of an enigma. In contrast, Laura Corman (a postdoctoral researcher at the Institute for Quantum Electronics) can't hide her enthusiasm when she explains how atoms suddenly become visible and gather into clouds. For her, this is a unique visual experience – almost magical. The cooling of atoms to near absolute zero allows scientists to draw conclusions about the behaviour of electrons in solids. Laura Corman

enjoys popularising science and succeeded in taking her complex subject through to the finals of the competition "Ma thèse en 180 secondes" (My thesis in 180 seconds). Here, she compared atoms to the spectators in the hall: If they have time, they occupy an even spread of seats. If you stop them abruptly, however, there are gaps here and collisions there. "After that, even my grandmother understood what my work is about," the 29-year-old says.

Corman discovered her passion for science as a ten-year-old when she visited an amateur observatory during the summer holidays in Provence. She is enormously grateful to her parents – her father is an engineer in the automobile industry, her mother a teacher – for giving her and her younger brother the opportunity to discover different worlds from an early age. When she went to university, she moved from the northernmost tip of France to Paris. There, whole new horizons once again opened up before her: "As I experimented with my own projects, I increasingly understood how things were connected." In her spare time, she became involved in an association helping socially disadvantaged children to learn mathematics and physics.

When it came to studying for her Master's in physics, she toyed with the idea of an exchange in the USA. Then some colleagues brought ETH to her attention, and she applied immediately. The interest was mutual: ETH offered

Corman an Excellence Scholarship, and her move to Switzerland was settled. To round off her year, she received the Willi Studer Prize for her outstanding mark in her final Master's examination.

As a woman, she has always been in a minority within her subject. As far as she is concerned, though, this has hardly made any difference – or rather, just once. This was when Corman felt that she was getting less interesting work to do than her male colleagues during an industrial internship. Being a direct person, she refused to accept that. In hindsight, she wondered to what extent the problem really had to do with the fact she is a woman, or whether perhaps prejudices were distorting her perception. "Men probably never ask themselves questions like that," Corman acknowledges thoughtfully.

When Professor of Quantum Optics Tilman Esslinger invited her to return to his laboratory at ETH after her doctorate in Paris, she did not hesitate for a moment. The team is fantastic, the infrastructure and support superb, says Corman. She is now receiving support from the ETH fellowship programme for promising postdoctoral researchers, although she still finds it a huge challenge to give lectures in German. In order to improve their language skills and make some contacts, she and her partner play handball at the ASVZ.

"Whether it's handball or German, we are total beginners in both," she laughs. Corman is adamant that she would continue to pursue her career, even if she were to become a mother someday. In France that's the norm, she explains, although the conditions there are somewhat different: a single income is not usually enough to get by, but then day care places are affordable and in sufficient supply. Corman gets annoyed that it is often only women who are confronted with the issue of reconciling work and family life. Nowadays that's just as much a matter for men, and it's mainly a question of organisation.

Where her career path will one day lead her still remains to be seen: "It would be fantastic to establish my own group at a university. But exciting possibilities

might be lying in wait in other places too – everything is left to play for."

– Isabelle Herold

Quantum Optics Group:  
→ [www.quantumoptics.ethz.ch](http://www.quantumoptics.ethz.ch)

wide range of people. The time she spent on coordination kept increasing. "I had no experience in project management, so I attended a course at ETH to learn the basics." Even today, she still remembers this course clearly. It was the first time anyone asked her whether she would consider setting up her own company. "I had never asked myself this question before. But the longer I thought about it, the more I liked the idea."

With the support of her academic supervisor, Badir successfully applied for an ETH Pioneer Fellowship, which helped her to establish her company, Pregnolia. About her motivation for doing this, she says: "I wanted to give something back to society by creating a device for clinical practise after I had finished my doctorate." In fact, the need for it is evident. Seven to nine percent of expectant mothers deliver prematurely, with the associated adverse effects for their children. If clinicians identify the risk of a premature birth early enough, they can treat the women in question with medication so that they carry their babies to full term.

The Pregnolia team now consists of five members, and there is no shortage of work. "We are currently verifying our method in a large-scale study of 1,000 women," says Badir. "If the outcome is positive, we will be able to register our device as a diagnostic tool." Badir has been able to secure the cooperation of several big hospitals in Switzerland. However, at the moment she is primarily concerned with finding investors. "Thus far, the fellowship and the prize money that we have won in competitions have enabled us to make ends meet. Now, though, we need considerably more money to allow us to take the project into the next stages." The search for backers is proving to be more difficult than anticipated.

Badir had to learn that someone who expresses an interest is still a long way from becoming an investor. "Lots of potential investors would be willing to back us – but only at a later stage, when we have a market-ready product. As things stand, the risk is too big for them." >



**"I wanted to give something back to society by creating a device for clinical practise after I had finished my doctorate."**

**SABRINA BADIR,**  
Founder of ETH spin-off Pregnolia

Pioneer Fellowships enable ambitious researchers to develop their ideas into market-ready products. Further information and possibilities to promote the program can be found here:  
→ [www.ethz-foundation.ch/en/pioneer-fellowships](http://www.ethz-foundation.ch/en/pioneer-fellowships)

Nevertheless, Badir is confident that the project will succeed. "Essentially, everything is there: the need for a reliable way to detect premature births, a tool that is easy to handle, an effective treatment option, and considerable market potential." And last, but not least, the fledgling company has an established team as well as a dedicated boss who communicates her objectives in an eloquent and persuasive way to the outside world. – Felix Würsten

Founder of ETH spin-off Pregnolia:  
→ [www.pregnolia.com](http://www.pregnolia.com)



## The professor

**GABRIELA HUG** She isn't a loud campaigner or someone who is determined to impress her beliefs on others. She is simply happy that she has found the best model for herself and her family. Gabriela Hug is a professor at ETH Zurich, while her husband stays at home full-time with their three children. "Funnily enough, my experience of the gender issue tends to come from my husband's side – we hear a lot of remarks," says Hug. "I feel much more accepted as an ETH Professor for Electrical Engineering than my partner does as a full-time house husband." If a

school asks mothers for their mobile number to put on its telephone list, it naturally asks fathers for their business number. "For a man to work even part-time is unusual, but our case is about as atypical as it gets," Hug laughs.

At work, she is immersed in electrical engineering and research at the Power Systems Laboratory. As a scientist, she focuses on the power grid. She creates models, does calculations, and answers questions which are now more relevant than ever. For instance, if I suddenly find that a large or a small amount of wind or solar power is available, how do I ensure that energy consumption and production balance each other out? In this period of energy transition, her research captures the spirit of the age.

Times were different when, as a high school student, she took part in a robotics course for girls organised by the Swiss Youth in Science foundation. At that time, people were considering abolishing all professorships in the field of power grid research – because they felt sure that they already knew everything there was to know. Once she had programmed her robot dog, Hug was sure of one thing: she wanted to study electrical engineering.

After completing her degree in electrical engineering and going on to do her doctorate at ETH Zurich, she moved into industry. Together with her husband, she went to Canada – but just for one year. The offer of an assistant professorship at Carnegie Mellon University in Pittsburgh drew her back into the world of academia. "I realised that I missed the freedom as well as the opportunity to research longer-term issues," says Hug.

For two years now she has been an associate professor at ETH, based in the same office that her supervisor once occupied. Now, she is the one who decides who she brings on board. "I welcome every application from female candidates," says Hug. "But I don't give them preferential treatment. I just take the best applicant, male or female." At the moment, 2 of her 12 doctoral students are female.

Even though her research group doesn't contain any set quota of women, she is always available to listen to her female students. "The annual spaghetti dinner for first-year female students is very important to me," says Hug. "They should see that there are women professors, too." In her day there wasn't a single female professor in electrical engineering, but nowadays women hold 4 of the almost 40 professorships at the Department of Information Technology and Electrical Engineering.

