



VOYAGES of DISCOVERY

Exploring the Sunda Shelf with Universiti Malaysia Terengganu

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CUTTING EDGE TECHNOLOGY
at The School of Ocean Engineering

MAPPING THE WIND
of Change for Renewable Energy

A FRUITFUL COLLABORATION
Among ASEAN Neighbours

**OCEAN ENGINEERING
AND NAUTICAL SCIENCE**

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The logo for 'VOYAGES OF DISCOVERY' is located in the top left corner. It features a small rectangular image of a sunset over the ocean with the text 'VOYAGES OF DISCOVERY' in white, bold, sans-serif capital letters.

VOYAGES OF
DISCOVERY



**We Know That When We Protect Our Oceans,
We're Protecting Our Future**



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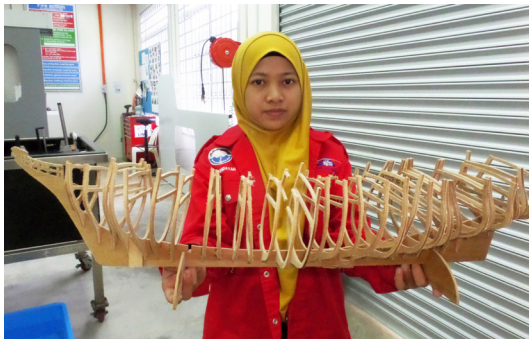
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VICE CHANCELLOR'S MESSAGE

In the olden days, sailing ships were the mainstay of various voyages of discovery by great explorers, from Amerigo Vespucci to Christopher Columbus.

At a glance, they may seem technologically inferior compared to modern ships but in the context of renewable energy usage, the sailing ships of yesteryears accomplished what scientists of today are now trying to achieve: pollution-free power that benefits a great number of people from fishermen to traders and travelers.

Researchers around the world, including UMT, are currently trying to perfect methods of harnessing renewable energy sources like the wind and the sun to generate electricity, power our homes and industry, as well as powering up vehicles, much like the sailing ships. The innovations that made the sailing ships so successful are providing insight into possible ways of harnessing wind power.

As human beings have benefitted from wind power since the advent of sailing ships, the concept of using it to generate electricity is readily accepted and understood by the general public.

Similarly, the idea of using people-centric application of knowledge is also at the core of our drive as Universiti Malaysia Terengganu (UMT) forges ahead.

With the theme of "Exploring the blue ocean; towards community sustainability", UMT's course from this year onwards will be focused on activities and programs that bring benefits for the community, provide solutions to the nation's problems and have an impact on global issues.

This is in line with the Higher Education Ministry's call for universities to conduct more translational research, i.e those that directly benefit the community at large.

Although translational research, being community-focused, may seem on the opposite spectrum from those that are focused on national and global issues, they could actually complement one another.

The ship simulator of the School of Ocean Engineering (PPKK) that is featured in this issue of the Voyages of

Discovery provides insight and virtual experience about ship handling to students before they even set foot on a real ship; similarly, the translational research that benefits local communities can form the building blocks of bigger programs that can help solve national or even global issues.

Translational research is not a new concept in UMT as we have conducted social innovation programs since 2013. However, we have more translational research projects lined up for 2017, among them are research on seahorses, horseshoe crabs, stingless bees or kelulut and aquaponics projects. The Higher Education Ministry has allocated almost RM8 million translational research grants for UMT to pursue such research.

Our research and knowledge transfer activities have given UMT the opportunity to collaborate with the state government as the activities have helped push the development and community programs in Terengganu. In the long run, such activities will enhance UMT's visibility to the local community in line with the translational concept.

On the other hand, UMT is seeking to be more visible globally and the International Centre has developed UMT's Internationalisation Blueprint as the basis for an action plan towards that objective. We will work with our MoU and MoA partners to widen our strategic international cooperation network.

International Credit Mobility Student Programmes will be further strengthened through the introduction of our Summer Camp program. We are targeting to have each school in UMT, with the support of the International Centre, to have at least one program under this initiative this year.

Of course, there will be challenges ahead but like the explorers that risked all to discover the world, UMT will also persevere in our voyages of discovery.

Let us explore the blue ocean for the sustainability of the community.

Professor Dato' Dr. Nor Aieni Haji Mokhtar
Vice Chancellor
Universiti Malaysia Terengganu

Walking The Talk in Minimising Carbon Emission, **TROPIMUNDO** **STYLE**



« These students were awed by the stunning beauty of the Crystal Mosque in Kuala Terengganu. Visiting the local tourist attractions is among the activities the TROPIMUNDO students love to do in their spare time to help them understand the local culture. Pic by Thomas.

