TUM Asia

A newsletter from Technische Universität München Asia

digest

May - August 2016 Issue

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CPE Registration No. 200105229R (13/06/2011 - 12/06/2017)
German Institute of Science & Technology – TUM Asia Pte Ltd

director's message

Time has flown by and the first quarter of the year has been filled with many eventful activities at TUM Asia. We participated in two Open House's and held a career workshop and networking session for students and alumni. These events allowed us to highlight the practical skills and knowledge that students are able to gain from our programmes.

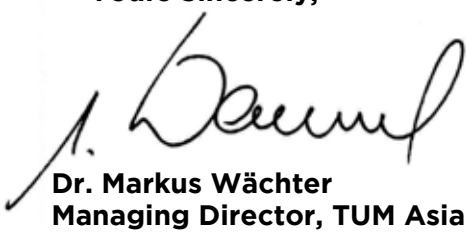
Highly skilled engineers are important to the betterment of Science and Technology. Two TUM Asia students started their academic journey at TUM Asia with the Bachelor programme to gain skills that would allow them to contribute to the industry. They embraced unique opportunities, which led them to gain experiences that would make a lasting impact on their futures. One of our students, Yu Lin, was initially studying in the Bachelor of Science in Chemical Engineering programme at TUM Asia. In order to gain more specialised knowledge to advance his career, he went on to pursue a Master degree immediately after completing his Bachelor degree. Abel, the second student, was able to travel to Munich, Germany for his Overseas Immersion Programme (OIP). Last year's OIP was particularly special for him as he was able to extend his stay in Germany through securing an internship with Lantiq. To find out more about how their experiences would give them a headstart in the future, turn to pages 4 - 9 to read their interviews.

In order to prepare students for industry networking sessions, a career essentials workshop was organised for students to attend. Regardless of whether they are looking for an internship or a full-time job, through this workshop, they are able to benefit from them. Flip to pages 14 - 15 to read more.

Industry-relevant and practical degrees are crucial in TUM Asia's programmes. Although one may think that studying Aerospace Engineering would limit them to working with aircraft, that would not be the case. Dr. Martin Rott and Martin Langer, who were teaching in the Spacecraft Technology module in TUM Asia's Aerospace Engineering programme, share their views on spacecraft technology, as well as how the knowledge can be easily applied across industries in satellites, aircraft and cars for instance. You can turn to pages 16 - 17 to read more.

We hope that you will have an insightful read and stay tuned for the next issue.

