TUM Asia

A quarterly newsletter from the German Institute of Science and Technology — TUM Asia

digest

July - September 2014 Issue

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Credits: TUM Asia (Photo “Giving Back To The Community”) / Torsten Nielsen (Photo “Winning It Big In Denmark”) / TUM (“Growing Into Leadership”)

in this issue

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director's message

Photo: TUM Asia

Staying true to our values, we at TUM Asia try to continuously give back to the community and invest in the next generation. Throughout the years, we have been committed to innovative progress in scientific fields that will improve our society. Our sense of responsibility for the future generation has led to the interest of supporting the well-being of the local communities. It is always a joy to be involved in the community and we aim to go above and beyond to give back our success to the people.

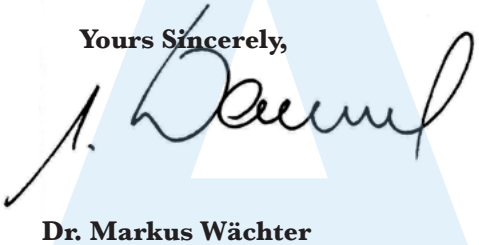
This year, our undergraduate students from the Student Management Committee partnered up with The Straits Times School Pocket Money Fund to organize an orientation for the charity's Step-Up Programme. This programme involves volunteer coaches from tertiary institutions who mentor financially disadvantaged primary school children for their upcoming PSLE English examinations. This orientation established relationships between the mentors and the children prior to the next term of the Step-Up Programme. Read up to find out what other activities they did on pages 8 to 11.

Our Bachelor students from the Electrical Engineering and Information Technology programme were invited to TUM CREATE to learn more about EVA, the codename for its electric taxi, which is one of their most exciting electromobility inventions. The students were able to witness the knowledge they gained in their modules come alive. Look to pages 12 & 13 to read more on their experience at TUM CREATE. Nurturing our young talents educational interests is important as they shape our future.

Many talented people at TUM have contributed to the society we live in today. We had the opportunity to hear from one of them, Dr. Christian Kohlpaintner, TUM alumnus, who did his doctoral under Professor Herrmann, the President of TUM. Dr. Kohlpaintner is currently a member of the Executive Committee of Clariant AG and the Chairman of the Advisory Board of the TUM University Foundation. He chose to devote his life to the furthering of science and technology. Read more about him under the Choosing Engineering section to find out why he made the decision to pursue a career in the Science field.

We hope that you will enjoy this issue.

Yours Sincerely,



Dr. Markus Wächter
Managing Director, TUM Asia

GIVING BACK TO THE COMMUNITY

As a research university dedicated to developing solutions to benefit the mass communities, giving back to the greater community has always been a main aim of Technische Universität München (TUM). Having established our campus here in Singapore, TUM Asia saw it only fitting to continue the mission of TUM. To kick-start this mission, TUM Asia approached The Straits Times School Pocket Money Fund (STSPMF) – a charity set up by The Straits Times to provide pocket money to children from low-income families to help them through school - to find out how our students could get involved in community work.

In April 2014, TUM Asia's undergraduate students from the Student Management Committee were selected to plan the 2014 Step-Up programme orientation of STSPMF.

The purpose of this orientation was to foster stronger bonds between the mentors and the beneficiaries, prior to the next term of the Step-Up programme. The Step-Up Programme is a weekly 90-minute coaching programme intended to focus on English language, national education, and values education to benefit students in need of additional support. The programme's coaches consist of volunteers from junior colleges and tertiary institutions, who will then be paired with a child to support their preparation for the PSLE English examination.

It was an exciting experience for TUM Asia's students to be involved in planning an enriching yet fun event. The committee planned a beachside race, known as "Clash of the Clans". The beneficiaries and mentors were split up into 4 main clans. Ice breaker games and main games were played, with games such as Capture the Flag, Water Bag Teamwork and Obstacle Course. Teams were tested as they worked together to defeat their opponents and gain important points for their own clan.

The orientation allowed the mentors and beneficiaries to cultivate positive relationships with one another, in turn breaking down possible barriers that deter effective learning in the classroom.