In the US, a new regulation was introduced at her university shortly before she returned to Switzerland. This required all members of appointment committees to attend unconscious bias training, which helps them to resist the pull of subconscious stereotyping when assessing candidates. "Perhaps that isn't direct advancement of women, but at least it guarantees that nobody is disadvantaged," says Hug.

During her time as an assistant professor in the US, what she most appreciated was being able to share her thoughts with other female researchers. "That helped me a lot at that stage of my career. I realised that other women are facing the same challenges and have similar concerns to my own," remembers Hug.

Exchanging ideas face to face is something that remains important to her today. Now, though, she mainly takes more of a supportive or advisory role. When asked about her three little boys and her ETH professorship, she gladly offers information. However, she doesn't want to impress her own family model on anyone. Nonetheless, she is grateful to her husband, her greatest supporter, for making it possible for her to pursue her career in this way.

– Corinne Johannsen

Power Systems Laboratory:  
→ [www.psl.ee.ethz.ch](http://www.psl.ee.ethz.ch)



**"It would be fantastic to establish my own group at a university."**

**LAURA CORMAN**  
Postdoctoral researcher at the Institute for Quantum Electronics

**T**he catalogue of measures issued by the Department of Civil, Environmental and Geomatic Engineering (D-BAUG) at ETH Zurich runs to five pages. It contains 22 concrete proposals for making the department a better place for women, based on the Gender Action Plan approved by the Executive Board in 2014. The purpose of this action plan is to assure gender equality throughout the university.

## More female engineers

The Department of Civil, Environmental and Geomatic Engineering has worked harder than most to implement ETH Zurich's Gender Action Plan. Numerous measures are being taken to promote career opportunities for women.

TEXT Andrea Schmits

D-BAUG obtained a high score in the evaluation of the results of the action plan in 2016. "My predecessor Ulrich Weidmann set the wheels in motion and now it's my job to see the project through," says Head of Department and Professor of Structural Engineering Thomas Vogel. Women are rarely seen in the corridors of the HIL building on the Hönggerberg campus, where the professor has his office. As Vogel points out, civil engineering has traditionally been a male-dominated field. "When we organised an excursion to a tunnel site 30 years ago, the miners refused to let women in – out of fear that their patron saint, Barbara, would be jealous." Things have improved since then, but there are still significantly more men than women studying and working in the department.

Other actions include an onboarding event for new recruits, a quiet room for nursing mothers, and a gender aware-

**"When you have a family, you don't fit the norm."**

ADRIENNE GRÉT-REGAMEY

ness campaign in which successful female researchers or entrepreneurs talk about their work. Guaranteed access to day care facilities and extended maternity leave are also under discussion. Vogel admits that "we can't do everything we'd like to. The intentions

### From mentoring to day care

One of the most important actions proposed to increase the number of women in D-BAUG is a mentoring programme for postdocs and other senior-level researchers. The mentors are tasked with providing career support – regardless of the supervisor's opinion and whether the scientist intends to stay with ETH Zurich or seek employment elsewhere.

are there, but sometimes reality forces us to make concessions."

The goal of these changes is to encourage more women to stay in the department because, as elsewhere at ETH, D-BAUG is confronted with the so-called leaky pipeline problem: the departure rate of women increases at each level up the career ladder. Whereas more than a quarter of undergraduates are women, the ratio drops consistently from the postdoc stage onward. Currently, D-BAUG has 5 female professors as opposed to 35 men in equivalent positions.

### Outside the norm

One of them is Adrienne Grêt-Regamey, Professor at the Chair of Planning of Landscape and Urban Systems (PLUS) in the Institute for Spatial and Landscape Development. "When you have a family, you don't fit the norm," says the mother of two boys aged 11 and 14. For women who have a gap in their CVs because they took a couple of years out to raise their children, it's hard to find a good job again. "ETH Zurich and other universities ought to show more courage and consider such candidates for high positions," she adds.

As Vogel sees it, one problem is that the concept of work-life balance is new to Swiss culture. All-day schooling isn't always available and there are too few day care centres. "In short, we lack the infrastructure that would allow mothers to pursue their careers," he says. And house husbands aren't given the recognition they deserve. He continues: "The Scandinavian countries are way ahead of us in that respect."

D-BAUG aims to set an example, but one based on diversity rather than establishing a women-only ETH. As Vogel explains, "Men and women approach problems from different angles. A culture in which they work together produces better results." The five-page catalogue of measures represents a huge step in the right direction, but it will take a good while before the Gender Action Plan needs no further assistance. Vogel says, "It's much too soon to rest on our laurels." ○

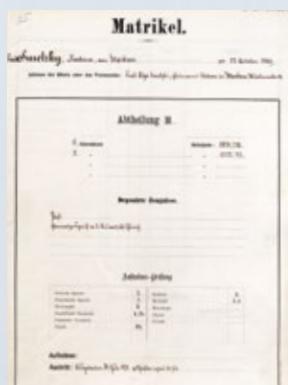
## The pioneering women of ETH

**1855** ETH Zurich opens its doors. Women are permitted to enrol – earlier than in other European countries.



The Zurich polytechnic (1855)

**1871** The first female student, Nadina Smetzky from Russia, takes up her studies in mechanical engineering.



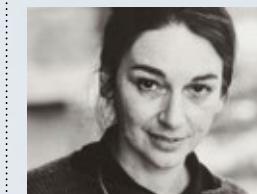
Registration of first female student

**1877** The first female graduate is likewise Russian: Marie Kowalik completes her degree in agronomy and forestry.



Image: Crafft; ETH Library Image Archive (3) and ETH Zurich University Archives

**1895** The first Swiss female student, Maja Knecht from Zurich, obtains her degree in the natural sciences.



Flora Ruchat-Roncati (1986)

**1897** After much to and fro, Marie Baum is given a fixed-term one-year contract as the first female scientific assistant in the analytical chemistry laboratory.

**1909** Pharmacist Hedwig Delpy is the first woman to obtain a doctorate. Pharmacy becomes a popular discipline among women.



Pharmacy group photo including women (1933)

**1910** Laura Hezner completes her habilitation to become the first female senior lecturer in chemical mineralogy and petrography.

**1976** The association of students at ETH elects its first female president, Barbara Haering, who later goes on to become a member of the Federal Assembly of Switzerland.

Source:  
→ [www.ethz.ch/equal-history](http://www.ethz.ch/equal-history)

**1985** Architect Flora Ruchat-Roncati is appointed as the first female professor at ETH Zurich.



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for the future."**

Martin Müller,  
R&D Engineer



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Der STAB-Jahres-Preis 2017 geht dieses Jahr an

**Prof. Dr. Lino Guzzella**

Professor am Departement für Maschinenbau und Verfahrenstechnik und Präsident der ETH Zürich.

Die Feier findet am **Samstag, 4. November 2017**, um 10.30 Uhr im Auditorium der ETH Zürich statt.

Weitere Information zur Preisverleihung und Anmeldung sind zu finden unter: [www.stab-ch.org](http://www.stab-ch.org)

The graphic features the ETH Zürich logo at the top. Below it, a blue bar contains the text "Are you looking for a new job? Check the ETH Alumni Jobplattform — THE job opportunities exclusively for ETH Alumni. [www.alumni.ethz.ch/jobplattform](http://www.alumni.ethz.ch/jobplattform) →". The background shows a newspaper clipping with the words "Looking for EMPLOYMENT" and "Alumni" visible.

# COMMUNITY



A computer-generated visualisation of the DFAB House

**DFAB House**

## ROBOT BUILD

At the Empa and Eawag NEST building in Dübendorf, eight professors from ETH Zurich are collaborating with business partners to build the three-storey DFAB House as part of a project initiated by the National Centre of Competence in Research (NCCR) Digital Fabrication. It is the first building in the world to be designed, planned and built using predominantly digital processes. With this pilot project, the participants are looking to find out how digital technology can make construction more sustainable and efficient. Work began in the summer, and the building is expected to be ready in summer 2018.

