WELCOME, FRESHIES!
A new academic year signifies the start of an exciting learning journey for our newly enrolled Year Ones!

LIFE AT COE
- Welcome, Freshies!
- Professional Internship - Gateway to Jumpstart your Career
- Inspiring the Young Budding Engineers

PEOPLE AND EVENTS
- Hi Profs!
- Students Doing Us Proud

SCIENCE AND ENGINEERING
- New Flexible Concrete Doesn’t Crack under Pressure
- Diagnosing Early Stages of Brain Disorders by Listening to the Sound of Light
Welcome, Freshies!

A new academic year signifies the start of an exciting learning journey for our newly enrolled Year Ones! What is a better way to welcome them than an exciting orientation programme? Besides informative sessions provided by staff and faculty members, there were also fun activities that made the Freshmen Orientation 2016 memorable.

CxEE

CxEE’s Freshmen Welcome Orientation 2016 was themed CEEvil War. Participants were grouped into 3 clans representing the 3 programmes offered in CxEE.

Held on campus and at Sentosa, everyone had a great time gaining new knowledge and getting to know their fellow course mates. They were exposed to an array of well-planned activities throughout the 4 days, forging friendships that would last down the memory lane. When asked what they thought of the orientation, one freshie replied, “This orientation was a fun experience and the activities were well-executed seamlessly. The Beach Day was especially memorable to me because of the campfire and the fireworks we saw that night. I feel extremely bonded with my group and student leaders!”

MSE

MATScIV (MAterial SCIence), pronounced as ‘Massive’, consisted of 4 orientation groups revolving around the theme of constellations, uniting to achieve greater heights and conquering challenges as one.

A series of activity line-ups included Field Games and Pool Games, Beach Games at Sentosa and an Amazing Race across 8 stations from west to central Singapore.

At the Pool Games, participants got wet and wild at NTU’s Sports and Recreation Centre, competing in various water games like the Water Captain’s Ball.

SCBE

SCBE’s freshies were divided into 6 orientation groups (OGs) in this year’s Freshmen Orientation Programme, NUEVE XII. Participants went through a series of exciting activities, forging new friendships. This was an invaluable opportunity for them to exercise leadership, teamwork and facilitation – important skills that not only will benefit their upcoming university education, but life in general.

At the Social Night, freshies got to interact with their course mates from other OGs and had a night of fun games with performances by seniors, culminating with a batch dance and a cheer showdown. That was the calm before the storm, as the freshmen faced off against their seniors in a water bomb war at the Grand Finale. The camp was a great success as freshmen were able to interact and involve in a meaningful learning experience.

CoE welcomes the freshmen once again and we hope that they will enjoy university life and make the most of their years at NTU.
Professional Internship - Gateway to Jumpstart your Career

An integral part of the undergraduate engineering curriculum at NTU CoE, Professional Internship provides students the opportunities for professional experience in a private or public organisation locally or overseas before they even enter the workforce, so that they can become productive and effective contributors to their respective organisations after graduation.

Let’s hear from some of the students, their internship experiences.

**STEVEN ADITYA**
MAE, Year 3
Interned at Johnson & Johnson (J&J), Singapore

Describe your job scope during your internship.
I interned with the Supply Chain department, where my main project was to manage, review and optimise US$190M inventory in the Asia Pacific region. This required me to liaise and work with many people in Asia Pacific countries and also from the Global team.

What was the overall experience like?
I met and liaised with many people with different functions and learnt how to communicate effectively with different people and understand the business better. More importantly, I got to know my interest and realised that I enjoy solving challenging cases. There was also fun during the internship, where I got to know people from all over the world, understand their different cultures and learn to accept the differences. Apart from work, J&J provides many other activities for employees such as movie sessions, community services to help the elderly, etc.

Any accomplishment/achievement during the internship that you would like to share?
I developed inventory management procedures and drove the implementation of inventory reduction plans to optimise the inventory. Our team managed to do so and successfully reduced the inventory value by 20%.