"Being able to give back to the community is one of the attributes of any TUM Asia student. It is humbling to see a smile on the children's faces"

Khairin
Student, Bachelor of Science in Chemical Engineering

Photos: TUM Asia

The young participants, ranging from ages 7 to 12, commented that it was a rare opportunity for them to be able to visit the beach. TUM Asia students also enjoyed facilitating the event for the kids.

"It was an eye opening experience for me. I was able to get a glimpse into their lives and the challenges that some of them face"

Nanthini
Student, Bachelor of Science in Chemical Engineering

"Seeing the kids smile and enjoy themselves thoroughly through the games we planned really taught me that happiness can be that simple to attain"

Darren Yeo
President of the Student Management Committee

This was an extremely successful first attempt on the university's end. All credit is due to the student committee who gave their time outside of lessons to plan this and the enthusiastic student helpers from TUM Asia and the junior colleges. We believe this is a good first step for other collaborations in the future.

Photos: TUM Asia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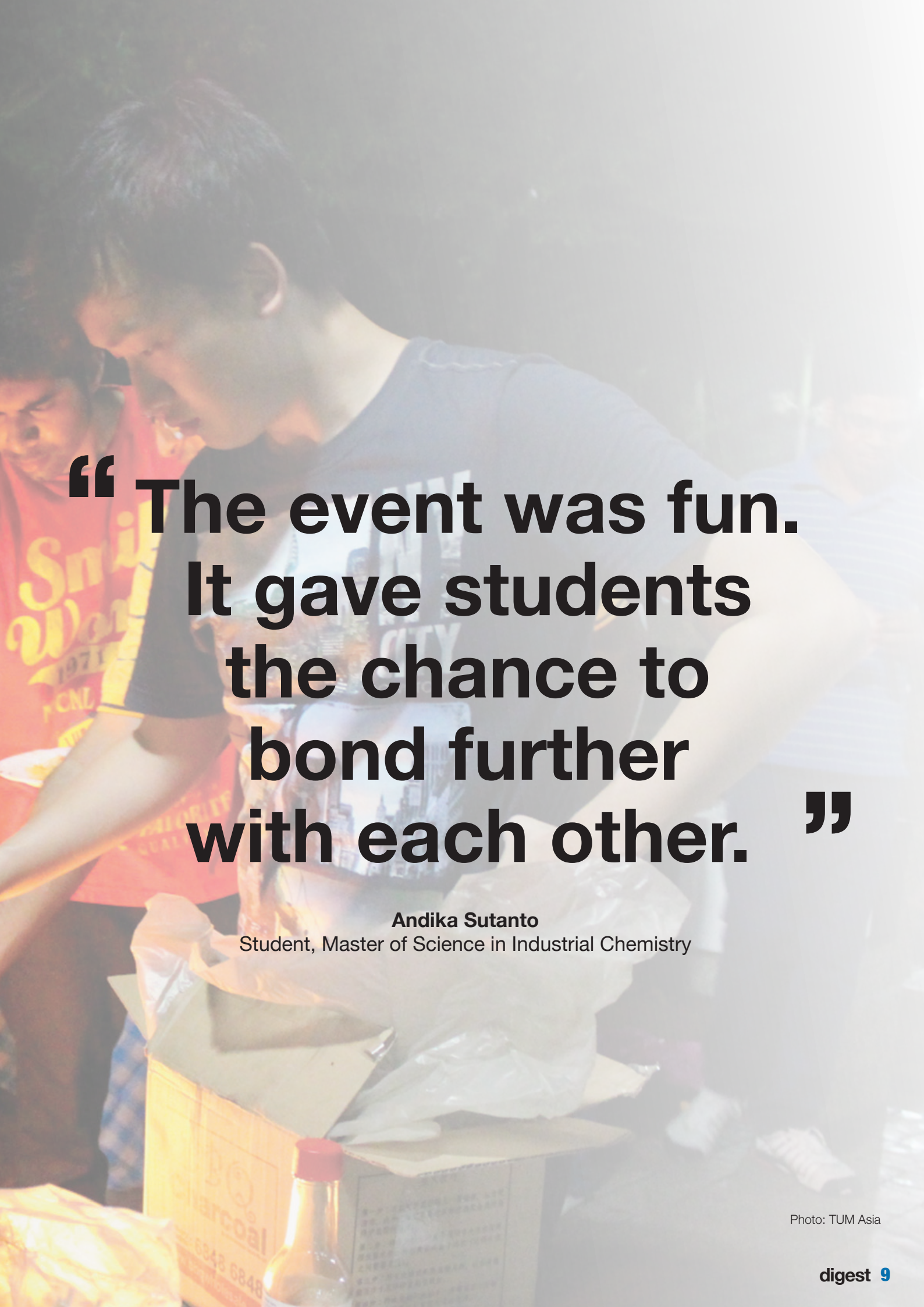
DESPICABLE ME2

End Of Semester Barbecue



“The event was fun. It gave students the chance to bond further with each other.”