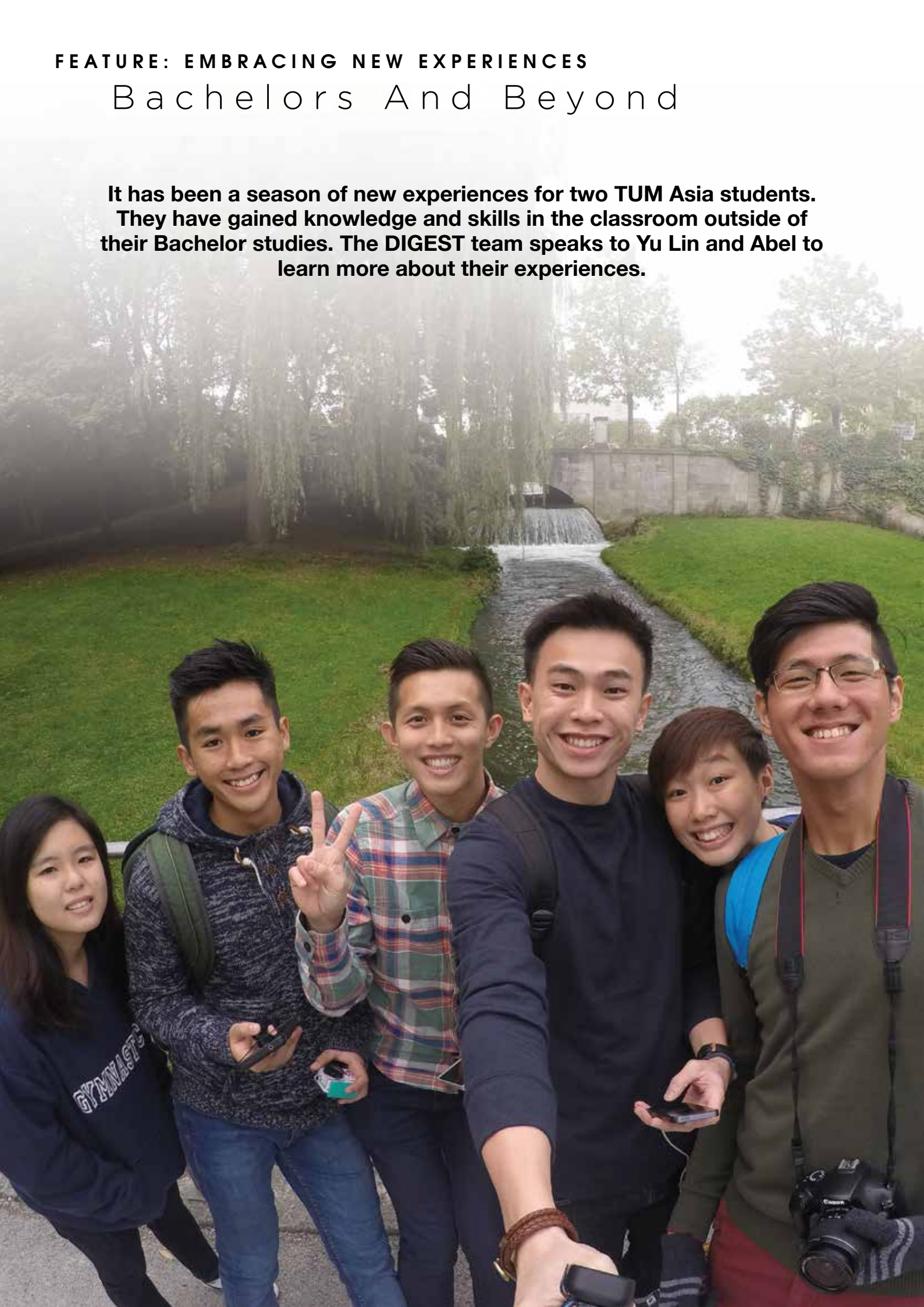
Yours Sincerely,



Dr. Markus Wächter
Managing Director, TUM Asia

Bachelors And Beyond

It has been a season of new experiences for two TUM Asia students. They have gained knowledge and skills in the classroom outside of their Bachelor studies. The DIGEST team speaks to Yu Lin and Abel to learn more about their experiences.



Chen Yu Lin

Bachelor of Science in Chemical Engineering
Master of Science In Industrial Chemistry

Yu Lin (extreme right) with his classmates in the Master's programme

Yu Lin completed his undergraduate studies with TUM Asia and went on to pursue the TUM Asia Masters in Industrial Chemistry immediately. In this issue, we find out what motivated him to pursue further education.

How did you first hear about TUM Asia?

Yu Lin: I first heard about the Bachelor of Science in Chemical Engineering from my polytechnic lecturers. They shared with me that a German-based education is ideal as the Germans are renowned for their engineering and scientific expertise and knowledge. Being interested to know more from that moment onwards, I did more research. TUM is highly rated amongst other prestigious and internationally recognized universities in education and research. I believe that TUM Asia enhances my learning and knowledge in science and engineering.

Most Singaporeans are satisfied with just a Bachelor's degree. What made you decide to pursue TUM Asia's Master degree?

Yu Lin: In the highly competitive global market, getting a Master's degree would set graduates apart from other candidates for specific job positions, particularly since engineering jobs require more technical skills in order to advance. My passion towards the subject and my experiences from my Bachelor programme and overseas exchange to TUM further directed my decision to pursue the Master of Science in Industrial Chemistry degree offered by TUM Asia. It would benefit me immensely to achieve my career aspiration and learn a wide spectrum of specialized knowledge. The programme combines discipline-specific, business knowledge, advanced coursework with skills like critical thinking, analytical ability, and innovation that are easily transferred even if your career path changes. I gain a highly practical and industry focused training.

There are Bachelor graduates who choose to work before getting a Masters degree. Why did you choose to start your Masters immediately?

Yu Lin: As I was fresh graduate, jumping from a Bachelor to a Master degree was a smooth transition

"TUM is highly rated amongst other prestigious and internationally recognized universities in education and research. I believe that TUM Asia enhances my learning and knowledge in science and engineering."

Chen Yu Lin

as I am still embracing the "student" mentality. Although the modules are filled with conceptual and specialised knowledge, as I did not have a long break between my degrees compared to someone who worked before starting their Masters, I was able to handle the challenges. I was able to find the energy and motivation to grasp and remember fundamentals. Besides studying, the Master programme provides direct industrial experiences in the internship and Master Thesis with a company or a institution.

How did you manage to perform well for both the Bachelor and Master degrees?

