

digest

January - April 2017 Issue



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Experience Across
The World
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Towards The Future
Of Manufacturing
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Hi, I Am An
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AN EXTRAORDINARY EXPERIENCE ACROSS THE GLOBE

Final-year Bachelor students gain unique perspectives from overseas exposure



MAKING MEMORIES THAT MATTER

How the Student Management Committee goes beyond to foster the TUM identity among students



BUSINESS FOR ENGINEERS

Dr. Franck Boeckelmann shares his thoughts on how valuable it is for engineers to be well-versed in business skills

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director's message



As we celebrate the start of a new year, I would like to wish all our readers a Happy New Year. I hope that 2016 was a memorable year for you. At TUM Asia, the past year was marked with many special memories for our students, alumni, staff and industry partners. We look forward to kickstart the year 2017 with some highlights from our student body and industry network.

Every year, our final-year Bachelor students await the arrival of September eagerly. This is when most of these students travel to Germany for their Overseas Immersion Programme. They spend a semester in our home campus in Munich, Germany completing the Bachelor Thesis. It is an experience that is fun, unique and extremely life-changing. This is a new classroom module for them - the module of life-skills. They have to learn to prioritize their studies alongside new responsibilities like living on their own in a foreign country. The DIGEST team spoke with five of these students on their life in Munich thus far. Hear from them in our feature interview on pages 4 through 9.

We also spoke with final-year undergraduate and entrepreneur, Stanley Chew, on his university journey where he juggles both school and his start-up company. With an educational background in chemical engineering, Stanley owns a business in the electronics field. How does he manage his two passions and what does it take to be a student-preneur, are questions we posed to him. To hear what he has to say, read his interview on page 14.

As a university that prides on entrepreneurship, it is encouraging to witness young individuals making a name for themselves. We are also proud to be consistently ranked within the top universities in the Global Employability University Ranking, taking 8th place this year. This is attributed to the industry-relevant curriculum that not only educates in theoretical knowledge, but also prepares students through other important skills, such as business administration. The DIGEST team spoke to one of our lecturers, Dr. Franck Boeckelmann, to learn more about the business module that he teaches to engineers at TUM Asia. To hear about Dr. Boeckelmann's views on the importance of business administration skills to engineers, turn to pages 16 and 17.

As we step into 2017, I would like to thank our readers, alumni, students, and partners alike who have showed their support throughout the years. We feel honored to have your continuous support and we look forward to greater successes together! May you have an enjoyable read.