**LIM YI YING**
EEE, Year 4
Interned at Keppel FELS Pte Ltd, Singapore

Describe your job scope during your internship.
I interned with the Electrical & Instrumentation (E&I) department, which is involved in the production as well as commissioning of electrical system on-board projects. On top of that, I worked on improving the department’s safety slides for the workers. It was good exposure as I was able to apply my knowledge of Risk Assessments to my job.

Any interesting or memorable experiences to share?
It was an exciting experience to be able to walk around the shipyard and learn how different systems add up to the final delivery of the jack-up. I learnt something new every day - about the marine and offshore industry as well as the workings of various kinds of jack-ups. An interesting experience was scaling the boom crane, which was 40m above the deck floor. The view from the top was amazing as I was able to look out to the sea as well to other ongoing projects. Getting to see how the electrical system on-board powers the numerous equipment will never fail to amaze me and makes me appreciate the knowledge that I have acquired in EEE.

Another highlight was speaking to a crowd of 200 workers during one of the morning briefings on my last day, as part of a challenge by the department’s assistant manager to move out of my comfort zone.

What are some key takeaways from your internship?
The internship has definitely taught me to be disciplined, as I have to be awake at 5am every morning, and to also respect and follow the rules in the shipyard. Staying humble and curious, and maintaining a positive outlook will also help you to form good relationships with co-workers.

**IYLIA HAZIQ BIN OTHMAN**
MSE, Year 4
Interned at the Singapore Chemical Plant, ExxonMobil

What did you do during your internship?
I interned as an Inspection Engineer and was tasked to provide support in the review of Inspection Plans for the Turnaround Job Packs. I also provided support in the planning of various Non-Destructive Testing (NDT) Qualification Tests between several 3rd Party Operators, field inspections and the different phases that go into inspection and troubleshooting of equipment with reliability or safety issues.

Any accomplishment/achievement during the internship that you would like to share?
I developed inventory management procedures and drove the implementation of inventory reduction plans to optimise the inventory. Our team managed to do so and successfully reduced the inventory value by 20%.

Yi Ying (on the right) with her fellow co-workers

Steven (on the left) with fellow colleagues on the company-organised voluntary services
LIFE AT COE

What was the overall experience like?
It gave me insights into the work environment in an oil and gas company, and how interconnected it is. Essentially, as an inspection engineer, one has to be multifunctional and able to work with other engineers because the reliability and safety of the plant are dependent on a holistic approach.

Any accomplishment/achievement during the internship that you would like to share?
I came up with a simple software tool that helped to automate the counting of tubes in a heat exchanger. This reduced the time taken from 4 hours to just under 8 minutes for a set of 50 heat exchangers.

Any tips and pointers for juniors to make the best out of their internship?
Stay open-minded, look for areas that can be improved on and try to involve yourself in some of the company activities.

Any interesting or memorable experiences to share?
The internship was not merely work. We got to experience the European culture in a unique fashion. The university staff was very hospitable and welcoming. We began our journey in Switzerland with a traditional cheese fondue gathering. There was also a weekly German class for all interns from non-German speaking countries that helped us better identify with the culture.

We had several trips to Swiss chocolate factory, beer factory as well as skiing and sledging trips. One of my most memorable moments was participating in the annual carnival at Rapperswil that happens in the form of a fancy dress parade. During the weekends, we also travelled to other places in Switzerland and Europe such as France, Austria, Germany, Italy etc.

What was the overall experience like?
Not only did I have a great learning experience, it was also an enriching one. It was a once-in-a-lifetime opportunity to further develop my technical skills and widen my horizons.

BHAVYA CHANDRA
SCSE, Year 4
Interned at The University of Applied Sciences Rapperswil, Switzerland

What did you do during your internship?
I worked on a big data project based on analysis of Geo-data from OpenstreetMaps, under the guidance of Professor Stefan Keller and his team. We also explored mini tasks such as attending the Swiss Python Summit, visiting the Google Zurich office and talking with the Google Maps team, working on smaller one-day projects etc.