Andika Sutanto
Student, Master of Science in Industrial Chemistry

Photo: TUM Asia

UNITY IN DIVERSITY

Why travel all the way to East Coast Park or Sentosa when West Coast Park is a stone's throw away from our Pixel campus? To celebrate the end of a semester, students from the Master of Science programmes came together for a barbeque at West Coast Park on the 16th

The majority arrived at the park just as the sun was setting. Of course, everyone was hungry after a long day in the classroom. Smoke and heat waves filled the air as the students started to place food over the hot charcoal. Laughing and chatting with one another, various foods from eastern to western cultures were enjoyed, such as sambal sotong (squid), curry, chicken wings, and sausages.

Some students commented that they had never tried some of these local foods before, with raving comments given for oriental-marinated chicken wings and mixed expressions on the sweet-tasting satay (meat skewers).

It was a rare opportunity for the different classes to come together to have some fun. One could easily spot the diverse nationalities represented at the gathering, seeing Chinese, Indian, German and Singaporean students bonding over food and conversations. Alumni also took this gathering as an opportunity to meet their juniors, as well as giving them practical advice on their coursework and upcoming thesis work.

Thanks to the wonderful weather, some of the students also started friendly games of volleyball and soccer. Teams were formed and everyone brought their best game face. The competition was fierce as teams battled against one another to score goals and make the winning point. Of course, the intense running about made all the boys hungry again as they crowded the barbeque pit for a second round of food and drinks.

There was almost too much food present but as the conversations continued through the evening, students managed to finish up everything – in which one student commented that the quantity and quality of food was more than satisfactory for the price they paid to come. Transport and Logistics student, Ranjit Mehendale, said, "I thought the BBQ was very well organized. I was just hanging out with my classmates and chatting. I had a great time. I thought it was a great way to build cohesion in the class".

As the night came to a close, it also signified the end of a chapter in the students' academic journey at TUM Asia as many of them will be moving on to their internship and thesis work at a company or institute, in Asia or Europe. Nevertheless, it was a good time of catching up and making new friendships while having fun. Till the next time!

Photos: TUM Asia

FUTURE TRANSPORTATION

TUM CREATE , a joint research programme by Technische Universitat Munchen (TUM) and Nanyang Technological University (NTU) was set up under the National Research Foundation (NRF) in Singapore. Employing more than 120 scientists from over 20 countries, one of TUM CREATE's focuses is on electromobility. One of its most exciting projects is EVA, the codename for its electric taxi prototype. EVA was designed from the ground up in Singapore in just two years. It is the first electric vehicle to serve as a taxi for tropical megacities.

In March 2014, our final year students in the Bachelor of Science in Electrical Engineering and Information Technology (EEIT) programme were invited to the automotive workshop at TUM CREATE to learn more about EVA.

For these EEIT students, the tour allowed them to see the application of classroom knowledge in the real world. Their subjects came alive as they saw the first-hand use of these solutions in EVA.

EVA was created as a solution to counter current challenges in electric vehicles, such as the extremely limited travel range and long recharge times. Other unique issues include the challenges from the heat and humidity in tropical climates. Research was focused to optimize areas such as energy storage, battery charging and thermal management.

Several TUM Asia students who did their Bachelor or Master Thesis or internship with TUM CREATE were also involved in the creation of EVA. The EEIT students were really inspired by the work that involved their fellow TUM Asia students. Mr Felix Roemer, the main researcher who hosted the students, commented afterwards that the EEIT students were inquisitive and willing to learn. They had numerous questions pertaining to the development of the taxi and Mr Roemer felt that he was in an active presentation with them.

The EVA visit really opened up the students' eyes to the different possibilities of the real world applications of their studies.