Yours Sincerely,

Dr. Markus Wächter
Managing Director, TUM Asia

FEATURE

An Extraordinary Experience Across The Globe

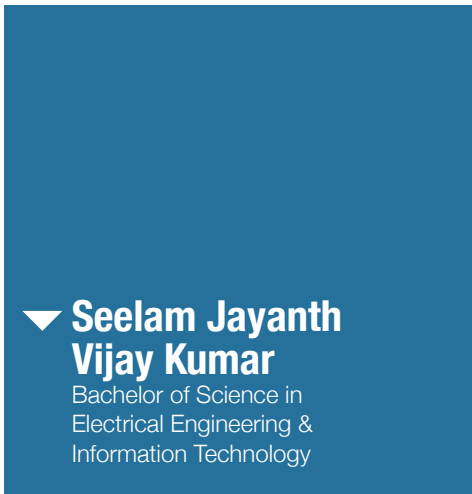


◀ **Noor Shazwani Bte Md Mohsin**

Bachelor of Science in
Chemical Engineering

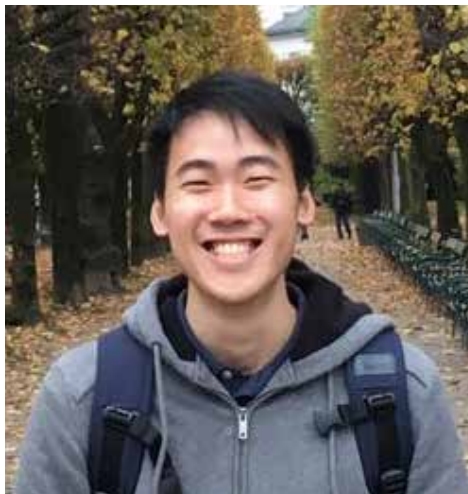
Muhammad Ariff Horlis ▶

Bachelor of Science in
Chemical Engineering



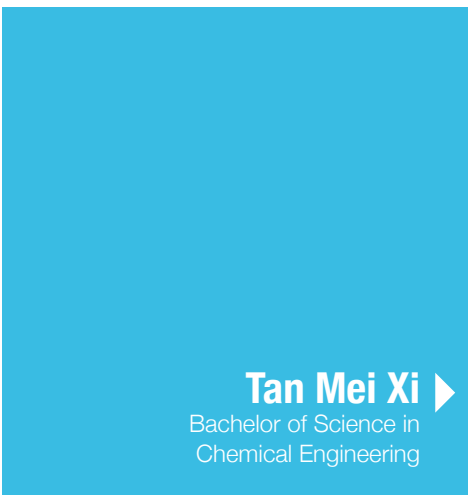
▼ **Seelam Jayanth Vijay Kumar**

Bachelor of Science in
Electrical Engineering &
Information Technology



◀ **Tobie Tham Kiat Meng**

Bachelor of Science in
Electrical Engineering &
Information Technology



Tan Mei Xi ▶

Bachelor of Science in
Chemical Engineering



The Overseas Immersion Programme (OIP) is a highlight for most TUM Asia final-year undergraduates. Students spend three to five months at the home campus in Munich, Germany, taking in many new experiences while completing their Bachelor Thesis. In this issue, the DIGEST team catches up with five final-year Bachelor students to learn more about their time in Europe.



Vijay (extreme right), together with his classmates and his Professor's family

Congratulations on finishing the final lap of your undergraduate studies! Can you tell the readers how studying in Germany has been for you?

Ariff: Germany has definitely opened my eyes to how much a country has to offer in terms of quality education. The reputation and richness of the engineering industry is amazing. There is however, a similarity in the level of stress when it came to quizzes and exams. I guess I can say that my junior college education was only the tip of the iceberg as compared to my university journey.

Mei Xi: There are similarities in the way our courses are conducted. The Chemical Engineering students have to complete two lab courses here, which are completed in groups and reports are written. The supervisors are very diligent with the coursework and sometimes they even ask us questions outside of the textbook!

Shazwani: I agree with Meixi. Skills that we learnt in Singapore can be applied during our lab courses in Germany. Additionally, we were able to complete our practicals using an extensive range of state-of-the-art facilities.

Tobie: For myself, I received the same kind of assistance from my Professors and supervisors. We could freely ask questions during our lessons in Singapore and it was the same in Germany when I had to clarify any doubts on my work. It was easy to integrate into a new environment with this level of help.

Vijay: In my lab, I enjoy the same multi-national environment in Germany as in Singapore. My lab mates are from Austria, India, Iran, Pakistan, Russia, Tunisia, United States of America, to name a few. This was unique for me as I have never had a lab experience like this.

Has your time in Europe shaped new perspectives on life?

Ariff: To me, the OIP trip is a bonus to our university experience. There is no better way to end off an education experience with a trip to a place as

advanced as your home country. Living in Germany has allowed my friends and I to acclimatize ourselves to a different way of life. One example would be the recycling effort we have picked up, since all Germans take it seriously. This means we now put in our empty plastic bottles for recycling, and also bring re-useable bags when grocery shopping.

Mei Xi: Some have said that the best way to experience a brand new country is by studying abroad. Now that I have been in Munich for over two months, I definitely agree with that statement. I learnt to plan my meals and do my own grocery shopping. Meals in school were also interesting for us since the cafeteria provided different menus each day.

Shazwani: The OIP allowed me to experience a completely different culture. Coming from a country with no distinctive seasons made this trip more unique as I was able to experience the changes in autumn and winter. Germany has an abundance of historical sites and some magnificent architecture. The cultural journey has been eye-opening for me.

Tobie: Yes, it has been some time since I spent time outside of Singapore. The OIP changed my opinions about travelling. After this, I am keen to travel to other countries to experience other cultures.

Vijay: My friends and I travelled around Europe in a group of ten or more. I definitely learnt to be a good planner while making full use of resources since we needed to ensure affordability and convenience for everyone. Working with the available weekends for travel was also a challenge. I can now say that I know how to travel on a budget!