Inspiring the Young Budding Engineers

The Institution of Engineers, Singapore (IES) celebrated its 50th Anniversary with a series of engineering talks to provide the public with a better understanding on what being an engineer entails. With an open and honest sharing platform, the sessions aim to encourage participants to rethink and reshape the way in which engineering is perceived and to engage young engineers to remain in the profession for a long time. CoE is honoured to host two sessions together with IES for our engineering students on 17 August 2016.

SESSION 1: CONVERSATIONS WITH C-LEVEL EXECUTIVES - CAREER PROGRESSION

Young engineers hold the key to Singapore’s future. But what personal attributes are required from them to become successful leaders in their profession? And what should they do to achieve that?

Mr. Choo Chiau Beng, Chairman of M1 Limited, Ms. Leong Wai Leng, Chief Financial Officer of Temasek Holdings, and Mr. Fong Sai Khey, Chief Technology Officer of ST Engineering, shared their valuable experiences with the attendees.

Talking about his road to success, Mr. Choo encouraged the young to learn with an open mind. He stressed that many doors can be opened, but one must have a positive attitude and do his/her best in every assignment undertaken.

On career moves and changes, Ms. Leong shared with the students three considerations before making the next big move:

SESSION 2: ENTREPRENEURSHIP

Are you an aspiring entrepreneur? Do you know what it takes to be a successful entrepreneur and what must an entrepreneur know in order to sustain in this competitive world?

Mr. Feng T. Ong shared his life experience as an entrepreneur and what makes an entrepreneur successful. He challenged the audience to question status quo and push for new solutions that touch lives. He emphasised the importance of networking and making friends, and constant communication with people at all levels. The key takeaway from all the three speakers was that one should always possess three main values: leadership, integrity and the ability to maintain one’s moral compass.

The session ended off with a lively Q&A session with many burning queries from the students.

CONVERGENCE
Hi Profs!

The Convergence team invites 3 new professors who have recently joined/ will be joining NTU College of Engineering to tell us a bit more about themselves, their secret recipe for making lessons more engaging and their advice for students.

ASST. PROF. MATTEO SEITA (MAE)

Hello… Ciao…
Bonjour... Prof. Seita speaks English, Italian, French and more.

When I am not in the lab or in the classroom, there is a good chance that I am with my family. We like to travel and look forward to exploring the Asia-Pacific region.

I make lessons interesting and exciting by enriching my slides with videos and animations to help assimilate more abstract concepts. During lectures, I question, discuss and debate with my students. I find that this challenges students to reason through the material themselves and develop their own explanations, which they will remember more easily. I use practical, simple examples from everyday life to explain new concepts. I also make use of electronic feedback forms and online quizzes to give students the opportunity to ask questions or leave comments anonymously and to engage them outside of the classroom.

The best part about teaching is when, after explaining the fundamentals to students, I share with them aspects of my research and why it is impactful. I love when they appreciate the challenges and opportunities behind a research effort and start thinking about how they would contribute to it.

My advice to students is to find out what gets you excited and follow it. It might be a problem you want to engage and solve, a discipline you want to specialise in, or a project you want to undertake. No one can promise that you will succeed. In fact, sometimes you may fail catastrophically but you will learn a great deal and will have a lot of fun along the way. Also and I know it’s hard, try to study for your own sake and not for the sake of getting good grades.

ASST. PROF. SONG JUHA (SCBE)

Any good method to connect with students? I try to memorise names of individual students during a semester if possible, and recognise them in class. Also, when they ask questions, I try to respond as soon as possible. Fast feedback really helps me connect with the students.

My advice to students is to be curious and be open to trying something new. In our highly competitive society, GPA or fast success is often used as a measure of a person’s capabilities. However, don’t judge yourself by any apparent outcomes. Instead, focus on what you can create based on what you’ve learnt. Even though you may appear to fail, as long as you don’t give up, eventually you can reach where you aim for. Also, please remember that failure is another opportunity to learn, which makes you stronger once you move on.