"I really enjoyed it! The best thing about this visit was being able to see how engineers come up with an invention, from the idea generation, design and technology, to development"

Nurzaidah
Student, Bachelor of Science in Electrical Engineering & Information Technology

We hope that this continues to inspire young budding engineers to join the quest to use research to find solutions to the world's problems. One day, we hope to hear of such research from our students that will change the world!

Photos: TUM Asia

As a fresh graduate of the Class of 2014 with a Master's Degree in Transport & Logistics, Torsten Nielsen was recently awarded 'Best Student Project 2014' in the International Railway Conference in Copenhagen for his Master Thesis work. **In this issue, we catch up with our Danish graduate about his achievements since his time with TUM Asia.**

Hi Torsten. To start off, tell us about you.

I was born in the country side just outside of the Danish town of Kolding, a town with a population of about 50,000 people. After finishing high school, I moved to Aarhus, the second largest city in Denmark. I started studying for my Bachelors of Engineering in Architectural Engineering. During my studies, I spent a year in Berlin as an Erasmus Student and one of the classes I took was a railway course. After graduation in January 2011, I worked in a trainee position at Rail Net Denmark (Banedanmark), which is the infrastructure manager responsible for the national network in Denmark. When my contract ended after a year, I decided to go back to the academic world to do my Masters. As I was interested in returning to Germany, I started looking at the M.Sc. offers there. I came across the Master of Science in Transport and Logistics at TUM (Asia) and found it interesting.

Having to move to Singapore must have been a big decision. Was it a big change for you to leave Denmark and study here?

As I had been living abroad before coming to Singapore, I had a good idea about how it would be to leave family and friends behind in Denmark for a while. I arrived in Singapore a few days before classes started, so I did not have time to be bored and lonely. There were a lot of new things to explore in Singapore and our free time passed by very quickly. It was a really good thing that almost no one in our class knew each other before coming to Singapore. We were all more open minded and willing to meet new people.

Where did you carry out your internship and thesis?

I have always known that my home base would be in Denmark. Therefore, I returned to Copenhagen after finishing my coursework in Singapore to carry out my internship. Danish engineering consultancy, Ramboll DK, agreed to take me as an intern for 2 months, followed by my thesis period of 6 months. Ramboll is a Danish company with offices in many different parts of the world, dealing with everything from oil and gas to buildings, railways and airports. I was working on the largest Danish railway project during my internship and I based my thesis on that project. The project dealt with an upgrade of the 120km railway line, which will connect Copenhagen and Hamburg in the future, which will reduce travel time by 2hr 30min.

Photo: TUM Asia

Can you tell us the inspiration behind your thesis?

The idea behind my thesis topic was to look at alternative ways of optimising the Danish way of doing speed upgrades. I questioned the way the current norms and standards approach speed upgrades, looked abroad and learnt from other countries in order to find alternatives. Over the next 10-15 years, almost all of the Danish main lines will be upgraded, allowing trains to travel faster and offering more attractive time tables for passengers and international freight train operators. I wanted to ensure that the most up to date knowledge would be used for these projects. It has not been possible to look at all the norms and standards. Therefore only a few, concerning alignment geometry and speed, have been investigated.

Could you tell us more about your thesis?

In my thesis, I looked at the benefits of implementing alternative transition curves, which is the part of the alignment connecting the tangent part and the circular curved part of a track. By using other mathematical equations, it might be possible to increase the speed of the trains with smaller adjustments to the existing alignment. The implementation of tilting trains has been investigated. Normally, a tilting train can traverse a curve at a velocity approximately 30% higher than a conventional train.

We are very pleased by your recent success when you received the "Best Student Project 2014"award. Were you nominated for it or did you submit it among many other entries?

After submitting my thesis, I was encouraged to enter my thesis for the "Best Student Project Award 2014", an award given by the Danish Rail Sector Association. The best theses are read by a jury of railway experts from various companies in Denmark. The winner is announced at the annual railway conference in Copenhagen at the opening ceremony. This year, 570 experts participated in the competition.

What's next for you after your Masters?

Ramboll has hired me full-time. I am currently working on the project to upgrade the line that will connect Copenhagen and Hamburg by 2020, when the 18km long Fehmarn Tunnel between Denmark and Germany opens for service. For now, I will gain some experience and enjoy being a part of a professional team at Ramboll.