“Germany has definitely opened my eyes to how much a country has to offer in terms of quality education. The reputation and richness of the engineering industry is amazing.”

Muhammad Ariff Horlis



Each student chooses a topic for the Bachelor thesis. Can you tell us more about your topic, in relation to how it will affect everyday life?

Ariff: With limited resources of crude oil and the rising demand of it, more can be done to utilize residues of refineries. However, they would require suitable catalysts in order to be purified from sulfur, nitrogen and other impurities. My thesis topic involves research on the operations of a trickle bed reactor system and heterogeneous catalysis. Through this, resources should increase in utilization with minimal wastage, which is beneficial for the environment. On an economic basis, if a suitable and low cost catalyst could be produced, more refineries can commit to refine these “wasted” components of crude oil.

Mei Xi: I will be researching on the functionalization of magnetic nanoparticles in a microfluidic reactor, of which a system for coating the magnetic nanoparticles will be developed, assembled and tested. This optimized process would be beneficial especially for applications in medicine, where the synthesis process has to be carefully monitored.

Shazwani: Using nuclear magnetic resonance spectroscopy (NMR), the identity of a substance can be easily identified as different molecules have different magnetic properties. NMR uses the magnetic properties of the atoms or molecules and my thesis will be based on this technique. This technique can be applied to advanced medical imaging such as MRI, and it can also replace the classic titration method in areas that require an analysis of samples.

Many worry that living in Germany requires that you speak fluent German. Is this true for you?

Ariff: I did take a basic A1 course at the Goethe Institut before I enrolled for my Bachelor’s degree. This is not sufficient for fluent conversation but it gives you an idea. In Germany, it was not easy to use my



“Coming from a country with no distinctive seasons made this trip more unique as I was able to experience the changes in the autumn and winter seasons.”

Noor Shazwani Bte Md Mohsin

Shazwani (second from left) and Ariff (extreme right) with their classmates





Mei Xi (second from right) together with her batch mates

limited German, but through a few encounters with the locals and the constant announcements on the trains, you will get used to it. When living in a foreign speaking land, knowing the language is an advantage. It certainly helped with shopping and other everyday affairs.

Mei Xi: I agree with Ariff. I felt that the basic German course we did in Singapore was helpful as I could communicate with basic words and phrases. I am still not very good with German but I can recognize the basic questions and words. They speak English so getting around is no issue.

Tobie: Yes, I took a basic German course before I left for Munich. I was able to gain a basic understanding in the German culture and the language. It introduced us to what kind of lifestyle and encounters we could expect in Germany. Furthermore, the course was extremely enjoyable! But the requirement to speak fluent German is not true. Germans speak good English.

Now that you are in Europe, what is one thing that you have learnt while being in the region?

Mei Xi: Many of us take time to travel since its our first time in Europe. We learnt to travel in groups of five, because the regional tickets are cheaper that way. I also learnt to manage my frustrations while it came to train delays. After a conversation with a local while being stuck on the train for nearly an hour, I found out that their regional trains have train faults as often as once a week.

Shazwani: Find accommodation earlier as many students from different countries travel to Munich

“My organizational skills have been put to the test. With plenty of things on my plate such as studying for our lab courses, completing reports, and finding time to travel, I had to learn to balance it all.”

Tan Mei Xi



Photos: Ariff, Mei Xi, Shazwani, Tobie, Vijay, Yong Kia

for their studies. The affordable places are often unavailable for rent. We had to apply for our rental a few months in ahead of the semester.

Tobie: Bring food that you would not be able to get in Munich, such as Milo. I personally enjoy drinking Milo, however, I did not bring any along with me to Munich as I thought that it was not necessary. Surprisingly, I found myself missing the familiarity of having a cup of Milo during my stay in Munich.

Vijay: Academically, I wished I had more practise on Matlab softwares like simulink. I felt that I lacked the knowledge compared to the students in Munich. I would also recommend having knowledge in Latex software as many students in Munich are familiar with it. It makes writing thesis reports would be much easier. I would also suggest being familiar with basic household chores and cooking simple meals as you will be living on your own for a few months.