ASSOC. PROF. XAVIER BRESSON (SCSE)

Tell us more about yourself. I grew up in the South of France. In the past fifteen years, I have been living in different places in Asia, Europe and the United States. I love the cultural enrichment each experience offered me and consider its own challenges and rewards as my driving force. I also like spending time with my family and sharing my passions with them.

I connect with students by ensuring that there is a clear two-way communication between the students and me. I make sure that students receive clear information on course schedules, homework and exams. In class, I try to initiate discussions. I also encourage students to have one-to-one consultation if they feel more comfortable to do so. Accessibility is also a key factor. Students are aware that I am always available to discuss any specific problem.

I consider my teaching effective when students believe in their own learning abilities and are not afraid to make mistakes to comprehend complex ideas. I like to see students developing self-confidence in their own ability to master scientific ideas and solve real-world problems. My goal is to get all my students engaged in this form of active learning.

My advice to current students is to always stay alert, proactive and creative. Learning is a never-ending process. What you learn during your studies may change significantly in the next five or ten years. Students need to bear in mind that education and re-skilling are constantly updated, and new curricula are designed to adapt to the ever-changing world.

Prof. Song on her greatest achievement and most memorable experience in teaching: “When the students for my first undergraduate class doubled after the first week. Subsequently, there was low absenteeism and unpunctuality; and more active participation from students. At the end of the semester, most students commented that it was one of the best classes they’d ever taken.”
Students Doing Us Proud

WINNING BIG AT SEMBCORP-EMA ENERGY CHALLENGE 2016

A team of four EEE undergraduates won the 1st Prize under the Higher Education Institute Category and was crowned the overall champion for all categories in the annual SembCorp-EMA energy challenge (SEEC), held on 3 June 2016.

The Sembcorp-EMA Energy Challenge is a national competition aimed at inspiring and engaging the energy professionals of tomorrow through a suite of programmes comprising learning journeys, an energy competition and internship opportunities.

Twenty-four teams from four Technical Education (ITE), Polytechnics and Universities participated in the SEEC. On the day of the energy competition, the teams challenged one another in a 90-minute computer simulation game to manage and develop a power ecosystem while maintaining the profitability, reliability and environmental impact of the plant. The teams were challenged to build and run the best-performing, most efficient membrane bioreactors (MBRs). They needed to configure their MBRs for optimum life cycle cost, and find the best strategy to operate their plants with the lowest possible power usage.

Despite the difficulties faced during the competition such as faulty pumps and leaking pipes, the team from EEE overcame the problems with their tenacity and innovativeness in employing alternative methods and impressed the judges with their persuasive presentation that is strongly supported by key experimental data, graphs and reasoning. They beat 13 other tertiary teams to clinch the first prize and were presented a cash prize of S$5,000 by Sembcorp Group President & CEO, Mr. Chong Choon Lin, and an internship opportunity with Sembcorp.

CEE UNDERGRADUATES WIN THE SEMBCORP WATER TECHNOLOGY PRIZE 2016

Mr. Tang Kin Fei, Sembcorp Group President & CEO (left) presenting the award to the team

The fifth annual ASC16 Student Supercomputer Challenge, the largest student cluster competition in the world, kicked off on 25 April 2016. It was hosted at the Huazhong University of Science and Technology (HUST) in Wuhan, the capital of Hubei province, China.

From an initial pool of 175 teams, representing 148 universities across six continents, 16 teams advanced through the preliminary rounds into the final round. Participating teams had to design their own supercomputing system within the constraint of 3000 watts and apply it to various frontier scientific and engineering projects, such as an optimised benchmark test, ocean simulation, materials science, life sciences and in-depth learning. This is the third time NTU is competing in ASC Student Supercomputer Challenge. Seven students from SCSE spent 5 days running these tests on their own cluster, which contains 4 server nodes and 8 NVIDIA Tesla K80s, in total 80 CPU cores and 512 GByte memory.

The team won the Application Innovation Award on HPCG, an optimised benchmark test and was awarded with the “Most Popular Team” identified through online voting on Twitter.