33

**WEF China**

## DEMYSTIFYING QUANTUM

ETH Zurich was well represented at this year's World Economic Forum (WEF) Annual Meeting of the New Champions in Dalian, China, which focused on the Fourth Industrial Revolution and how technology can empower people and serve society. ETH Professors Jonathan Home, Sebastian Huber and Vanessa Wood presented an IdeasLab on "Demystifying Quantum", where they discussed the potential of quantum physics for future technologies. During the "Ask a Scientist About" sessions, Huber demonstrated how to harness precise quantum control for simulation-machines tailored to provide answers to specific questions relevant for our understanding of future materials. He

**Circle of Innovation**

## INVESTING IN THE FUTURE

The Mirabaud Group and the ETH Zurich Foundation have hosted the inaugural Circle of Innovation, an event in which students of ETH Zurich were able to present their spin-off ideas to potential investors. The event kicked off a project that has been designed to help talented young people make a successful transition from academia to industry. The idea behind the Circle of Innovation is to make contact between students and investors as direct and straightforward as possible. In this, it supports the existing spin-off encouragement initiatives.

20 years of ETH juniors

# Students acquire practical experience – and companies valuable expertise

From app development to market analysis: talented students in the ETH juniors club have supplied expertise to companies for 20 years. A success story.



The leaders of ETH juniors are themselves ETH students.

Up the hill from the ETH Main Building stands the small home of ETH juniors, on the idyllic Zürichberg. They have worked their way up, so to speak. Twenty years ago they had to knock on every door at the university in search of a place to call their own. It was on Floor G of the Main Building back in 1997 that the five founding members of ETH juniors wrote the first chapter in the success story of this student club. The driving force behind it was Frank Floessel. At the time, he was an electrical engineering student and president of the Mechanical and Electrical Engin-

eering Club for Students. He knew that there were junior enterprise organisations at other universities, and decided that he should create a club like that for ETH students and Swiss companies. After all, Floessel emphasises, it's a win-win situation: "Students gain insights into the working world while getting some experience, and companies benefit from the students' sound expertise and reasonably priced services."

ETH juniors have offered many different services over the years – ranging from IT solutions, such as developing apps, to business management work-

shops and market analyses. Most jobs involve engineering, however, and reflect business challenges that intertwine with degree programmes at ETH Zurich. "Companies especially value students' expertise on cutting-edge technologies, such as machine learning or big data," says Robin Bloch, current president of ETH juniors. He adds that students get extra credit for sharing creative ideas with customers.

The president and his nine fellow ETH juniors are all responsible for handling customer projects, in addition to their individual tasks. All ten members organise meetings with customers and seek out suitable students for collaboration. Bloch points out that they strive to make their group a "school for entrepreneurs" that exemplifies start-up culture. Small wonder then that many ETH juniors later work as consultants, or combine forces with fellow former members to found a company. The start-ups Tempobrain, Climeworks and GetYourGuide were all founded by alumni of ETH juniors.

For these reasons, Floessel regards the club that he founded not only as a corporate consultancy, but also a hotbed of talented students. He is thrilled with the work of ETH juniors who followed in his footsteps. "Every member takes on a lot of responsibility, which makes it difficult to keep finding such dedicated students time and again. I'm very proud of them." But talent and motivation alone are not enough. The club benefitted early on from financial assistance provided by ETH, and con-

tinues to enjoy the advantages that come with being allowed to use the prestigious ETH brand name.

Floessel and his fellow club members were so successful that they became financially independent during the first financial year. While the profits were then solely used for the compensation of its members, ETH juniors now invests a share of profits into a fund of their own, the recently created jFund. "The aim of the fund is to provide financial support to start-ups and other projects that former members oversee," Bloch says. jFund has already written its first success story: Careship, a new online platform that arranges senior citizen care on an hourly basis. After receiving start-up capital from ETH juniors, Careship has since benefitted from an investor who provided four million dollars.

a situation that led to the recent Flyer-Bits project. A start-up had the idea to use an app to disseminate flyers from a varied range of local brick-and-mortar businesses. Smartphone users earn a few cents every time they read a company's flyer. Users can choose to cash out their earnings, or donate them to charitable organisations. Although the idea was sound, the start-up lacked the IT expertise to make it a reality. ETH students then stepped in to develop, design and implement the app – seeing the project through from start to finish. "We think it's important that students have a chance to do a job from A to Z," says Bloch. It took four months of development work to complete the app.

Bloch hopes that ETH juniors continue taking on front-line projects, crafting new technology solutions for businesses while honing their own capability to innovate. ETH juniors exhibit the same strengths today as they did 20 years ago. Founding member Floessel therefore remains confident that the club will continue to write one success story after another.

— Meryem Riahi

More information on the club:  
→ [www.ethjuniors.ch](http://www.ethjuniors.ch)



## Considerable potential in the IT industry

It might not surprise, that the first start-up success was in IT industry. Most young people have grown up using modern technology and are at home in the digital world. Established companies, however, often lack experience with the latest technologies. It was such

*Philanthropy*

## A BRIDGE BUILDER IN EVERY SENSE

Christian Menn is one of Switzerland's most prominent bridge builders. Anyone who has driven along the San Bernardino motorway will remember the filigree curves of his prestressed concrete arch bridges. His work on more than 100 major road bridges has brought Menn international renown. Born in Meiringen in 1927, he completed his doctorate at ETH Zurich in 1950, becoming a civil engineer. In 1957, he founded his own office and, as an ETH professor from 1971 to 1992, shaped generations of civil engineers – as well as Switzerland's roadscape.



Owing to his wealth of experience, the engineer served as a consultant

well into his retirement years to help solve particularly difficult design problems. The 90-year-old

still loves to help, also through his philanthropic bridge-building efforts: Since 2013, Menn has been supporting young ETH talent with the help of the ETH Zurich Foundation with the Excellence

Scholarship & Opportunity Programme (ESOP) – his way of passing on some of the advantages he enjoyed as a young student.

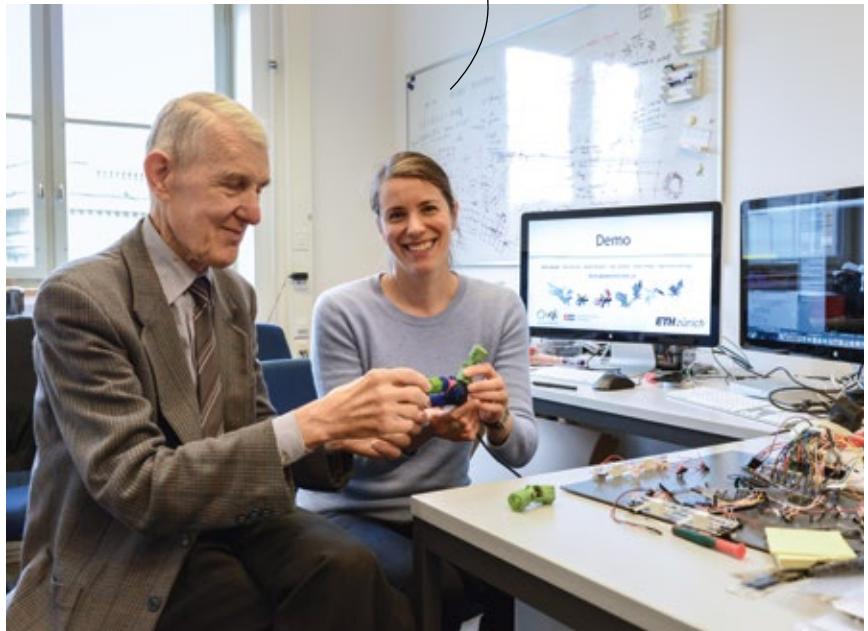
Information about ESOP:  
→ [www.ethz-foundation.ch/en/excellence-scholarships](http://www.ethz-foundation.ch/en/excellence-scholarships)

*Zurich alumni***CAUSE TO CELEBRATE**

On 30 June, the Zurich regional group of ETH Alumni celebrated its 100th birthday with three afternoon events and an anniversary dinner in the *Zunfthaus zur Meisen* guildhall. The Zurich group is one of the oldest in the ETH Alumni Association. Zurich group president, Heinz Mäder, opened the evening by recalling how it all began on 11 July 1917 with the founding of the "Mechanical Engineers Group of the Zurich Polytechnic Alumni Society" (Maschineningenieur-Gruppe Zürich der GEP).