Yu Lin: Forming study groups with my classmates gave us a better chance to tackle the problems together. Having effective study plans, good time management, being attentive in class, focusing on the important information being taught and consulting

Photos: Yu Lin

are highly applicable in the workforce. We get a good insight of the industries with valuable practical knowledge. Classes are conducted in a smaller size which ensures a more effective learning experience instead of a lecture hall with hundreds of students. I am able to have a strong interaction with the lecturers and ask them questions whenever I am unsure. The programme structure is similar to my Bachelor degree, with the exception of more in-depth knowledge and classmates from all around the world.

You will be heading for your internship and thesis soon, what are your plans for them?

Yu Lin: Towards the end of our Master programme, we have to complete an internship and thesis. I will be doing my internship and Master thesis with a European oil and gas company in Singapore. During this time, I would like to broaden my knowledge horizon, gain industrial exposure and deliver my enthusiasm and contribution to the organization. The internship and industrial thesis will provide me with a chance to apply the education and knowledge that I have learned in school. I hope to strengthen my professional and transferable skills through actual experiences. This would also enable me to develop a better work habit to manage tasks and learn to carry myself in a professional environment. Eventually, I will have more confidence and a good understanding of my future career direction.

Yu Lin (top left) with his Master of Science classmates

"The Masters programme involved a greater emphasis on independent and self-directed study compared to the Bachelors. It will challenge your ability to undertake a more comprehensive and higher level of subject knowledge. I also utilized more critical, independent and innovative thinking through group assignments or case studies from the Master degree."

Chen Yu Lin

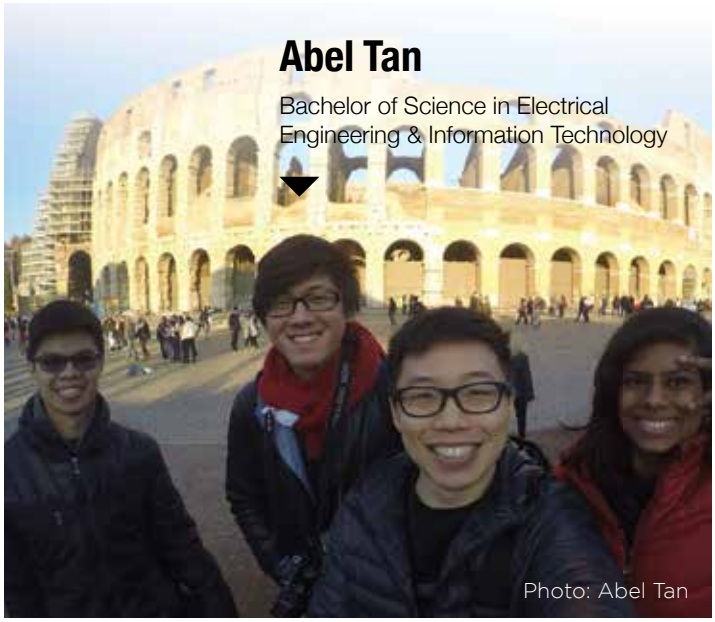


Photo: Abel Tan

We speak to Abel Tan, who recently completed a three month internship stint in Munich, Germany. As the first TUM Asia undergraduate who had the privilege to experience working in a different culture, we hear his thoughts about his experience.

How did you manage to land this amazing opportunity of interning with Lantiq?

Abel: This whole internship opportunity came as a surprise to me. Back when I was still in Year 1, I happened to be talking to my professor, Dr. Joham, and he was telling me about plans to have students intern or work in companies at Germany. He recommended me for this opportunity as he felt that I was suitable to represent TUM Asia, having done well for his class.

The plans only became concrete in the following year. A PhD student at the signal institute in Munich under my professor was working in Lantiq. After some discussion, I was fortunate to be offered the internship at Lantiq under the PhD student.

What were your feelings about the internship?

Abel: It was a mixture of feelings for me. I was thrilled from being able to do an internship overseas in Munich, to being overjoyed that I would get to stay in Europe for a longer period of time, and then to being a little anxious because I did not know what to expect, and feeling pressured because a lot was expected of me. I would be representing the school and the signal institute in TUM as an intern in Lantiq, and I would also be the first bachelor student in TUM Asia to do an internship overseas. The internship work would be closely linked to my thesis topic, thus I was initially unsure if I should accept it as there would be no changes to it after that. However, I chose not to let

Abel (top right), with his classmates and Dr. Joham (extreme left)

Photos: Abel Tan

this opportunity slip by. After witnessing the troubles and worries that my classmates had to endure to decide on their thesis topic, I was quite relieved that I did not have to go through the same ordeal.

Was it beneficial to have your internship conducted after your OIP?