SCSE TEAM SHINES AT THE ASC16 STUDENT SUPERCOMPUTER CHALLENGE

Members of the SCSE team

New Flexible Concrete Doesn’t Crack Under Pressure

NOT YOUR USUAL CONCRETE

“...most promising new type of concrete that is bendable yet strong and longer lasting than regular concrete which is heavy, brittle and breaks under tension. Named ConFlexPave, this innovation allows the creation of slim precast pavement slabs for quick installation, thus halving the time needed for road works and new pavements. It is also more sustainable, requiring less maintenance.”

Mr. Koh Chee, Director, Technical Services Division of JTC and Co-Director of the NTU-JTC I3C

“...Innovation of this game-changing technology will not only enable the construction industry to reduce labour intensive on-site work, enhance workers’ safety and reduce construction time, it also benefits road users by cutting down the inconvenience caused by road resurfacing and construction works.”

ConFlexPave has been successfully tested as tablet-sized slabs at NTU laboratories. It will be scaled up for further testing over the next three years in partnership with JTC – at suitable locations within JTC’s industrial estates and in NTU where there will be human and vehicular traffic.
Diagnosing Early Stages of Brain Disorders by Listening to the Sound of Light

POSTs is an iPhone sized Photoacoustic Oxygen Saturation sensor that can measure the haemoglobin oxygen saturation of blood in the central veins (SvO2) non-invasively. This breakthrough could help doctors to diagnose brain disorders in their early stages for better treatment outcomes.

POSTs – NON-INVASIVE CONTINUOUS MONITORING OF SvO2

POSTs is a novel iPhone sized sensor that can detect SvO2 accurately in a non-invasive manner. Prof. Zheng explained that POSTs works by shining light of different colours on the patient’s neck and then ‘listening to’ the resultant sound generated by the blood in the central vein to infer the SvO2. “The result is very accurate (~2%) since oxygenated and deoxygenated haemoglobin show distinct signatures in absorbing different colours of light and the generated sound waves could be accurately localised (<1 mm) with high signal to noise ratio. The measurement process is real time and the device is portable, making it suitable for continuous monitoring,” he added.

The results demonstrate that POSTs has great potential in non-invasive SvO2 measurement and could be used in the ICUs in the near future for early detection of shock, which reduces the onus of doctors and the pain of patients.

Haemoglobin oxygen saturation of blood in the central veins (SvO2) however, begins to fall early in shock even when blood pressures appear normal. In patients with shock, the SvO2 become lower than normal (<65%), reflecting a poor delivery of blood to oxygen-starved tissues. On the other hand, abnormally high levels of SvO2 reflect a reduced ability of the tissues to metabolise oxygen. Thus, SvO2 is an invaluable parameter for shock diagnosing.

Conventionally, SvO2 can only be measured invasively using catheters in the right superior vena cava or in the jugular vein. The insertions of such catheters are by themselves risky, and only performed in select patients. As a result, measurements of these values using catheters cannot be performed on patients who are not suitable.

In hospital ERs, OTs and ICUs, it is a matter of life to rapidly and accurately detect the patient who is suffering from shock, and to speedily institute treatment to save their lives. Shock is a state where there is a reduced delivery of blood and oxygen to the tissues to meet metabolic needs. There are typical clinical features of shock, such as fast heart rates, low blood pressures, altered mental status and reduced urine output, but many patients may not exhibit these features. There are also biochemical measures of shock, but they only begin to be raised later in the disease process.

POSTs is an iPhone sized Photoacoustic Oxygen Saturation sensor that can measure the haemoglobin oxygen saturation of blood in the central veins (SvO2) non-invasively. This breakthrough could help doctors to diagnose brain disorders in their early stages for better treatment outcomes.

Patients who suffer from stroke, shock and other brain diseases can benefit in the near future from POSTs (Photoacoustic Oxygen Saturation sensor) – a new invention by researchers from EEE. Led by Professor Zheng Yuanjin, this breakthrough could help doctors diagnose brain disorders in their early stages for better treatment outcomes.