*Heinz Mäder kicks off the evening.**ETH vocational education  
and training*

ETH isn't all about research and study. Young people also have the opportunity to complete an apprenticeship here. Vocational training concentrates on technical and commercial careers. This summer, 52 apprentices successfully completed their training. ETH Zurich is currently training a total of 165 apprentices and interns.

*Olga Sorkine shows Max Rössler one of her developments.**Rössler Prize***COMPUTER SCIENTIST  
HONOURED**

The ETH Zurich Foundation has awarded this year's Rössler Prize to ETH Professor Olga Sorkine for her pioneering work in computer graphics. Funded by ETH alumnus and mathematician Max Rössler, the prize comes with an award of 200,000 Swiss francs in research funding. It has been awarded to young professors of merit each year since 2009.

Professor Sorkine is only the second woman to receive the prize. The computer scientist has made a name for herself with her innovative methods for modifying and animating the surfaces of complex geometric figures, represented by innumerable small surfaces, in real time. The ETH Zurich professor is a world-leading authority on geo-

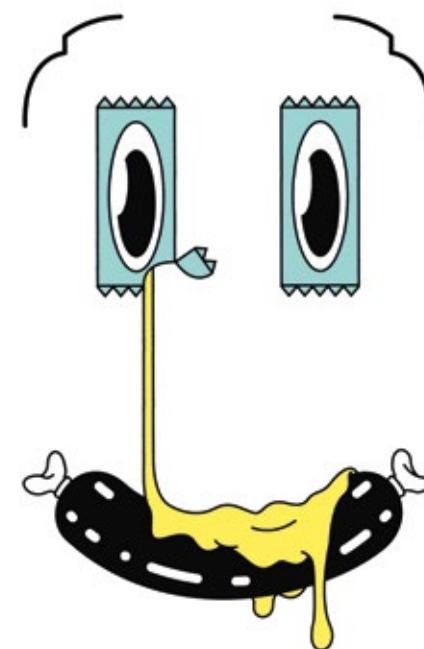
metric modelling and digital geometry processing.

Applications include animated figures for the entertainment and film industry. However, Sorkine has also worked with hearing aid manufacturer Sonova to digitally plan personalised hearing aid shells and manufacture them from a single piece. Similar methods are used in dentistry and architecture.

Sorkine has already won some prestigious awards, including ETH Zurich's Latsis Prize in 2012 and a coveted ERC Starting Grant. She has also won some of the most significant awards in the field of computer graphics, including the ACM SIGGRAPH Significant New Researcher Award in 2011 and the Eurographics Outstanding Technical Contributions Award in 2017.

Olga Sorkine has already received several high-profile awards

was too much effort to put out, refill and clean. Instead, customers help themselves to a single-portion sachet.

*Column***How to wrap  
five eggs \***

**A**n exhibition on Japanese culture offered the perfect solution to this conundrum. Aesthetic packaging that also saves space and protects the contents has been developed to a high art in Japan. I therefore wish to pay tribute to the art of packaging engineering, which I see as the epitome of interdisciplinary collaboration: it requires intensive knowledge-sharing about packaging materials, the physics of forces, the chemistry of the contents and the behavioural psychology of the package-openers. Not to mention the labyrinth of legal formalities, from child protection to age discrimination and transport safety to health and hygiene.

**T**ake the mustard I'm spreading on the grilled sausage I'm about to tuck into (anyone who's ever tried Swiss bratwurst will understand my haste). A mustard bottle on the table has become a thing of the past – maybe for hygiene reasons or it

try, impatiently, to rip the thing open, but to no avail. Woe to those who fail to respect the mysterious workings of the engineer's mind. The designers surely knew what they were doing! Let's try again. The sachet has jagged "teeth" at both ends, where the machine has split it from its neighbours, but an attempt to tear a hole in the sachet between two of the teeth fails miserably. Tearing it down the middle doesn't seem like a good idea either, because the mustard would spurt out everywhere – except where I want it. So which edge should it be: right or left? The mustard-maker wants consumers to recognise their brand, so it seems logical that the logo should face the front. If you look closely, a thin, coloured line is visible next to the second tooth from the right. This is the key to the puzzle. The sachet opens with barely any effort and, what's more, it tears in a perfectly straight line – the material evidently has anisotropic properties. How clever! And it doesn't tear all the way down, so you can dose your serving of mustard exactly how you want it. Even cleverer! The sachet's silver-coloured plastic lining provides a hermetic atmosphere, acid stability and thermal protection – all of which are good things in the eyes of the law. Thousands of these engineering masterpieces can be filled in a fraction of a second.

**T**o top it all, the mustard sachet is sure to be compostable. So, hats off to this miracle of interdisciplinary collaboration. It's just unfortunate that the enticing smell of the grilled sausage steals the show – resulting in the casual binning of the mustard packaging.



Gerd Folkers heads the ETH Critical Thinking initiative and is also President of the Swiss Science and Innovation Council. Prior to that, he spent many years as President of the Collegium Helveticum.

\* The five eggs are wrapped in a kind of hanging basket made of raffia, suspended one above the other, which allows each egg to be removed individually.

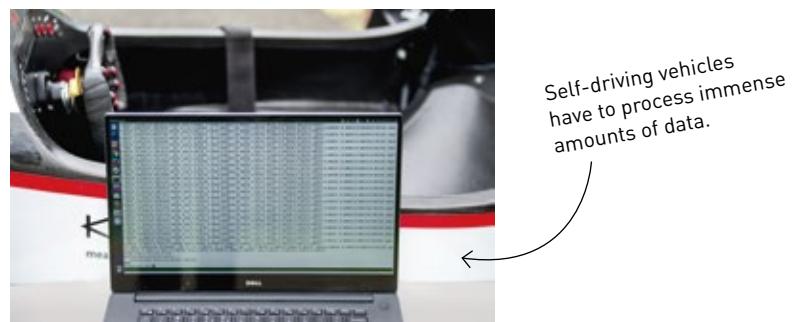
*Still learning: test driver Huub has the race car collect data while it drives around the track.*



## Bringing smart algorithms to the Hockenheimring

A team from ETH is breaking new ground by developing an autonomous vehicle for the Formula Student engineering competition using smart algorithms. *Globe* caught up with the AMZ Driverless Team during a test day.

TEXT Samuel Schlaefli IMAGE Simon Tanner



It's 6.45 on a Saturday morning and we're in a workshop in the Zurich Technopark. The race headquarters of the Academic Motorsports Club Zurich (AMZ) smells of rubber. Six racing cars stand neatly in a row, one petrol and five electric – including *grimsel*, which made quite the stir at Formula Student back in 2014 when it set a new world record of 0 to 100 kilometres per hour in 1.513 seconds. This year, the AMZ has set its sights on another first, and will be competing in the new category for autonomous, driverless vehicles in the world's biggest engineering competition. Since February, the Driverless Team has been hard at work at its garage in the Technopark, preparing for the finale at the Hockenheimring in August.

Midst the workbenches, engines and brake test stands sits *flüela driverless*, an electric racing car that weighs in at 185 kilograms, delivers 50 horsepower to each wheel and reaches a top speed of 115 kilometres per hour. Those familiar with the competition will recognise the car that propelled AMZ to first place in the world rankings the year before last – though with a driver, it should be said. Now the team, which comprises 14 ETH Master's students and three graduates of Lucerne University of Applied Sciences, have overhauled the vehicle to make an autonomous system.