Abel: It was definitely beneficial as I was already settled down in Munich from my OIP. My supervisor did not have to explain much as the basics were already covered during my thesis. As such, I had an easier time understanding the concepts used for my work in Lantiq.

What were some of your tasks during your internship?

Abel: My role was to assist my direct supervisor in the research in his project. My work was specialised in one topic and I had to utilise many different concepts. I spent time understanding those concepts at the beginning of my internship and was given research papers to read which was highly relevant to my work. A big part of the internship involved applying those concepts and equations to the program and running simulations to obtain and observe the results. My supervisor gave me the free space to do my work at my own pace and checked up on me once in a while to see if I was doing fine. I would approach him when I needed help with my understanding or my program code.

What are the differences between the work culture of Germany and Singapore?

Abel: For one, language could have been an issue. Thankfully, all of my colleagues in my department could speak English. Working in a German company was really an eye-opening experience in terms of their work-life balance, employee benefits and welfare, as well as the working culture. As my department did project-based work and research and development, my work schedule was very relaxed. I could plan my own time in the office, with some days having more hours, and some days having less, as long as I met the minimum required hours per week. There were even times where I could take a whole day off if I had worked the required amount of hours beforehand. This would be one perk that I probably will not get to experience working in similar departments in the companies of Singapore.

A fun fact: I once asked a German for the number of leave days that they were permitted to take per year. I was told that they could take a minimum of 30 days of leave per year, depending on the company, and I have confirmed this with other Germans.

How can you apply what you learnt in your next phase in life, be it in the working world or furthering your education?

Abel: I believe that my work and my little accomplishments in the short span of my internship is just merely the tip of the iceberg in the industry, and there is much more to learn and understand. Definitely, I would not say that I have become an

> **"This knowledge that I have gained will definitely help me and give me a headstart if I were to pursue further studies, or work in a company in the same field."**
>
> Abel Tan

expert in this field of work, but I have gained some valuable knowledge which I believe was beyond the scope of my bachelor studies. With that being said, this knowledge that I have gained will definitely help me and give me a headstart if I were to pursue further studies, or work in a company in the same field.

Looking back, how do you feel about your experiences in Germany?

Abel: The purpose of the OIP is not only to complete our thesis. Many professors would advocate their students to travel around Germany and Europe to gain new experiences, which was exactly what I did. While I still had to complete my thesis, my workload was not overwhelming to the point where I had to coop myself up at home or at school to do my thesis every day. Travelling during the free time in my OIP allowed me to experience the life and culture of the people while my internship allowed me to experience the working culture in Germany. Both experiences were something that I would not exchange for anything and I really learnt a lot from my time in Germany.

Any advice for your juniors who are interested to complete an internship in Germany?

Abel: For my juniors who are interested to do an internship in Germany, it would be good to start from companies that have links to the school, whether is it through a current student or past student, as it would be easier to get in contact with the respective HR staff. Do take note that you would require a visa to do an internship or work in Germany and to obtain that visa would require a lot of admin work, and you would require supporting letters from the school. The process of applying for a visa is tedious, with a lot of paperwork, and subject to approval, meaning you may not get an approved visa. However, getting the visa is absolutely worth the effort.

> **"Working in a German company was really an eye-opening experience in terms of their work-life balance, employee benefits and welfare, as well as the working culture."**
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> Abel Tan

Soccer In A Bubble

The TUM Asia Student Management Committee organised a get-together event for the Bachelor and Master cohort. The event, named “Bubble Bump”, involved everyone participating in a bubble soccer game. Participants are required to wear a bubble suit and bump into one another to get close to the ball. The game was much more challenging than it sounds. Everyone had to be alert as opponents could tackle them and knock them over. However, the games turned out to be a surprising amount of fun for all!

Photos: TUM Asia Student Management Committee

German University, Singapore Culture

Photos: TUM Asia

In the past quarter, TUM Asia was involved in the Singapore Institute of Technology (SIT) Open House and held her own Open House at the SIT@SP Building, the latter being the first since moving into the new SIT@SP campus. Potential students were able to find out more about the university and be assured of their education decisions by meeting and talking to staff, students, and faculty members. Talks were also held for interested parties, who sat down and listened to the faculty members about what it means to pursue a German degree in Singapore. One of the highlights was when TUM Asia's Industry Partners gave presentations at the TUM Asia Open House to speak to potential students on how a German degree allows students to excel in the workforce. The responses for the open houses were overwhelming and it was great to see our current students being involved to assist at the event.