What will be one special memory from your OIP experience as you move on to your next chapter in life after this?

Ariff: Surprisingly, it will be cooking! Being away from the convenience of ready-made halal food or home cooked food forced me to learn some basic cooking skills. After a while, it became mundane to eat the same

type of food and I had to think out of the box to create more creative dishes for my own meals in Munich.

Mei Xi: It will be the skills I picked up while being on OIP. My organizational skills have been put to the test. With plenty of things on my plate such as studying for our lab courses, completing reports, and finding time to travel, it can be challenging to balance it all. I had to plan, prioritize, and organize my time. I have certainly learnt a thing or two from struggling to finish my reports in time. Moving on from here, I know that what I learnt during my stay in Munich would benefit me as I step out into the working world.

Shazwani: I learnt to step up and be independent, daring to learn new things whenever you can and experience as much as possible because sometimes, the opportunity only comes once. This trip will always be special because of the experiences I had. Therefore, I will encourage others to grab it as soon as you are presented with that golden chance.

Tobie: This education journey has been a rigorous one, with its difficulties along the way. I will definitely take away the ability to persevere and be determined, even in the face of the many challenges. This attitude will help me in new challenges as I step into the workforce.

Vijay: One special memory for me will be the time with my flatmates. My three Chinese flatmates taught me how to cook Chinese dishes. I have also seen myself become more independent, having to manage my time and complete a project on my own. It was a challenge to get out of my comfort zone, however, this taught me to always get out there and explore, because you never know what you will find.

This education journey has been a rigorous one, with its difficulties along the way. I will definitely take away the ability to persevere and be determined, even in the face of the many challenges.

Tham Kiat Meng, Tobie





“In my lab, I enjoy the same multi-national environment in Germany as in Singapore. My lab mates are from Austria, India, Iran, Pakistan, Russia, Tunisia, United States of America, to name a few.”

Seelam Jayanth Vijay Kumar



Photos: Ariff, Mei Xi, Shazwani, Tobie, Vijay, Yong Kia

Making Memories That Matter



Photos: SIT-TUM SMC, TUM Asia

At TUM Asia, an exemplary team of students work together to integrate the student body outside of their classrooms. Coming from different programmes, these Bachelor students form the Student Management Committee (SMC) at TUM Asia, often committing their time outside of their lessons to organize team-building activities and facilitate the TUM spirit among the cohorts.

“We want to ensure that the events are enjoyable and evoke a sense of belonging to TUM. University life is all about socializing, expanding your network, and most importantly, having a great time with one another!”

Carolyn Quek
Student, Bachelor of Science in Chemical Engineering

Besides organizing events, such as bowling and Halloween events, the SMC serves as the voice of the student body and actively promotes the shared identity of being a TUM student. This is done through facilitating the sale of student-only TUM t-shirts and hoodies. Everyone has a different role to play and support one another.

“It was a great experience coordinating the t-shirt and hoodie sales. We had plenty of work to do, from sourcing for shirt suppliers to promoting the merchandise to the students and liaising with vendors. The result was meaningful as we managed to achieve our goals.”

Cheong Hao Weng
Student, Bachelor of Science in Electrical Engineering & Information Technology

As the new year begins, the SMC aims to continue planning events to encourage students to integrate with one another despite coming from different backgrounds, cohorts and programmes. To more memorable and enjoyable events!

“Our main objective is to bring the students together and put their interests first. I hope to see more active involvement in these events just to have fun and create wonderful memories together.”

Ang Shieh Ying
Student, Bachelor of Science in Chemical Engineering



The efforts of the SMC allows the student body to build a sense of identity and deepen the bonds with one another through common experiences such as fun events.

Towards The Future Of Manufacturing: Industrie 4.0 Symposium



Photos: Israel Tan Photography

The Industrie 4.0 Revolution that sparked off in Germany has already been making waves into the shores of Singapore. It brings about benefits for integrated computing, networking and improvements in physical processes that are revolutionising manufacturing. Industrie 4.0 has headlined many discussions for both the threats and opportunities it presents.

This prompted the inaugural launch of a 2-day research symposium that was held in Singapore from 1st - 2nd November 2016, with the theme “Industrie 4.0: Towards the Future of Manufacturing”. This

symposium was held in partnership between The Agency for Science, Technology and Research (A*STAR), the German Academic Exchange Service (DAAD) and Technical University of Munich Asia (TUM Asia).