### Supercar algorithms

Huub Hendrikx, one of the team members, stands next to the car, his laptop connected via Ethernet cable to the master computer – the vehicle's brain, if you like. Huub is feeding in new algorithms that will be simulated overnight. Today, the team wants to check that the algorithms will actually work on the track. "This time, it's the algorithms that are the limiting factor, and not the car," says project manager Fabio Meier. Fabio is a Master's student in mechanical engineering with a specialisation in robotics, and this is the third time that he has taken part in the Formula Student competition. For the racing car to be able to steer itself autonomously

around the track, the algorithms have to work efficiently and process unimaginable quantities of data in fractions of a second.

Manuel Dangel, the team's technical coordinator, claps his hands: "Let's go!" He pushes the car into the garage workshop and lifts the vehicle into a trailer with three of his colleagues. Soon after 8 a.m., we're on the motorway heading towards Alpnach, which is where weekend test runs take place. While we drive, Fabio tells us about the months of uninterrupted toil that have gone into this project. Most team members put in about 50 to 60 hours per week, and they haven't attended any lectures since February. Aside from any credits that they might receive for a semester or Master's thesis completed based on the Formula Student competition, their studies are on hold.

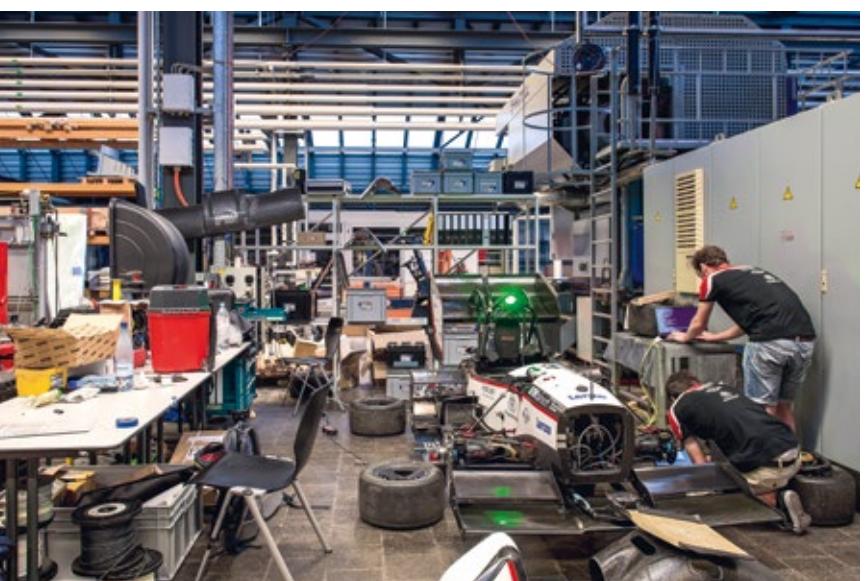
To develop a complex autonomous system, you need people with expertise in robotics and machine learning. Fabio and his colleagues built up their team by going after students who had already programmed autonomous ships or quadcopters. This time, there wasn't much of a problem getting funding: "The sponsors were really interested: the big car manufacturers and suppliers

want to be at the forefront of automated driving," says Fabio.

### A honed team

Shortly before 9 a.m., Manuel drives the vehicle onto the landing strip at Alpnach military airport. We are on a level with Lake Lucerne, looking onto the Pilatus and Stanserhorn mountains. Morning fitness enthusiasts are descending by bike, while an elderly man does loops with a remote-controlled plane in the cloudy sky. The AMZ team behind *pilatus*, the newest piloted electric racing car, are also there, and have constructed a dugout with a fixed bench bearing multiple laptops. At the side of the track, there is a small generator – not an entirely petrol-free zone, then.

Fabio, Manuel, Huub and Miguel de la Iglesia Valls heave *flüela* out of the truck. There follows a general check: Are the screws of the chassis and the wheel nuts secure? Is the battery (concealed in the rear of the car, weighing 46.3 kilograms and about the size of a hiking rucksack) fully charged? One by one, they go through the checklist they have stuck onto one of the boxes they have brought with them. Everyone knows exactly what they have to do, and the operation runs like a well-oiled >



*A few final preparations in the garage before the team hit the track for a test drive.*

machine. Meanwhile, Huub is setting out a course on the landing strip using coloured plastic markers. When he's done, he measures their position using a geoinformation system (GIS). Later, the coordinates of the markers will act as a reference to optimise the racing car's localisation system.

Testing begins at 10.40 a.m. Huub sits in the fireproof Kevlar seat with a laptop on his knees while Manuel and Miguel push the car around the course. The point is for *flüela* to learn to recognise its surroundings and build up a map. In terms of localisation, the team has installed three systems in the vehicle. Under the nose, there is a LiDAR, an optical sensor. In the glass, which is around the size of a fist, there are 16 laser beams rotating around their axis at up to 20 times a second. If a beam encounters an object, it is reflected, allowing for the object to be pinpointed with an accuracy of two centimetres. "The LiDAR is great for detecting depth," says Fabio, "but it has its weaknesses in angle resolution." As a result, the team developed an inertial stereo camera system installed on the roll bars of the driving seat. This consists of two cameras fitted at equal distances from

one another and coupled to an acceleration sensor. An algorithm installed on the main computer uses the two video images to calculate the position of objects in the vehicle's path. And thanks to the acceleration sensor, the system also knows the distance travelled between captures. The LiDAR and stereo camera systems are rounded off with a GPS, which is also coupled to an acceleration sensor.

After the first complete circuit of around 150 metres, Huub takes his hands off the wheel. Now it's up to *flüela* to find itself on the map it has just created and drive itself. For a few metres, everything goes well, before the car veers off course. What's the problem? A lively debate breaks out. Huub gets on his laptop and starts to tweak certain parameters within the algorithm. Efimia Panagiotaki, the only woman on the team, collects another laptop, sits down on the track next to the car and begins to log the changes. Efimia's logbook has timestamps so that the notes can be synchronised with the code and sensor data at any time. This is what makes it possible to review each development step later on. Organising and documenting such a vast software

project is a challenge in itself. Sometimes, there are eight people working on programming the algorithm at the same time. As a result, documenting everything systematically is more crucial to victory in Hockenheim than even the horsepower of the engine.

#### "Of course it's fun"

Just before midday, Fabio wriggles his way into a set of beige racing overalls and puts on a white helmet. He's going to do a few laps so that Efimia can test the effect that different films on the camera lens have on the image obtained. One of the outstanding challenges is how to extract the relevant data from the images; for instance, detecting the markers at the edge of the course that the autonomous system uses for navigation. The greater the contrast, the easier it is to filter out the relevant data. Fabio flips a switch and puts the racing car into pilot mode. The batteries are

The team take one last look at the computer before going into action.



Sensors are vital for the car's orientation.



above: Team conference – what went wrong with the test drive?

left: Efimia wants to find out whether putting coloured film over the camera lenses makes it easier to process image data.

now at full voltage. He presses the accelerator. Efimia gives him instructions, laptop in hand. Huub gets into position with a fire extinguisher – you never know what might happen.

On the second lap, Fabio rams into one of the markers. Everyone laughs; he won't have heard the last of it. "Of course it's fun to drive a racing car like this," says Fabio with a grin as he gets out. But he's no petrolhead. In Zurich, he usually gets around by bike. "I'm fascinated by how we have this opportunity to see a whole practical project through ourselves," he says. "Formula Student is the perfect learning environment for engineers." For Huub as well, it's not high-powered cars and roaring motors that excite him the most. "I'm more of a plane enthusiast," he says. He studied aerospace engineering at TU Delft and computer science at EPFL. He came to Zurich to complete his Master's degree in robotics. His work with AMZ has been the highlight of his

**100 gigabytes of data a day**  
Over lunch, Efimia downloads the camera images from Fabio's test onto her laptop and begins to evaluate them. During the two-minute drive, the cameras had generated more than two gigabytes of data. "On some days, we get up to 100 gigabytes," she says. Almost all of it is uploaded in the evening to the server for documentation – an incredible mass of data.