Numerous studies have proven that carbon dioxide is the most damaging of greenhouse gases due to its high volume in the environment, and various initiatives have been taken worldwide to minimise carbon emission. The Erasmus Mundus Masters Course in Tropical Biodiversity and Ecosystems (TROPIMUNDO) in which Universiti Malaysia Terengganu (UMT) is a partner has become the first Erasmus Mundus program in Europe to integrate carbon offsetting into its student mobility scheme.

Among the biggest contributors of carbon emission are vehicles, as they burn up fossil fuel in order to transport goods and people around. The increasing awareness about such pollution and how fragile our environment is has prompted scholars to travel the world to study various aspects of it - from biodiversity and ecology to specific ecosystems and species. However, their travels to study the environment also contributed to carbon emission, which is called carbon footprint.

This aspect was brilliantly addressed by the TROPIMUNDO programme when they took steps to minimise the carbon footprint of their students as they travel around the world for their studies.

TROPIMUNDO is one of the 116 Master programmes in Europe that obtained the Erasmus Mundus excellence label and involves a joint programme between several European universities and their global partners. It also requires considerable mobility on the part of the students in order to advance science and knowledge about the Earth's system and its interactions with the environment, biota and human societies, particularly in the tropics.

In December 2014, the TROPIMUNDO Steering Board took the principle decision to create a carbon offset mechanism for each international mobility executed within the program.

"Our own emissions of carbon or other greenhouse gases will be compensated by supporting projects

which increase the absorption of the same amount of carbon dioxide. The selected carbon offsetting projects will be of a certified nature such as those certified by the United Nations Framework Convention on Climate Change (UNFCCC)," said TROPIMUNDO General coordinator Prof. Dr. Farid Dahdouh-Guebas after the TROPIMUNDO Steering Board made the decision.

"By starting to set the right example in established education systems, we would like to convince all of our colleagues to follow carbon offsetting in order to help cure our planet from increased hurricane, lightning, drought, and other natural phenomena resulting from increased carbon emissions," he said.

Background

TROPIMUNDO is an European Council (EC)-funded Erasmus Mundus Masters (MSc) course in Tropical Biodiversity and Ecosystems that was established in September 2013.

According to UMT's TROPIMUNDO Local Coordinator Assoc. Prof. Dr Behara Satyanarayana the aim of this program is not only to bring together expert Higher Education Institutions (HEI), with long-standing worldwide expertise in tropical rainforests and woodlands and in coastal ecosystems, but also to provide knowledge and understanding on the constituting biodiversity and environmental elements of one or more tropical ecosystems to the post-

The TROPIMUNDO local coordinator Assoc. Prof. Dr. Behara Satyanarayana and TROPIMUNDO students posing for a group photo during a field trip to a mangrove forest in Perak. Pic by Thomas.



Italian student Giulia Puntin during a free dive in the waters off Redang Island, Terengganu. Pic by Jessica Micklem.





The TROPIMUNDO students after registration session with UMT. Pic by Mehran.

graduate (MSc) students to master the key concepts of ecology and its socio-economic functions.

“The European Commission has approved financial support for the first five years (2013-2017), and after that the program is expected to be run on self-sustained basis. However, Prof. Dr. Farid Dahdouh-Guebas from the TROPIMUNDO Coordinating Institution Université Libre de Bruxelles in Belgium has recently submitted a proposal for extended financial support for another five years (2018-2022) and it is likely to be considered,” he said.

Core Values of TROPIMUNDO Program

- Unique mobility programme worldwide
- Study, research and field courses in Amazonian, African, Asian and Australian wet tropics (including set of threatened ecosystems)
- Intensive contact with different cultures and languages

Institutions Involved

This MSc program is designed for four semesters (120 credit hours), with the involvement of six European partner institutes namely,

1. Université Libre de Bruxelles (ULB), Brussels, Belgium (Coordinating Institution)
2. Vrije Universiteit Brussel (VUB), Brussels, Belgium
3. Université Pierre et Marie Curie (UPMC), Paris, France
4. Muséum National d'Histoire Naturelle (MNHN), Paris, France
5. Université de la Guyane Française (UdG), French Guyana, France

6. Università degli Studi di Firenze (UNIFI), Firenze, Italy

There are also three third-country (non-European) higher education institutes in full-partnership of the programme namely,

1. Université de Dschang (UDsch), Dschang, Cameroon
2. University of Queensland (UQ), Queensland, Australia
3. Universiti Malaysia Terengganu (UMT), Malaysia

UMT's Institute of Oceanography and Environment (INOS) is the hosting institute for the TROPIMUNDO programme at the university. In UMT, two local coordinators have been appointed for the programme; Assoc. Prof. Dr Behara and INOS' director Assoc. Prof. Dr Aidy@Mohamed Shawal M Muslim.