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Study and
Research in

A Career Headstart

How can I be prepared for an industry networking session? Will I be able to promote an impactful identity of myself? Students were able to learn more about these topics in the recent Career Essentials Workshop, which was aimed to help students be prepared for career networking opportunities and job interviews.

The workshop had a positive outcome, with many students turning up for it to help them be prepared for upcoming networking sessions. There were even opportunities for them to practice with the instructor, allowing the other students to learn from their example. Some were planning to search for internships soon, allowing this workshop to be a useful chance for them to ask questions and learn new tips to prepare for interviews.

Photos: TUM Asia

TRANSFERABLE KNOWLEDGE BETWEEN INDUSTRIES

Photos: TUM Asia

Dr Martin Rott, Senior Scientist and Academic Director, Institute of Astronautics (TUM), shares his views on how Spacecraft Engineering is very relevant to Aerospace Engineering. We also hear from PhD student, Martin Langer, who assisted Dr. Rott in his class on Spacecraft Technology. Both Dr. Rott and Mr. Langer spent two weeks in Singapore teaching in the Master of Science in Aerospace Engineering programme.

We are curious to hear more about the Institute of Astronautics. Can you share with us some of the technologies that your institute works on?

Dr. Rott: I have been with the institute for 30 years and one area that I work on involves the stimulation of micro meteoroids. This is the special environment around the planets, which can impact spacecraft and damage spacecraft. We stimulate these environments in our labs. I also work on antenna systems, which is mainly funded by the German Space Agency. Our institute chair is a former astronaut, therefore there is a team working with him on human space research.

Martin: I am working on building small satellites, also known as Cubesats. The first satellite that I worked on was launched and has been in orbit since 2013. I am currently working on my second satellite.

What do students learn from the ESPACE programme being offered under your institute?

Dr. Rott: ESPACE is a Master Course in Munich. It is taught in English so that students from around the world can contribute to the diversity of talents. It focuses on investigating Earth Orientation from space, instead of from the inter-planet. The module that I teach there is similar to the module that I conduct here as well, which is on spacecraft technology.

How has satellite technology advanced over time?

Martin: Satellites use electronics that already exist. For example, a stable 15 year old computer. With the advancements in electronics, smaller satellites can use normal consumer technology such as super fast smartphones like the Google Nexus on a satellite; PhoneSAT. However, they can only stay in orbit for a short time. For long term projects you would rather use something reliable because it requires more stability to function for data collection in a long time. However, it still takes years to collect enough data. NASA's New Horizon probe launched in 2006 but only just flew by Pluto. Nowadays you are only allowed to launch a satellite for a maximum of 25 years. Our first cubesat will only last till 2030 and we have to prove that our technology will only be in orbit for those years.

What are the future possibilities for satellite technology?

Dr. Rott: Satellite applications today include solutions such as car navigation systems and weather predictions. Some future possibilities would include higher precision, monitoring climate change, which is significantly more important than before, ocean temperatures, and communications.

Martin: There is so much more you can do with small

satellites unlike in the past. Instead of one, you can use many small satellites to collect more data. For example, SpaceX, which launches a lot of satellites in an area, enables you to efficiently and effectively obtain more data, real-time photos and videos. Many places in the world do not have high speed internet and these satellites are able to solve this problem since it is easier to provide high speed internet from space. The cost of setting up GPS is high, but by improving the accuracy with efficient satellites, the results are much more worth it.

How do you engage your class to further expose them to spacecraft engineering?

Dr. Rott: Martin made sure that the information in the slides that we used were updated in order to make it relevant and interesting for the students. For example, we showed photos of Rosetta from 2014 to match the relevance of the lengthy formulas and equations.

Martin: The great thing is you can find everything online so one can keep themselves informed and updated of the data and rocket launches. I believe that these will help the Aerospace Engineering students understand the practical application to what they learn, which is also being applied in space.

How are spacecraft engineering and aerospace engineering related?

Dr. Rott: Principles that you learn in spacecraft engineering can also be applied to aerospace engineering. For example, with systems engineering, you can use the same principle for large systems across different craft. Launching a rocket from earth requires it to move through the atmosphere, which is likewise for aeroplanes. The tests for propulsion and aerodynamics apply similar principles. Although satellites are normally built as one-of-a-kind, they are not manufactured as much compared to aeroplanes and cars. However the knowledge required to build them is transferable across industries.

Martin: In my opinion, for Unmanned Aerial Vehicles, their technology can be applied to satellites. I did my Masters in Aerospace Engineering and worked in Aerospace Engineering, before coming to work in Space Engineering. Another interesting thing to note is that the knowledge you gain from an Aerospace Engineering degree would not only be applicable to aircraft, but also applicable to vehicles such as cars. I have friends who studied in Aerospace Engineering and work for BMW, because in principle, systems engineering apply to these large companies when they manufacture their car engines. Systems engineering was invented in NASA in the 1960s and this same principle was then applied in other industries, such as the automobile industries and even civil engineering industries.