In the afternoon, the team repeats the morning's localisation test. As before, the car strays off course after a while. The engineers are going to have to refine the parameters of their algorithm if the autonomous system is to navigate the car successfully to the finish line in Hockenheim. Even so, they remain optimistic. "We want to be in the top three," says Fabio. "We're well on the way."

On the other side of the track, the driver of *pilatus* is guiding the car with incredible precision over the prescribed course. Huub pensively watches the driver pass by. Suddenly he laughs and says quietly to himself: "We've got a few years to go before our driverless cars can drive as fast and precisely as that."

A few weeks later the students celebrate a big success: *flüela* is the winner of the first Formular Student Driverless Race at the Hockenheimring. □

For more information on the AMZ Driverless project, please visit:

→ [www.driverless.amzracing.ch](http://www.driverless.amzracing.ch)

# CONNECTED

## 1 Swissloop

### ZURICH-BERLIN IN 35 MINUTES?

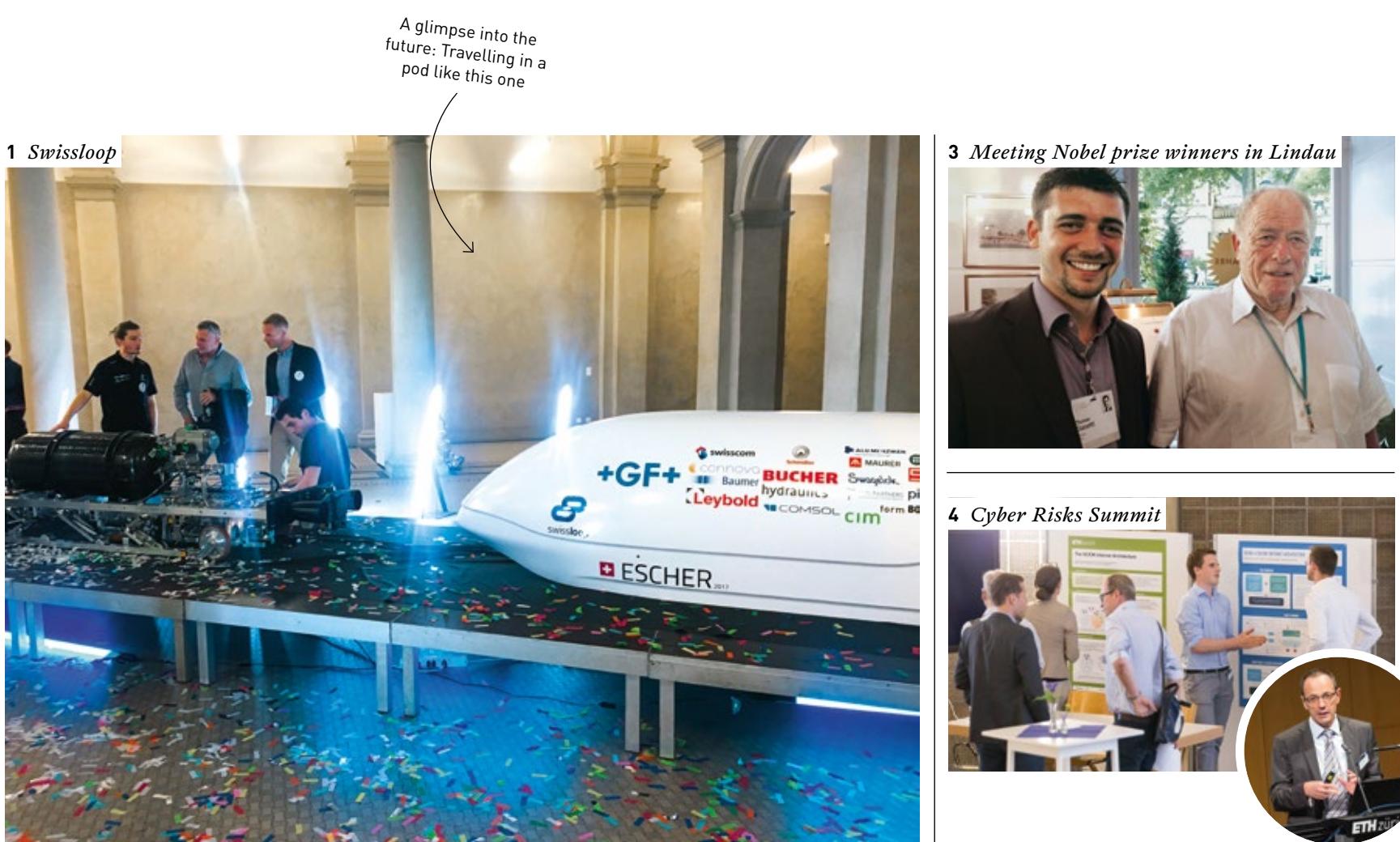
Consisting of students from ETH Zurich and other Swiss universities, the **Swissloop** team is looking to revolutionise transport with an emissions-free capsule that zooms through a vacuum tube at the speed of sound. The capsule has been unveiled for the first time in a rollout at ETH Zurich.

In August, the Swissloop students took part in the final of Elon Musk's Hyperloop Pod Competition in Los Angeles. Last September, 1,200 teams from around the world applied to send a transport capsule, known as a pod, as fast as possible through a vacuum tube. How they did it was left to the students. Swissloop was judged to be one of the 27 most promising concepts, and ultimately the team managed an impressive third place finish.

## 2 Helmut Horten Foundation

### THANKS FOR PARTNERSHIP

For many years, the Helmut Horten Foundation has been very generous in its support of Zurich as a medical hub, with a total of 68 million Swiss francs donated to ETH, the University of Zurich and the university hospital so far. In recognition of this generosity, an ETH lecture theatre has now been named after Helmut Horten. ETH President Lino Guzzella thanked donor Countess Heidi Goëss-Horten for the foundation's outstanding commitment.



## 2 Helmut Horten Foundation



## 5 Alumnae lunch



## 3 Meeting Nobel prize winners in Lindau



## 3 Meeting Nobel Prize winners in Lindau

### NERD HEAVEN

Thomas Gianetti, a postdoctoral researcher in inorganic chemistry, was one of the young scientists to take part in the 67th meeting of Nobel Prize winners in Lindau, attended by 28 Nobel laureates and 420 young researchers.

Gianetti represented ETH Zurich along with four other young scientists and presented his ideas on "green chemistry". One person he was privileged to meet was former ETH professor **Kurt Wüthrich**, recipient of the Nobel Prize for chemistry in 2002.



## 4 Cyber Risks Summit

### MORE SECURITY

At the Cyber Risks Summit, held at ETH Zurich, international experts discussed and presented the latest research and technological approaches for effectively protecting society against the risks of cyberspace.

In his opening address, **ETH President Lino Guzzella** stressed the need for collaboration with industry as well as the importance of basic research, calling for redoubled investment in this area.

## 5 Alumnae lunch

### WOMEN'S NETWORK

Organised by the University of Zurich's **alumni** association for alumnae of UZH and ETH Zurich, the alumnae lunch in June saw **ETH Rector Sarah Springman** talking about the situation of women at ETH. Around 70 listeners took the opportunity to get to know her and to make new contacts.

**Agenda****EVENTS****28 Nov. 2017 / 6.30–9 p.m.****Storing electrical energy**

ETH alumnus Remo Lütolf, country manager of ABB in Switzerland, will speak at the Alumni Focus Event about "Storing electrical energy – visions, possibilities and limits". Followed by a panel discussion.