Study Scope

The TROPIMUNDO students will be able to concentrate on Botany, Zoology and integrative ecosystem approaches in the institutions worldwide in the two years of their MSc course. This way the students get a unique opportunity to study the evolution of tropical flora, faunistic assemblages, informatic tools to treat and manage biodiversity, dynamics and evolution of tropical and subtropical ecosystems (in connection with tropical rainforests and woodlands, mangrove forests, seagrass beds and coral reefs, including the interactions between flora, fauna, man and the environment within and between each of these adjacent ecosystems), conservation and restoration ecology of natural habitats and their competences in sustainable management and governance of biodiversity, and finally, on tropical

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ethnobotany, exploitation and valorisation of natural resources and conservation of traditional ecological knowledge.

Students' Selection

TROPIMUNDO target students with a minimum Bachelor's degree (*i.e.* equivalent to 180 higher education credits) in Biology, Natural Sciences, Environmental Sciences, or equivalent from an accredited university. The proficiency in English and/or French (depending on the Trajectory) equivalent to Common European Framework of Reference for Languages (CEFR) level B2 is compulsory. The consortium will rely on how certification bodies evaluate their own equivalences against this framework, *e.g.* Cambridge Certificate A-C, IELTS (academic) 6.5 (with no individual score below 5.5), TOEFL (paper based) 580, TOEFL (computer based) 237, TOEFL (internet based) 92, etc.

This is a worldwide program and all interested students can apply online at <http://www.tropimundo.eu> as per the call given by the authorities (by the end of September). The selection of students will be carried out in December every year (one year in advance).

Scholarship Awards

The students applying for TROPIMUNDO can also apply for the European Commission scholarship, which is however limited by a number of criteria (for details, please go through <http://www.tropimundo.eu>).

Study Plan (4 Semesters)

- For the first semester, the students can choose any one of the European institutes and start their studies to acquire similar competences (at ULB, VUB, UPMC, MNHN or UNIFI)
- In the second semester, field experience and courses will take place in the university in a non-EU country (at UMT, UQ, UDSch)
- The third semester will cover a specialization in a European university, different from the first semester (if the student went to ULB in first semester, he/she needs to go to VUB, UPMC, MNHN or UNIFI for third semester)



The TROPIMUNDO students were briefed before conducting a project at a mangrove forest in Perak. Pic by Mehran.



The TROPIMUNDO students were amazed by the great biodiversity in Malaysia, exemplified by the fact that they got to see otters right in the UMT campus. Pic by Liam Lachs.



TROPIMUNDO student Jose Francisco during a discussion with UMT's International Centre staff. The good rapport between the International Centre staff and TROPIMUNDO students made them feel at home in UMT. Pic by Chaizani Shamsuddin.



The use of traveling is to regulate imagination by reality, and instead of thinking how things may be, to see them as they are.

Samuel Johnson

- In the fourth semester, the students will return to the same institute where they completed their first semester. This time, the students will focus on the final year thesis work and submission.

Role of UMT and Benefits

Both steering board and selection committee members of the TROPIMUNDO unanimously elected the UMT as a potential full-partner in Asia on 1 September 2014. As part of the curriculum signed between UMT and ULB, UMT is offering six courses for the international MSc students. Every year, the students register for Semester-2 classes (February-June) and acquire 30 credits in the following subjects namely,

1. Estuarine and Mangrove Ecology (3 credits)
2. Remote sensing and GIS (3 credits)
3. Conservation of Marine Endangered Species (3 credits)
4. Mangrove Field School (15 credits)
5. Tropical Oceanography (3 credits)
6. Lake and Terrestrial Ecology (3 credits)

UMT received 13 students from 12 countries as first cohort in 2015, followed by 14 students from 10 countries as second cohort in 2016 and 18 students from 12 countries as third cohort in 2017. In addition, as part of the ongoing MOU between ULB and UMT, several exchange students will be visiting UMT every year for study as well as research purposes. The increasing number of international students clearly shows UMT pedigree in both teaching and research. As a result, UMT faculty have the opportunity to guide the international students as their main/co-supervisor.