What is one sentence that describes the accomplishment of engineers in the spacecraft industry?

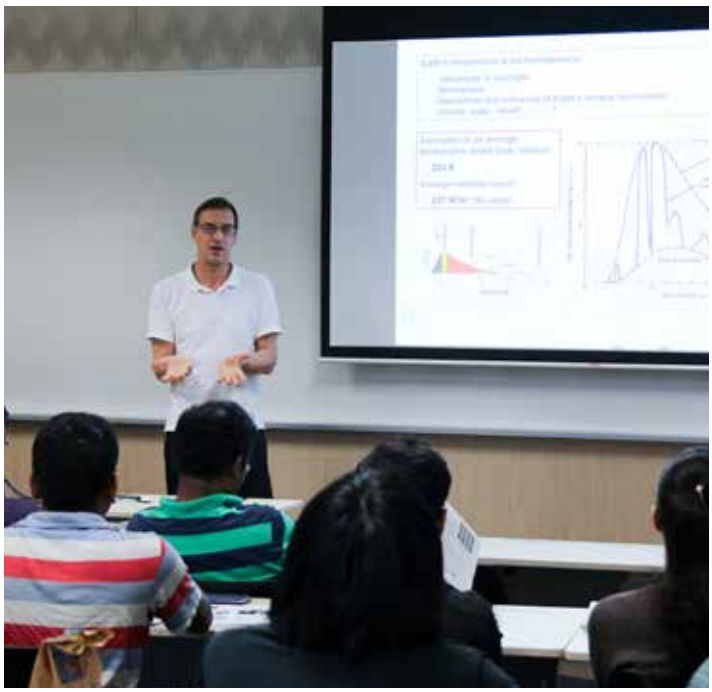
Dr. Rott: I am still amazed that engineers helped to build these space probes – which enabled us to learn about the evolution of our universe, such as how our solar system looks like and develops.

Martin: Space engineers help us to answer questions like “where do we come from?” We are able to find out more about other planets, like the sun, and if there is life on other planets.

What is one advice you would like to give to students?

Dr. Rott: Do not narrow yourself to one particular industry, be it the space or aerospace industry for instance. As opportunities are limited, even if you are unable to join one industry, you can always apply the same knowledge in other industries.

Martin: If you are interested to be a space engineer, you should get hands on experience as soon as possible. We teach the theory; however, you have to get practical experience by working on student projects – which include working with satellites, controls, drones, rockets, roboteurs and more.



Photos: Dr. Rott (left) and Martin Langer (right) teaching the Spacecraft Technology module, which is offered in the Master of Science Engineering programme at TUM Asia

A selfie with the President: Prof. Dr. Wolfgang A. Herrmann welcomes freshmen at the matriculation fest in October 2015.

5 Answers By The President On The Topic Of Openness

From Prof. Dr. Wolfgang A. Herrmann, President of the Technical University of Munich

1. A longing for the new

Openness towards the new, and more than that - a longing for the new - is the fundamental outlook of science. As the university's teaching mission is science-oriented, it must always keep alive and breathe new life into an atmosphere of intellectual openness across the generations. This spirit is naturally open to internationality, which it cannot help but be within a scientific ambiance. Dependent on the possibilities of the era, today's TUM became international soon after its foundation (1868): back then students came in droves from Eastern Europe, mainly Russia, and became good engineers and chemists with us.

2. With eyes open and an open mind

Openness and internationality are what keep science alive. The researcher's openness needs open eyes and an open mind to keep curiosity alive and arrive at the right questions – a fundamental prerequisite for successful scientific research. The international attitude of the researcher requires a pure heart that respects the cultures of foreign countries, thus making it possible to tune into their scientific understanding. An attitude of internationality is only sustainable if one establishes a connection between one's homeland and the world. That is the difference to mere "science tourism", which has been on the rise in recent times.

3. Overcome habitual ways of thinking

Openness is character-specific and not science-specific. Indeed, it is a fundamental characteristic which we can observe again and again in our children and grandchildren. In difficult, conflict-ridden situations in particular, openness has proved its worth, because it is what lends argument its atmosphere. I have seen this on many occasions, when we had to overcome our habitual mode of thinking at our university in order to make progress. Two examples are the structural reform, above all in Weihenstephan, and the TUM experiment clause, which ultimately led to the amendment of the Bavarian university legislation in 2006. But also the foundation of new faculties with the new, unusual cultures of their subject areas are part of this experience. Just think of the Faculty of Economic Sciences or the TUM SCHOOL OF EDUCATION. We have learned there that openness also needs hard work and stamina to be effective.