📍 ETH Main Building, F3

→ [www.alumni.ethz.ch/events](http://www.alumni.ethz.ch/events)**1 Nov. 2017 / 6.30–9 p.m.****Digitalisation in the world of finance**

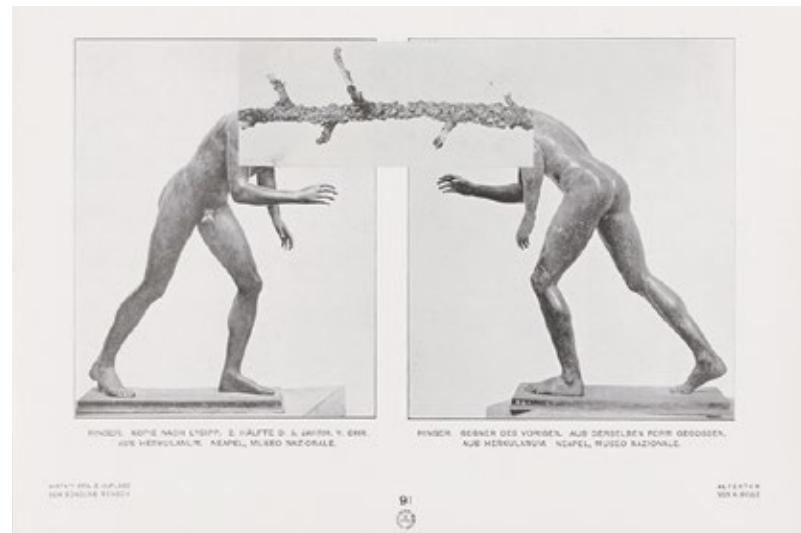
Jürgen Rogg, partner and managing director at The Boston Consulting Group, will give a talk on "Digitalisation in the world of finance" in conjunction with the Alumni Career Event. His talk will be followed by a panel discussion featuring other guest speakers.

📍 ETH Main Building, D5.2

→ [www.alumni.ethz.ch/events](http://www.alumni.ethz.ch/events)**18 Nov. 2017 / 10 a.m.****ETH Day 2017**

At ETH Day, ETH Zurich takes a look back at the past academic year and honours individuals for their outstanding achievements.

📍 ETH Main Building

→ [www.ethz.ch/eth-day](http://www.ethz.ch/eth-day)

*A collage from the collection entitled 'Of beautiful people – diseases and pests' by artist duo huber.huber, 2009.*

**Collection of prints and drawings****ON SERIES, SCENES AND SEQUENCES**

**Until 15 Oct. 2017** In times of the Netflix boom, where every aspect of modern everyday life is played out in TV episodes, where cookery shows, theatre plays and time analyses are available as series, the serial format seems to enjoy a blessed existence almost everywhere. In celebration of the 150th anniversary

of the Graphische Sammlung ETH Zürich, the Zurich artist duo huber.huber (Markus and Reto Huber) will assume the role of curators for this exhibition. They have selected works from one of their own series as well as from four important series in the ETH Zurich collection: by Albrecht Dürer, Francisco Goya, Fischli & Weiss, and Claudia and Julia Müller.

→ [gs.ethz.ch/en/current](http://gs.ethz.ch/en/current)**Digital Day****THE FASCINATION OF DIGITALISATION**

**21 Nov. 2017** On this day, digitalisation will be at the forefront for the entirety of the Swiss population: you will be able to experience the first National Digital Day in Switzerland at a number of rail-

way stations and branches of partner companies, as well as on your own smartphone. ETH Zurich is participating with a programming course for school pupils and at the main railway station in Zurich will be showcasing the latest research findings in game technology and digital building technology.

→ [digitaltag.swiss](http://digitaltag.swiss)**GUIDED TOURS****24 Oct. 2017 / 6.15–7.15 p.m.****Robotic fabrication in architecture**

On this evening, the Arch\_Tec\_Lab, the world's largest robotic fabrication laboratory, will open its doors to interested visitors. The laboratory impresses with its curved wooden roof, which was designed by computer and built by robots. During the guided tour, visitors will learn how, in addition to designing buildings, machines can be used as modern construction workers, and what advantages result from this.

📍 ETH Hönggerberg, Arch\_Tec\_Lab

→ [www.tours.ethz.ch](http://www.tours.ethz.ch)**EXHIBITIONS****28 Sept. – 20 Dec. 2017****Phantom Theory: 50 years of gta**

The Institute for the History and Theory of Architecture (gta) was founded 50 years ago. Over time, the gta advanced to become one of the most renowned education establishments at the interface between the theory and practice, the past and present of architecture. The anniversary exhibition *Phantom Theory* traces the development of the Institute based on original documents.

📍 ETH Hönggerberg, gta

→ [www.gta.arch.ethz.ch/exhibitions](http://www.gta.arch.ethz.ch/exhibitions)**Until 19 Nov. 2017****Swiss polar research: Swiss Camp**

In 2017, Switzerland was one of the few non-Arctic states to obtain observer status in the Arctic Council. This comes as no surprise, given that Swiss scientists are very active in polar research. In Switzerland – as at the poles – an understanding of the processes of snow and ice is integral to both the landscape and the way of life. Since the 19th century, the long tradition of high-altitude research in the Alps has given rise to a wide spectrum of disciplines. Human activity and climate change have impacted the poles severely. Like almost no other branch of science, polar research today is reliant on an interdisciplinary approach and international networking. This is why the Swiss Polar Institute, a consortium of Swiss universities including ETH Zurich and the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), launched an expedition to Antarctica in 2016/2017, involving a global team of scientists representing numerous disciplines. The special exhibition highlights initial findings from the expedition and other polar research projects.

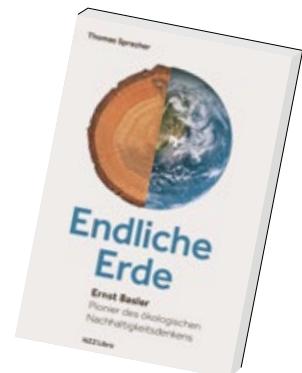
📍 focusTerra, Lichthof

→ [www.focusterra.ethz.ch/en/special-exhibitions](http://www.focusterra.ethz.ch/en/special-exhibitions)**Recommended reading****FINITE EARTH**

Swiss engineer and ETH alumnus Ernst Basler was at the forefront of the 1970s push to raise public awareness of the grave ecological problems that humans have created through rapid industrial progress. He is also among the pioneers of a movement that postulated the principle of sustainability. At the Massachusetts Institute of Technology (MIT) back in 1970, Basler gave the world's first lecture on the criteria of sustainable management.

In his book, Thomas Sprecher looks at Basler's career, and at the present and the future. In conversation with the author, Basler describes his ecological credo and offers advice on how humanity still has the chance to come to terms with the finite nature of our planet before we destroy it. The book is currently available in German only.

Thomas Sprecher  
*Endliche Erde*  
Ernst Basler – Pionier des ökologischen Nachhaltigkeitsdenkens  
ISBN 978-3-03810-260-1  
Published by NZZ Libro  
Price CHF 39.–



# At home in Singapore

Hans Jäger has spent the last two decades living in Asia. Despite the distance, he remains in close contact with ETH Zurich as the founder of the ETH Alumni Singapore Chapter.

TEXT Andrea Schmits IMAGE Thomas Lim

As he strolls along the banks of the Singapore River in a Chinese-style, short-sleeved shirt, you can tell Hans Jäger is completely at home in Singapore. He lives with his partner in the area surrounding the lively Clarke Quay district in the heart of the city, in a large residential complex with a community pool. The now 70-year-old ETH alumnus has lived in the south Asian city-state for 20 years, albeit with some interruptions. Jäger's long career has seen him pack his bags and move away to take up new challenges on more than a few occasions.

It's only mid-morning and the temperature is already just under 30 degrees – mild weather by Singapore standards. "This area has completely transformed over the past few decades," says Jäger as he points towards the restored, pastel-coloured Chinese warehouses. A place once filled with dock workers is now teeming with tourists. The river which resembled a sewer in the 1980s is part of the drinking water reservoir today.