Any advice for other Europeans/International students coming to Singapore to study?

Studying abroad develops your academic skills. Being far away from home for a longer time allows you to meet new and interesting people. You will get to know yourself in a different way, learn about costumes from other cultures, and make unforgettable memories.

Photos: Torsten Nielsen / TUM Asia

Left, Torsten, with his award. Right, the 1st runner up.

Choosing Engineering

Dr. Christian Kohlpaintner

TUM Alumnus Dr. Christian Kohlpaintner, Member of the Executive Committee of Clariant AG and Chairman of the Advisory Board of the TUM University Foundation, dedicated his time from the time he studied at TUM towards a career in the Science field. At a young age, he became the Vice President Innovation at Celanese Ltd, becoming their CEO further along. He continues to strive in managing Catalysts, Functional Materials, Pigments, among many others, with his Scientific career at Clariant. **In the second article of our Choosing Engineering series, we interview Dr. Kohlpaintner to find out why he chose to devote his life to the furthering of science and technology.**

You started your career with a Doctoral Degree at TUM?

Back then, I applied for a doctoral position with Professor Herrmann before he became the President of TUM. At that time, I wasn't able to choose my doctoral supervisor freely, because I belong to the baby boomer generation. When we met for the job interview, I probably impressed him with the voluntary internship in industry that I had completed between the diploma exams and the thesis – so I got the job.

What was your topic?

Two-phase catalysis. We developed new highly active catalyst systems in cooperation with a subsidiary of Hoechst. Professor Herrmann always supported industry-oriented and industry-related research, so I was able to learn how the industry works at an early stage. If you only conduct research at a university, you tend not to get an understanding of the mindset of the industry.

Dr. Christian Kohlpaintner
Born 1963 Stephanskirchen near Rosenheim
Married since 1992

1984-1990 Course of Chemistry studies at TUM
1992 Doctoral degree at TUM
1993-1997 Research at Hoechst AG in Germany and the USA
From 1997 Different tasks in executive positions at Celanese Chemicals Europe GmbH (Oberhausen)
2002 Vice President of Innovation at Celanese AG and Managing Director of Celanese Ventures GmbH (Frankfurt)
2003 Member of the Executive Board of the Chemische Fabrik Budenheim KG (CFB Mainz)
2005 Speaker of the Executive Board of the CFB (CEO)
2009 Appointed to the Executive Committee of Clariant AG
2010 Chairman of the Advisory Board of the TUM University Foundation

The interview was conducted by Annette Marquard / KontakTUM. All information are courtesy of KontakTUM Issue 2/2012. Photo: TUM

After graduating, you went into research at Hoechst?

Yes. At first I worked on homogeneous catalysis in Frankfurt. Later, I was transferred to Texas, USA. There, I was in the research field for almost two years and was able to learn a lot about the American research community.

What was different between USA and Germany?

The optimism. When starting a project in Germany, you will get about a thousand good reasons why it will not work out. In the US, there will be a thousand good reasons why it will. I'm not trying to say that one of the approaches is better than the other – they're just completely different attitudes.

How did you go from research to management?

It was largely due to the strong and structured leadership development at Hoechst. At the age of thirty-two, I took over a research department with more than 200 people – a sign that the company had confidence in me. It was a great experience!

Did you have a career plan in mind?

When I started at Hoechst, my highest career goal was to become a group leader in research. Back then, I could not imagine achieving what I have achieved now. This is something that cannot be planned. Anyone who tries to map out a career well in advance is likely to fail, because the plans will be based on false premises. You can only grow into a position. I took seriously every task I was assigned to.

Does a doctoral degree help?

Definitely! You have to be able to manage a huge workload on your own and go through many ups and downs. You have to learn to remain committed and not to be discouraged by setbacks. This is the most important thing about a doctoral degree. The research topics are one thing, but the personal development is the most important: to teach yourself and to learn to position and present yourself. With Professor Herrmann, we had to be prepared to present our research results every Monday. It was a constant challenge.

As a private person, you are a founding donor of the TUM University Foundation. Why?

The TUM University Foundation is a great story. I was always fascinated by foundations like this in the US. I was convinced by the determination with which the TUM University Foundation was established. When I was asked to become a founder, I spontaneously and happily agreed. Also, I was surprised and pleased that I was asked to become a member of the foundation's Advisory Board – and even more when I was elected to become chairman in the first meeting.