Over the course of two days, this symposium served as an avenue to provide insights and support innovations that would leverage on Industrie 4.0 technologies. Participants were able to hear from members of the industry and academia, deepening their understanding on this buzzword. The discussions were extremely fruitful for all attendees.



Hi, I Am An Entrepreneur



Final year student, Stanley Chew, is currently pursuing his Bachelor of Science in Chemical Engineering. In this issue of DIGEST, he shares how his interests motivated him to start a business in a different engineering domain.

Why did you decide to pursue a degree in Chemical Engineering?

Stanley: I have majored in Chemical Engineering since Polytechnic days. I chose to further my education in the same field in order to increase my technical knowledge in areas such as chemistry, biochemistry and material science. I was also inspired by the opportunities of work in multi-national corporations such as ExxonMobil and Shell in future.

You are a business owner and an entrepreneur. How did you end up starting a company in the electronics industry?

Stanley: I started my own business with my polytechnic friend, Edward, during my National Service days back in December 2012. After much planning and discussion, we started the company, Experience Ace, which provides professional training and consultation services for educational institutions and Singapore schools in the field of science, engineering and robotics. Other than Chemical

Engineering, Information technology was another field that I was interested in. I also wanted to pick up some business skills while running this business. I have since learnt more about having a business mindset, entrepreneurship, dealership, marketing, business development, networking skills and many more. On the other hand, through my Chemical Engineering education, I have picked up technical-based knowledge which proved to be essential in work.

Can you tell us more about your job role at Experience Ace?

Stanley: I am the Business Development Director and my job role involves optimizing current

“In the process of running a business, it also moulds your character. It is definitely true that the world itself is a classroom.”

sales processes and to continuously look for ways to increase revenue for the company. I keep myself updated with market trends so that I can be prepared for changes. I also consistently review and refine the business model to stay ahead of the competition. Being creative and building networks and partnerships to strengthen the business are very important to the success of the company. My company has focused on robotics training for schools using innovative teaching techniques. Through conducting numerous trainings in different schools, the continuous partnership over time has allowed the company to develop a close relationship with the teachers and we have been able to work together well.

You are still completing your degree. How do you cope with school and work?

Stanley: I strive to prioritize my tasks and ensure that I do my best in them. Discipline and motivation are also very important attributes that have helped me to balance both work and study.

Since all our Bachelor students are required to complete a thesis, will your thesis topic be related to your business or a business domain?

Stanley: The topic that I chose for my thesis will not be related to my business. While looking into topics that I was interested in, I was inspired by one of my senior's thesis work. I intend to continue from where he left off. It is a good learning experience to be able to try out new things, rather than staying with things that you are familiar with.

Your work and study experiences have imparted you with different skills which prepare you for the working world. How do you feel that these skills have benefitted you?

Stanley: I have gained a lot from working and dealing with clients. The life skills, networking skills, business marketing skills and other exposures are just a few of the many things I have learnt. In the process of running a business, it also moulds your character. It is



Stanley (middle, back row) together with his classmates

definitely true that the world itself is a classroom.

Now that you are coming to the end of your studies, what is next for you?

Stanley: After completing my studies, I intend to continue focusing on running my business, which has been expanding and I would like to take it further. Other than Experience Ace, I run several other businesses. One of my companies deals with the distribution of electronic and electrical products to retail outlets, schools and more. It is also undergoing a restructuring in order to evolve into a business specialising in electronics' corporate gifts. Looking back, I am thankful for my education as it has helped me to be more motivated and diligent, which are important attributes to have when you are in the working world.

What advice can you give to students who have other commitments outside of school?

Stanley: The intensity of the course is tough as it is, but there is nothing to be afraid of as long as you set your mind to achieve something. You learn the most during challenging times. Never give up and continue to persevere. If I can do it, so can you!



Stanley (middle), together with other entrepreneurs



Photos: TUM Asia

Being familiar with business administration makes engineers from TUM Asia stand out from the crowd. The DIGEST team had the opportunity to interview Dr. Franck Boeckelmann, a guest lecturer from Wacker Chemie, who has been teaching the Chemical Business Administration module in the Master of Science in Industrial Chemistry programme since 2002.