Since TROPIMUNDO receive excellent students from different parts of the world, this could encourage their Malaysian counterparts to pursue their studies and research works more competitively. Furthermore, the undergraduate students could also be motivated to apply for such advanced Master's programmes and pursue possible scholarships. In turn, this scenario will pave the way for more internationalisation in terms of academic and research collaborations, acquisition of national and international grants, joint supervision for students and scientific publications in peer-reviewed journals.

Unique Malaysian Experience in UMT

The above quote by the famous writer Samuel Johnson pretty much explains how travels can help improve knowledge and gather valuable experience. The TROPIMUNDO students in UMT have experienced first-hand how travel helps them to gather new knowledge.

Among the most impressive things about UMT is its unique, mangrove-ringed beachside campus where TROPIMUNDO students can see and experience the tropical biodiversity without even travelling out of campus.



Croatian student Kate Matvijev conducting a field experiment at the Setiu wetlands, Terengganu. Pic by Satiman Jamin.

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Irishman student Liam Lachs said although it is a widely known fact from literature dating back to the 19th century and from numerous documentaries that are featured on televisions globally, he was still shocked to come face to face with such a rich bounty of wildlife upon arrival at UMT.

"We can see six-foot-long water monitors, huge white-bellied sea eagles, otters and even the greater hornbill on campus. To study in UMT and to be situated right between Taman Negara, a vast rainforest region which was made into a National Park, and the Redang archipelago, a sanctuary of marine diversity, means full immersion in nature as well as full commitment to the challenge of its protection," he said.

Furthermore, UMT has research stations on Redang and Bidong Islands, which are perfect to study the flora and fauna of the South China Sea in which the two islands are situated. In addition, UMT also has a research station on Southeast Asia's largest man-made lake, Lake Kenyir, to study freshwater species.

Brazilian student Jose Francisco Carminatti Wenceslau, 27, said UMT's turtle research centre in Chagar Hutang on Redang Island is just what he needs to research the green turtle (*Chelonia mydas*).

"There is no better place to research the green turtle than in Chagar Hutang as it is a research centre and a turtle sanctuary," he said.

"Beside my studies, it is great fun living in a coastal city in Terengganu, mixing with the friendly locals and experiencing tasty local foods that have lots of flavours and spices," he said.

These sentiments are shared by other students like Jessica Micklem, 24, from South Africa, Zackaria Boustani, 22, from Belgium, Giulia Puntin from Italy and Sailee Sakhalkar from India.

Giulia Puntin said studying in Malaysia really is a great experience, both from the cultural and academic point of view.

"It's unbelievable that so many beautiful and unique environments are just a few hours' drive away from the campus, and the fieldtrips that we've been involved in were just amazing. My friends at home can't believe that I really study in such postcard-like scenarios," she said.

"One really positive thing: I've never lived in a place where people smile so much. It really warms your heart," she said. Sailee Sakhalkar said her Malaysian educational and cultural experience was very enriching.

"UMT began with a warm welcome, helped us try out a lot of different things, and aided us in some way or other to learn a lot about different things, not just about classwork, but beyond. The campus and the facilities available are very good, and I'm thoroughly enjoying my time here," she said.

Serbian student Adrian Tot said being able to integrate into the Malaysian culture is an enriching experience, not to mention tasty, when it comes to food.

"I highly recommend Malaysia as a study destination, and students should take the opportunity to study in such places and expand their international knowledge," he said.

"To me travels are an essential part of learning, as St Augustine said; the world is like a book and those who don't travel read only a page," he said.

With such positive feedback, it is highly likely that more international students, especially from the TROPIMUNDO programme, will be coming to UMT to widen their horizon in the years to come.



Brazilian student Jose Francisco has learned to speak Malay as he immersed himself in the local culture. He looks great in the Malay traditional attire as one of the hosts for the 2017 International Gala Night at the Dewan Sultan Mizan, UMT. Pic by Chaizani Shamsuddin.

Cutting Edge Technology at the School of Ocean Engineering

In the digital age that we are in now, computers can be found in almost all human activities, from manufacturing the tiniest precision parts in a factory to controlling a space shuttle beyond the realm of the Earth.

The advent of the computer is such that anything that does not use one is immediately recognizable as something from a past era, much like the triode during the solid state transistor emergence.

Realising the importance of having the latest technology to teach their students, Universiti Malaysia Terengganu (UMT)'s School of Ocean Engineering (SOE) have not one but two very significant digital-age addition to their arsenal of learning aids.