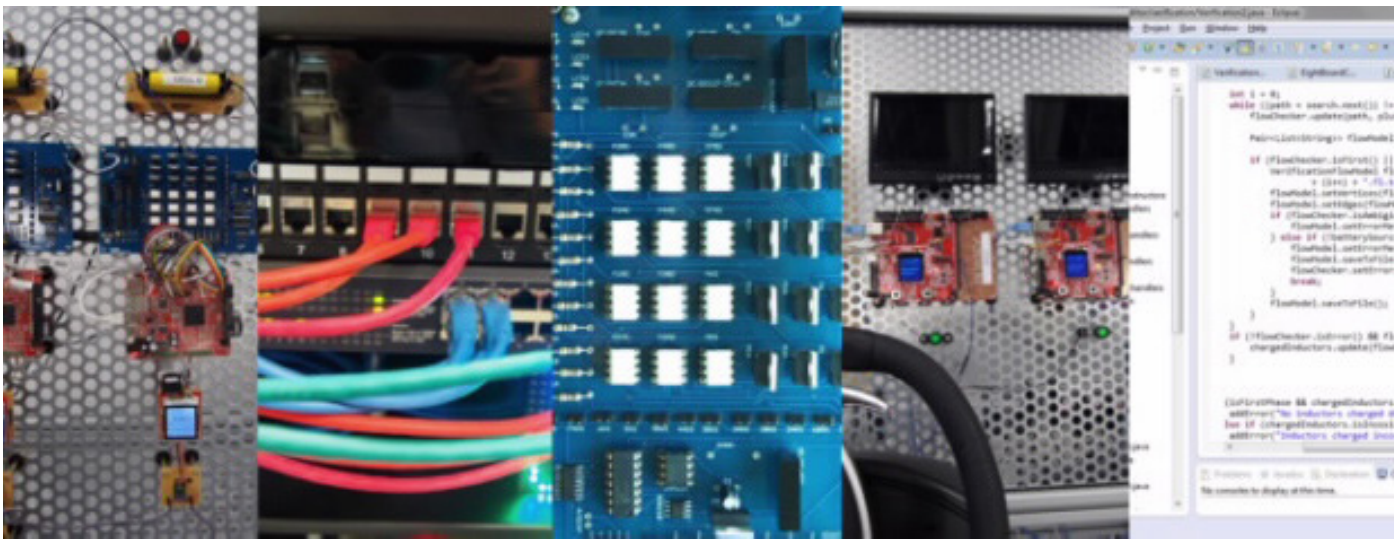
What are the next steps for the foundation?

We want to ensure that TUM can further enhance its excellence in innovation. We have agreed on ambitious goals for the foundation. The larger the foundation, the more we will be able to promote specific topics. During the first few years, we will have to build up a stock of capital before we can decide on funding any programs.

What advice do you have to offer the students?

To study with determination, not to be distracted and to pursue one's studies seriously. Don't be discouraged by setbacks, endure the doctoral thesis – and don't lose the fun of it. The world is in your hands, you can shape your own future. It is not the world that shapes you, it's the other way round. You need to understand this to be able to make the most of the opportunities that are open to you.

News from TUM CREATE, RP3 - Embedded Systems.



Electronics and Software as Innovation Drivers in Electric Vehicles

To cope with growing pressure to innovate in the automotive domain, car manufacturers implement an increasing number of embedded hardware and software systems in order to improve safety, comfort and efficiency of modern vehicles. As a result, the complexity of electronics and software in cars has grown rapidly within the last 25 years. Today, top-of-the-range vehicles comprise more than 100 embedded devices as well as a complex and heterogeneous network.

One major question is how a large-scale implementation of electric vehicles will change the design of electronics and software in the automotive industry. On the one hand, the powertrain becomes electrified and requires reliable and efficient embedded control systems. On the other hand, electric vehicles are an opportunity to enforce a paradigm shift towards novel hardware and software solutions.

In the context of modular architectures, TUM CREATE puts its focus on networks in cars. Today, automotive networks consist of various protocols and bus systems which were integrated in an evolutionary design process over the past decades. Currently, Ethernet - which is the fundamental protocol in the Internet - is gaining momentum, relying on a special implementation for the automotive domain. For this kind of automotive Ethernet, TUM CREATE works on various topics. Unlike in the Internet, it might have fatal consequences if data in the car are not transmitted within a given time-frame. For this purpose, in order to prevent congestions, scheduling approaches are developed that shape traffic sent over the network.