Jäger, who grew up in the town of Thalwil on Lake Zurich, walks on. A couple of minutes later, the surroundings become quieter. Loud nightclubs are replaced with hip cafes and restaurants that serve up Western cuisine. Jäger uses a keycard to open a gate that leads directly from the riverbank to the residential complex where he lives. Under the gazebo, he sits down at a table in the shade. "Singapore is my life," he says as he leans back. "Life here is wonderful!" He describes the country as a multicultural melting pot, concluding: "I think that's fantastic."

The majority of Singapore's 5.6 million inhabitants come from China, India and Malaysia. Expats from around the world add

to this cultural mix. Like Switzerland, Singapore – which is barely half the size of the canton of Aargau – has four official languages: English, Tamil, Chinese and Malay. Jäger loves walking through China Town, a stone's throw from where he lives. However, he avoids the touristy areas. "The alleyways that remain untouched by modernisation are the most fascinating," he explains. In fact, Singapore offers a little bit of everything: modern luxury meets Asian traditions; skyscrapers and giant shopping centres compete with 300 parks and four nature reserves. Jäger has found his home overseas. Returning to Switzerland is only his plan C, but more on that later.

## Raclette at the edge of the jungle

Despite the distance, the ETH alumnus, who studied engineering in his time, never lost touch with his alma mater. On the contrary: seven years ago, he established the ETH Alumni Singapore Chapter, a network of around 50 ETH graduates and associated members such as the researchers from the Singapore–ETH Centre. They meet several times a year, including for an annual get-together at the Swiss Club for a raclette meal with family and friends. Surrounded by the jungle of the nearby nature reserve and its wild monkeys, which keep straying onto the grounds, the group fondly remember their former home. Every now and then, they are joined by visiting members of the Executive Board; ETH Rector Sarah Springman was their most recent visitor this past spring. These network gatherings serve as a platform to meet, exchange information and create important contacts. Jäger is convinced that "ETH Zurich is not just a Mecca for scientists, but also an incubator >

"Although I've never built a single machine since completing my studies, I've built several companies instead."



PROFILE

## Hans Jäger

Originally from Thalwil in Switzerland, Hans Jäger studied engineering at ETH Zurich. Following a 23-year career in the industrial sector in Switzerland, he moved to Singapore in 1995 while working for the company Sulzer. It was here that he founded the ETH Alumni Singapore Chapter. Today he works in Singapore and Indonesia, where he sometimes flies on a weekly basis. He enjoys travelling and trekking in his spare time.

**"ETH Zurich is an incubator for leaders of technical enterprises."**

4

**ETH ALUMNI SINGAPORE CHAPTER**  
The ETH Alumni Singapore Chapter founded by Hans Jäger seven years ago currently has around 50 members. The chapter aims to connect ETH graduates based in Singapore. It also maintains close relations with alumni of the National University of Singapore (NUS), with the Singapore-ETH Centre and with the Swissnex network.

for leaders of technical enterprises." He himself took a similar path: "Although I've never built a single machine since completing my studies, I've built several companies instead. Organisation and planning have always fascinated me."

After completing his doctorate at ETH Zurich, Jäger spent a decade applying his engineering knowledge at truck and textile machine manufacturing company Saurer in Arbon on Lake Constance. He then spent the next 13 years working for Sulzer, an industrial group based in the Swiss city of Winterthur. It was his role at Sulzer as the head of the Asia-Pacific region that brought him to Singapore in 1995. Jäger was 48 years old at the time. "My path was unconventional. Most people go abroad when they are still young," he says. It's a step he has never regretted.

#### Detour via Switzerland

The biggest upheaval of his career was in the year 2000 when he was offered the post of Rector at the St. Gallen University of Applied Sciences. It was a job he couldn't refuse, as working in education had been a long-cherished dream. And so, Jäger moved back to Switzerland, although only for a brief period. During this time he accepted a position at the University of St. Gallen, a decision that took him back to Asia just three years later – to Jakarta, the Indonesian capital.

Once in Indonesia, he became actively involved in the International Senior Entrepreneurial Programme (ISEP), a seminar for executives supported by the University of St. Gallen and ETH Zurich. He was also instrumental in setting up the Swiss German University, where he continues to teach courses in strategic management and entrepreneurship to this day. "In Indonesia, when the lecturer is a *bule* – a white foreigner – they are held in great respect. And if you have grey hair to boot, you're pretty much a VIP," Jäger says jokingly.

After a four-year stint in Indonesia, Jäger decided to move back to Singapore and make the 75-minute commute by air to Jakarta every week. The reason for his move this time round was not work, but personal: a walk in Singapore's Fort Canning Park 15 years ago led to him meeting his Singaporean partner.

Back again in Singapore, Jäger became involved in several different projects. Alongside his teaching role in Jakarta, he is present-

ly also the director of Brain Connection Singapore, a company founded in 2004 by ETH graduates. Courses and consultation on topics of innovation, simplicity and strategic business development form the company's core business. In addition, he works as a consultant for Siteco, a non-profit organisation that sets up dual vocational education opportunities in emerging and developing countries.

#### More free time on the horizon

Jäger is slowly starting to toy with the idea of retirement. He's looking to travel more with his partner, who also works in education. His four children with his ex-wife live scattered across the globe. He also has seven grandchildren whom he plans to visit. He's also taken with the idea of trekking through Burma, West Java or China.

One thing is for certain – he won't be bored. After all, Jäger is also a member of the Rotary Club, a charitable organisation that takes on a specific project every year. Past projects included helping children in Indonesia born with a cleft palate or teaching English in Chinese primary schools. This year's project aims to help street children in Jakarta. "Life's been kind to me, which is why I'd like to give something back," says Jäger.

Jäger plans to stay on in Singapore as long his residence permit allows him to, but his permit is tied to his work, making things uncertain once he retires. His plan B is the apartment he has bought in the neighbouring city of Johor Bahru in Malaysia that comes with a ten-year visa. "Plan C is returning to Switzerland," he says. He could then finally go back to doing something he has missed in Singapore: skiing. ○

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# 5 QUESTIONS

Niko Beerenwinkel likes to be inspired by others and enjoys engaging in discussion:  
*“I always try to learn something from the people I meet.”*



## 1 What do you especially enjoy about this field of research?

What fascinates me about bioinformatics is that it's such a young and dynamic discipline. Mathematical modelling is already a major part of the life sciences, and in the future it's set to play a similar role in biology and medicine as it does today in physics. So then anyone studying biomedical subjects will be familiar with mathematical and computational modelling as a matter of course.

## 2 Who has been your greatest influence in life and why?

I've learned many things from many people along the way and continue to do so today. I always try to learn something from the people I meet. A particularly strong influence in my life was one of the senior assistants when I was studying mathematics. He often invited students to his office for a cup of tea and we'd spend hours discussing mathematical theory, everything from simple practical exercises and seminar topics to major unresolved maths problems. These chats taught me invaluable lessons about scientific methods and discourse.

## 3 What would you change about today's world of academic research if you had the chance?

I would do everything in my power to keep non-academic tasks – in other words anything not directly connected with teaching and research – as far away from scientists as possible. One could vastly reduce, say, the amount of bureaucracy that comes with allocating research funds and publishing scientific papers. Such tasks consume so much time that could otherwise be spent making scientific progress or improving teaching.

## 4 What do you hope your students take away with them?

I hope they learn how to think critically, first in relation to themselves and also to others and everything around them. But adopting a critical mindset is by no means enough. What you really need in order to be constructively critical is expertise in your field and plenty of experience with the subject-specific discourse and methods. But I also want my students to learn to be passionate about what they study. This passion usually develops when they start to be able to work things out for themselves. What's more, I want my students to learn through positive experiences that it often takes a bit of courage to go out on a limb and do things their own way.

## 5 How would you characterise a “modern” scientist?

Their ability to see beyond the boundaries of their discipline. For me, modern science is also about treating theory and practice as interrelated domains rather than separate ones – and grasping that each informs the other.

– Interview conducted by Corinne Johannsen



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