4. Secure the future

If you do not look into the world, you will not recognize the best standards in accordance with which a university of rank must orient itself. An international university is part of the worldwide research community – in different focuses. Depending on the subject, there are of course legitimate differences between the arts & humanities, the engineering sciences and the natural sciences. If TUM was not international, we would be robbing our graduates of their future. This is because the professional and employment markets are international today. With globalization, the sphere of activity that universities must cover has expanded enormously. Universities that are not internationally networked will soon no longer be of interest for very good students – nor will universities in which English is still seen as a foreign language!

5. Roots and wings

Openness involves a new start daily, something that is also a core characteristic of a successful researcher. Often-trampled pathways are foreign to the world of science. They are, however, not to be mistaken for an own identity that is rendered more stable by openness and an international attitude. The motto here is "roots and wings" - then a university is on the right track.

All information in this article are courtesy of KontakTUM Issue 1/2016
Photo: Astrid Eckert/TUM

Photo: TUM Asia

Career Opportunity Day

TUM Asia held its annual industry networking event, Career Opportunity Day, on the 22nd of March for students and alumni. Many industry partners spanning across the different industries were present at the event, offering different positions from internships to jobs. It was a successful turn-out as many students and alumni were present and ready to speak to the representatives of the companies.

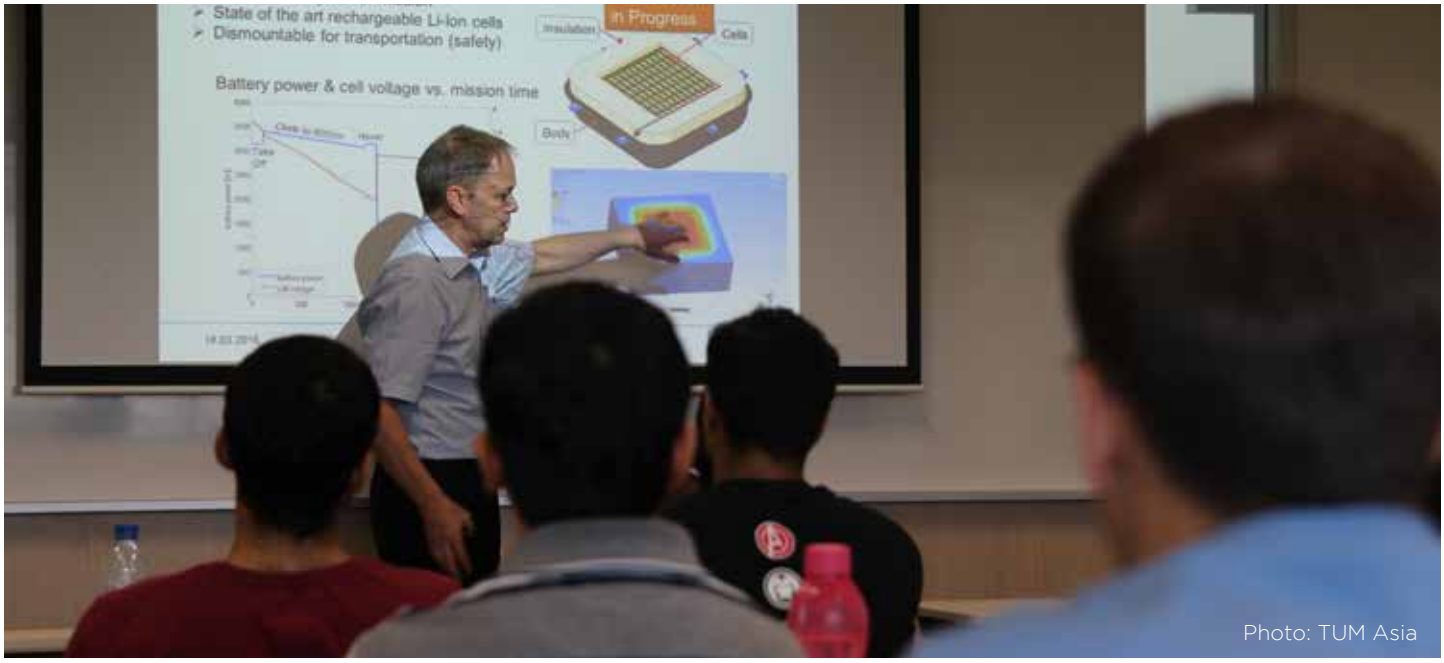
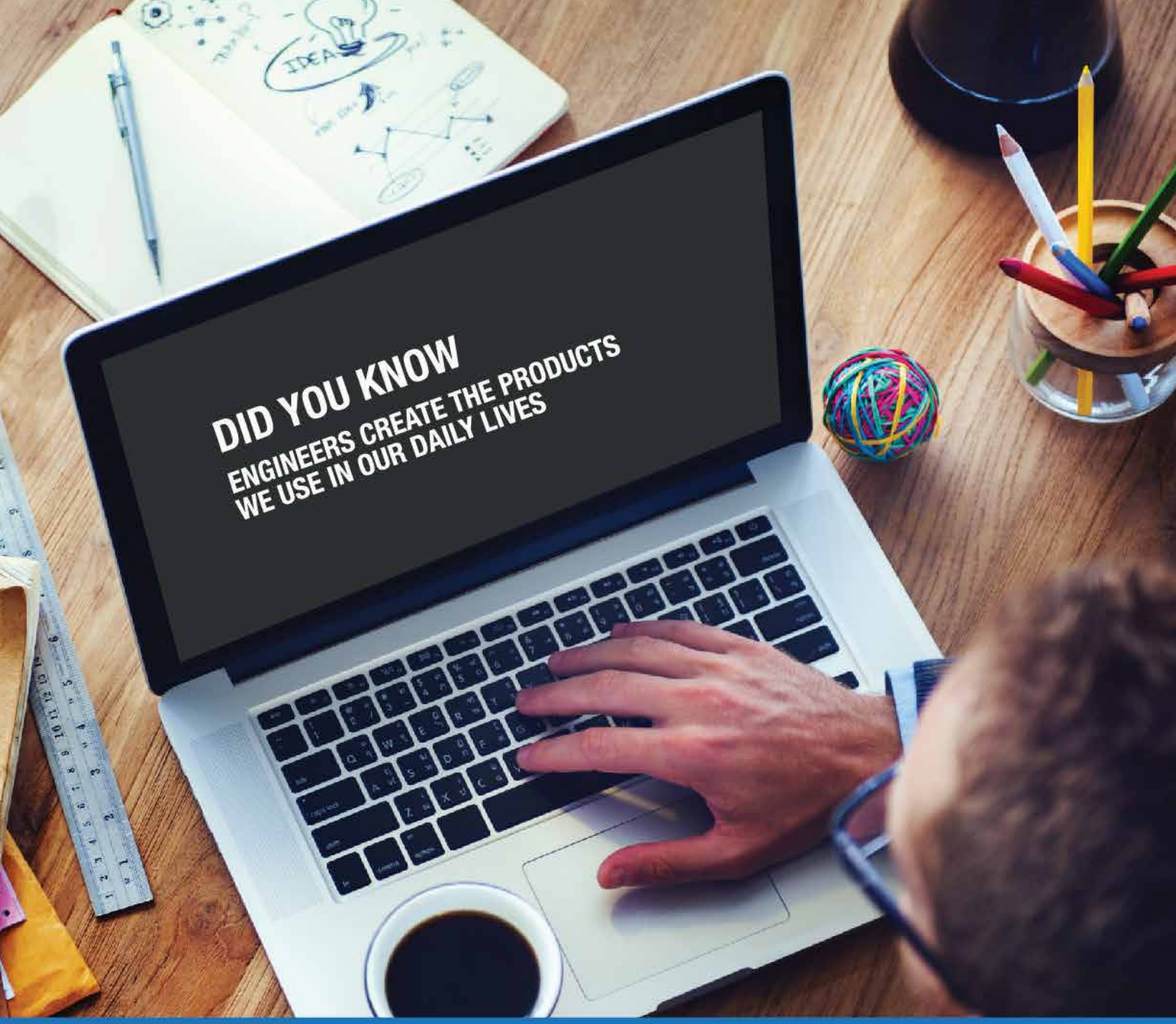


Photo: TUM Asia

Research For Rotorcraft

On the 18th of March, a public lecture was held by Prof. Manfred Hajek, TUM Professor and head of the EADs Chair of Helicopter Technology. Titled "Research for Rotorcraft", Prof. Hajek shared with participants more about what his institute does, such as on his rotorcraft simulation (ROSIE). His specialised knowledge comes from many years of experience in the industry, working at well-known institutions such as the former Eurocopter and Airbus. His knowledge is beneficial for his students in the Master of Science in Aerospace Engineering programme.



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