Since it is also projected that cars will become increasingly connected to the cloud, security in this domain is becoming very important. Towards a secure automotive network, TUM CREATE develops an Ethernet-gateway that implements lightweight security features that are suitable for cars.

Automotive electronics are exposed to harsh conditions and have to sustain large temperature ranges, electromagnetic radiation, humidity, etc. To detect and forecast failures of electronics efficiently, TUM CREATE researches diagnosis and prognostics methods at network-level.

As battery packs are the most expensive component in electric vehicles, a major goal is the cost reduction of this component - without compromising objectives such as safety and reliability. One way to achieve this goal is the research of novel materials and battery cell production methods. Complementary to this, TUM CREATE researches approaches in the embedded systems domain to make battery management systems more modular, proposing the implementation of smart cells that form a distributed battery pack management.

TUM CREATE Ltd.

Research: Electro-mobility

Partners: Technische Universität München (TUM), Nanyang Technological University (NTU), National Research Foundation (NRF)

Founded: 2010

Researchers: 125

Website: www.tum-create.edu.sg

Photo: Neurogadget

World Cup 2014 kicked off by a paralyzed man in a brain-controlled exoskeleton endowed by TUM

During the opening ceremony of the FIFA 2014 World Cup in Brazil, a paralyzed man made the first kick wearing a brain-controlled robotic exoskeleton. This was a bold demonstration of neuroscience and cognitive technology in action. The exoskeleton was created as an initiative of the Walk Again Project, an international collaboration of more than one hundred scientists, led by Prof. Miguel Nicolelis of Duke University and the International Institute for Neurosciences of Natal, Brazil. Prof. Gordon Cheng, head of the Institute for Cognitive Systems at the TUM, is a leading partner.

A group of volunteers, consisting of eight Brazilian patients, men and women between 20 and 40 years of age who are paralyzed from the waist down, have been training on the exoskeleton to make sure that one of them would be skilled enough to pull off the tricky feat. The exoskeleton, which was operated using an EEG headset, was worn by 29-year-old Julian Pinto. The mechanism works by recording electrical activity in the patient's brain, recognizing his or her intention, and translating that to action. It also provides tactile feedback to the patient using sensitive artificial skin created by Cheng's institute.

Source: TUM / www.tum.de/en/studies/studinews/issue-032014/show/article/31595/

"What can the TUM Asia Bachelor Programme do for me?"

With a growing demand and interest from tertiary graduates, the TUM Bachelor degrees offered here in Singapore have seen a steady increase in applicants. For some, it was the possibility of obtaining a German degree that intrigued them. Others were excited at the possibility of spending 1 semester in Munich, Germany at our home campus while there were those who explored the possibility of completing their Masters with TUM after their Bachelor degree. These queries were posted and answered at our 9 May Information Session, where we met over 100 students with their families. Being able to speak with our students and professors gave these incoming students a personal encounter with the faculty, with many surprised at how warm our German professors are.

“With an education that will outlast the trends of change, we are ready to combat the challenges of TUMorrow”

Wang Cong
Graduate Fellowship (PhD Student)
Singapore-MIT Alliance for Research & Technology (SMART)
Master of Science in Microelectronics

Wong Kye Howe
IC Design Engineer, Lantiq Asia Pacific
Master of Science in Integrated Circuit Design
Industrial Scholarship Recipient (Lantiq Asia Pacific)

Dr. Jennifer Ziriakus
Head of Faculty, Chemistry
TUM Asia

Nurhidayah Basri
Research Officer
Bioprocessing Technology Institute, A*STAR
Master of Science in Industrial Chemistry

Richard Tan
Project Engineer, Leading Electronics & Communications Organization
Bachelor of Science in Electrical Engineering & Information Technology

Prof. Dr. Fritz Kühn
Head of Molecular Catalysis
Faculty Dean of International Affairs / Faculty Graduate Dean
Teaching Professor, TUM Asia

Saravanan BJ
Project Engineer
Rolls Royce Singapore
Master of Science in Aerospace Engineering

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