Hi Dr. Boeckelmann, you have been working for many years at Wacker Chemie. Can you tell us more about your work at Wacker?

Dr. Boeckelmann: I started working with Wacker Chemie AG in 1989. I held leading positions in different working fields such as controlling and planning, internal audit, and also abroad as the Chief Financial Officer in Japan. My current position is Chief Compliance Officer.

How did you end up teaching in the Industrial Chemistry programme at TUM Asia?

Dr. Boeckelmann: During my career, I have always enjoyed training managers and employees and I discovered my passion to teach students. I have been teaching in the programme in TUM Asia ever since it started back in 2002. Since then, I have also started teaching a similar programme in 2007, which is catered more for doctoral students at TUM.

What types of business skills do you see that students are able to learn through the Chemical Business Administration module you teach?

Dr. Boeckelmann: As these students are studying chemistry – a natural science – I want to impart to them a comprehensive overview of economical thinking and interdependencies. My curriculum includes accounting and balance sheets, controlling, marketing and finance among others. Such areas are important from my perspective as it allows the students to witness how everything is links up through the case studies that I share with them.

How can the practical application of business skills benefit individuals working in a non-business department of a company?

Dr. Boeckelmann: The students will learn, through my module, how to discern and understand industrial capital expenditures. Through this, they will learn more about the internal business operations of a chemical company, such as understanding how those companies are financed and how their products are marketed.

As a senior executive figure in a leading chemical company, why is being familiar with business administration important to engineers?

Dr. Boeckelmann: As students venture into the working world, they will eventually climb up the working ladder. All managerial jobs will have to deal with economical thinking and that requires business

administration. It is important to think ahead and to be able to face the challenges a business can have. Engineers should have at least basic economical knowledge and managerial skills, and that will prepare them for advancements in their careers.

Is it common for students who start off in a technical background to eventually work in a business background?

Dr. Boeckelmann: I have several ex-students who have held different positions in the business fields. Some started off in a typical career in the chemical industry. They moved on from working in a lab towards a managerial job. Some of them even had the opportunity to work abroad in interesting locations. However, most vividly, I recall that one of my former students ended up working in a totally different and challenging job; a stock exchange broker.

Is there any advice you would give to students who are interested in a career that involves both business and engineering?

Dr. Boeckelmann: I think that it would be something that the students who study in TUM Asia should take note of because they are able to benefit from an excellent curriculum in engineering and natural scientific subjects of studies. In addition, there are also lectures in other disciplines such as business administration. What the students are learning is so much more than only knowledge – they are shown and taught analytical thinking.



The Chatter

Buildings That Live And Breathe

From London to Hamburg to Singapore, architects draw inspiration from living organisms to design energy-efficient buildings

Imagine a building that can breathe through thousands of pores. Sounds outlandish? An engineer from the University of Stuttgart in Germany has recently made it happen. Tobias Becker has designed a façade that adapts indoor temperatures to create a comfortable environment for people in the building. And the energy required is minimal. The system consists of small holes in the surface of the building that open and close to let in just the right amount of air and light.

Tobias Becker drew his inspiration from the skin of living organisms. Skin can regulate its permeability to control the light, heat and other substances that flow between the inside and outside of the body. Becker's invention is an example of biomimetics or biomimicry applied to architecture. The goal is to imitate biological systems to develop more eco-friendly construction solutions. The European Commission reports that buildings account for 40 per cent of energy consumption in Europe and 36 per cent of its CO₂ emissions.

"A few years ago, humans were building 'machines for living,'" says Leonardo Saavedra, a PhD student at the Technical University of Munich (TUM) who is studying the potential of biomimetic applications based on the skin in construction. "But architects now realise the limitations of this approach and are exploring ways of designing more sustainable, energy-efficient buildings."

Examples of architectural biomimicry abound worldwide. London's 30 St Mary Axe skyscraper, better known as the Gherkin, features a ventilation system similar to that of sea sponges. The innovation achieves energy savings of 50 per cent over a traditional tower of equal size.