In hospital ERs, OTs and ICUs, it is a matter of life to rapidly and accurately detect the patient who is suffering from shock, and to speedily institute treatment to save their lives. Shock is a state where there is a reduced delivery of blood and oxygen to the tissues to meet metabolic needs. There are typical clinical features of shock, such as fast heart rates, low blood pressures, altered mental status and reduced urine output, but many patients may not exhibit these features. There are also biochemical measures of shock, but they only begin to be raised later in the disease process.

Haemoglobin oxygen saturation of blood in the central veins (SvO2), however, begins to fall early in shock even when blood pressures appear normal. In patients with shock, the SvO2 become lower than normal (<65%), reflecting a poor delivery of blood to oxygen-starved tissues. On the other hand, abnormally high levels of SvO2 reflect a reduced ability of the tissues to metabolise oxygen. Thus, SvO2 is an invaluable parameter for shock diagnosing.

Conventionally, SvO2 can only be measured invasively using catheters in the right superior vena cava or in the jugular vein. The insertions of such catheters are by themselves risky, and only performed in select patients. As a result, measurements of these values using catheters cannot be performed on patients who are not suitable.

POSTs – NON-INVASIVE CONTINUOUS MONITORING OF SvO2

POSTs is a novel iPhone sized sensor that can detect SvO2 accurately in a non-invasive manner. Prof. Zheng explained that POSTs works by shining light of different colours on the patient’s neck and then ‘listening to’ the resultant sound generated by the blood in the central vein to infer the SvO2. “The result is very accurate (~2%) since oxygenated and deoxygenated haemoglobin show distinct signatures in absorbing different colours of light and the generated sound waves could be accurately localised (<1 mm) with high signal to noise ratio. The measurement process is real time and the device is portable, making it suitable for continuous monitoring,” he added.

The results demonstrate that POSTs has great potential in non-invasive SvO2 measurement and could be used in the ICUs in the near future for early detection of shock, which reduces the onus of doctors and the pain of patients.

Haemoglobin oxygen saturation of blood in the central veins (SvO2), however, begins to fall early in shock even when blood pressures appear normal. In patients with shock, the SvO2 become lower than normal (<65%), reflecting a poor delivery of blood to oxygen-starved tissues. On the other hand, abnormally high levels of SvO2 reflect a reduced ability of the tissues to metabolise oxygen. Thus, SvO2 is an invaluable parameter for shock diagnosing.

Conventionally, SvO2 can only be measured invasively using catheters in the right superior vena cava or in the jugular vein. The insertions of such catheters are by themselves risky, and only performed in select patients. As a result, measurements of these values using catheters cannot be performed on patients who are not suitable.

POSTs – NON-INVASIVE CONTINUOUS MONITORING OF SvO2

POSTs is a novel iPhone sized sensor that can detect SvO2 accurately in a non-invasive manner. Prof. Zheng explained that POSTs works by shining light of different colours on the patient’s neck and then ‘listening to’ the resultant sound generated by the blood in the central vein to infer the SvO2. “The result is very accurate (~2%) since oxygenated and deoxygenated haemoglobin show distinct signatures in absorbing different colours of light and the generated sound waves could be accurately localised (<1 mm) with high signal to noise ratio. The measurement process is real time and the device is portable, making it suitable for continuous monitoring,” he added.

The results demonstrate that POSTs has great potential in non-invasive SvO2 measurement and could be used in the ICUs in the near future for early detection of shock, which reduces the onus of doctors and the pain of patients.

Haemoglobin oxygen saturation of blood in the central veins (SvO2), however, begins to fall early in shock even when blood pressures appear normal. In patients with shock, the SvO2 become lower than normal (<65%), reflecting a poor delivery of blood to oxygen-starved tissues. On the other hand, abnormally high levels of SvO2 reflect a reduced ability of the tissues to metabolise oxygen. Thus, SvO2 is an invaluable parameter for shock diagnosing.

Conventionally, SvO2 can only be measured invasively using catheters in the right superior vena cava or in the jugular vein. The insertions of such catheters are by themselves risky, and only performed in select patients. As a result, measurements of these values using catheters cannot be performed on patients who are not suitable.