The surface of the Eastgate centre in Harare, Zimbabwe is covered in openings. Its architect designed it after watching how termites bore holes in their mounds for ventilation. The centre has no air conditioning system and only requires a tenth of the energy used by a similar building.

New fur coat

The surface of the Esplanade Theatres in Singapore is modelled after polar bear fur, a highly efficient system for regulating heat. The arts complex is covered in 7,000 triangular shades made of aluminium. Photoelectric light sensors adjust the angle and direction of these "shields" depending on the sun's rays.

This lets light in while preventing overheating. Energy Star, the U.S. government programme set up to promote energy efficiency, estimates that this type of reflective surface cuts the demand for air conditioning by 15 per cent. "So-called 'smart façades' have enormous potential, especially during periods of sunshine," says Jan Hensen, a professor with the Department of the Built Environment at the Eindhoven University of Technology. "A building envelope covered in photovoltaic panels can be used to collect electricity while also acting as a 'shield', for example, thus reducing the need for air conditioning."

The Centre for Sustainable Building at TUM is also looking into these smart façades. One of the centre's teams is developing a transparent building surface made with liquids and insulating glass. The liquids control the flow of energy between the outdoors and the building's interior, while the glass improves its thermal performance. Again, the technology results in significant energy savings.

The BIQ House in Hamburg has gone a step further by directly integrating living organisms into its structure. Its transparent surface contains micro-algae that affect the amount of light entering the building.

When the sun is shining bright, the algae grow by photosynthesis and filter out the sun's rays. If there is no sunlight, the algae do not multiply, letting sunlight in. Energy savings can reach up to 50 per cent.

"Today, we have the resources to apply certain biological processes to technology," Leonardo Saavedra says. "Many natural systems adapt to their environment, providing ideal end solutions." Luc Schuiten, a Belgian architect who designs futuristic urban ecosystems, believes that biomimetics is just a step towards a future more in harmony with the environment. "Humans have been using destructive building techniques since the industrial revolution. Other methods are available."



Article by Julien Calligaro, courtesy of LargeNetwork for Technologist magazine.

To read more about how nature inspires technology, visit www.technologist.eu/when-nature-inspires-technology



Sustainable Transportation for Urban Cities: DAAD - TUM Asia Speaker Series

Transportation is an important part of our daily lives. We require it to get from place to place. An efficient and effective transportation system is required to support economic growth and ensure a sufficient quality of life in cities. Singapore's high population density and limited land resources require new innovative and energy and social sustainable transport solutions. Green energy can be expensive and difficult to produce. The speaker series aimed to address how Singapore the challenges and possibilities of green transportation. Participants were able to hear more about overcoming these challenges and shared their opinions with one another. It was an insightful session with a great exchange of concepts and ideas.



TUM Ranks 8th Place In Global Employability University Ranking

Graduates from Technical University of Munich (TUM) are considered to be among the best in the world. According to the 2016 Global Employability University Ranking by Times Higher Education, TUM is the only German university ranked among the top 10. The ranking seeks the opinions of around 6,000 managing directors and recruiters in 20 countries. This places TUM among the top 3 institutions in Europe, after Cambridge and Oxford.

TUM has consistently been ranked highly in the Global Employability University Ranking. "For one, degree programs at TUM are exemplary in combining the most exacting scientific standards with real-world applications. That includes opportunities for students to work with top companies early on in their studies. But the real-world approach also means aligning what we teach in our pro-grams with the big issues confronting society today. We are also constantly modernizing our teaching methods on the basis of empirical findings and in an ongoing dialogue with our students," says TUM President Wolfgang A. Herrmann.

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- Master of Science (Green Electronics) by Technical University of Munich and Nanyang Technological University
- Master of Science (Industrial Chemistry) by Technical University of Munich and National University of Singapore
- Master of Science (Integrated Circuit Design) by Technical University of Munich and Nanyang Technological University
- Master of Science (Transport & Logistics) by Technical University of Munich

Admissions for Bachelor and Master Degrees are open. Find out more at www.tum-asia.edu.sg.

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 info@tum-asia.edu.sg

*As ranked in the 2015 QS Rankings and the 2011, 2012, 2013 and 2016 Shanghai Rankings (ARWU)

**In partnership with Singapore Institute of Technology (SIT)

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