The first one is the Full Mission Ship-handling Simulator that allows students taking the Nautical Science and Maritime Transport programme to experience all the details of handling a merchant ship without even being on board one.

The RM3.3 million Norwegian-made Kongsberg ship-handling simulator scored two firsts when it was installed last year; it is the first one ever to be owned by a public university in Malaysia and also the first one on the East Coast of Peninsular Malaysia.

The dean of SOE Prof. Ir. Dr Ahmad Jusoh said the simulator gives the students their first experience in handling a ship, in the same way a pilot experiences how to handle an aeroplane in a flight simulator.

"It is an indispensable training tool because simulates not just the environment and equipments on the bridge of a ship but also factors affecting the handling of a ship such as weather conditions and the maritime traffic of

»
A student showing a model
of a wooden ship's frame
that was built using the CNC
machine at SOE.
Pic by Satiman Jamin



The RM3.3 million Norwegian-made Kongsberg ship-handling simulator scored two firsts when it was installed last year; it is the first one ever to be owned by a public university in Malaysia and also the first one on the East Coast of Peninsular Malaysia

a given location. Handling a ship in a busy port is way more challenging compared to in the open sea as the former is crowded with ships. The simulator came loaded with programmes on the world's major ports so students get to train on how to manoeuvre a ship through their busy waterways, how to dock the ship for loading or unloading purposes, all without ever going out to sea," he said.

The Voyages of Discovery witnessed how the simulator became abuzz with activity during a training session as the captain and his crew steered the ship through the busy waterway of an international port. It really looks like the bridge of a ship, complete with banks of equipments, radar screen and navigational chart. The students were at their station, looking dapper and professional in their crisp, white uniform.

SOE also have a team of experienced trainers led by Capt. Mohd Naim Fadzil to guide and train the students using the simulator.



Just like on a real ship, the simulator respond to every directional changes that the helmsman executed.

Pic by Satiman Jamin.



Beside being trained using the cutting-edge, computerised navigation aid, the students also learn how to use the manual navigation chart to ensure that the ship is on the right track.

Pic by Satiman Jamin.

Having a simulator that adheres to the international standards set by the International Maritime Organisation and the International Convention on Standard of Training, Certification and Watchkeeping for Seafarers (STCW) is good but SOE is working to make it even better for their students.

Prof. Ir. Dr. Ahmad said they are currently building up simulator programmes for local ports so that students can get to experience of navigating a ship through them.

"We had just finished the simulator programme for the Kuala Terengganu port and will collect data and parameters on other local ports so that we can make their respective programmes," he said.

The second cutting edge technology equipment at SOE is the Computer Numerical Control (CNC) machine.

Whereas the ship-handling simulator recreates real life situations and conditions in a virtual reality setting, the CNC machine helps translate computer-aided designs and drawings into real, precision-machined parts.



Another part of the simulator where each student have his or her own bank of display terminals that simulate those on a merchant ship. Pic by Satiman Jamin

Prof. Ir. Dr. Ahmad said the manufacturing-sized CNC machine is a big help for students of the Maritime Technology programme.

"A good design needs to be translated into a part or product. The traditional way of drawing a design on a piece of paper and then executing the design into actual parts in a totally unrelated process is outdated. It also often gives rise to errors as the machining process is not tied to the design parameters," he said.





» Students extracting the parts that the CNC had cut into a piece of plywood.

Pic by Satiman Jamin

“In contrast, the cutting head of the CNC machine will only execute the parameters that have been set into the design. Thus, the possibility of errors will be greatly reduced,” he said.

Explaining further, he said another advantage of using the CNC machine is that any changes made in a design will immediately be translated into a revised cut.

“If a student makes a last minute decision to change his design then he’ll just have to key in the new parameters and the CNC machine will do the rest, cutting the delay between the design and actual production,” he said.

The CNC machine is also crucial in the SOE’s plans to offer a new course on naval architecture next year.

Prof. Ir. Dr. Ahmad said currently naval architecture is an important subject in SOE’s Maritime Technology programme but it will soon become a separate new programme.

“We are still fine tuning the minor details but it is certain that SOE intends to offer the Naval Architecture and Marine Engineering programme as early as next year,” he said.

Although the CNC machine is a product of modern technology, Ahmad said it will be central to help a traditional industry that has long been synonymous with Terengganu.

« The Full-Mission Ship Simulator have monitors that display life-like images of the waterway or port that the students are training for.

Pic by Satiman Jamin.



Design parameters can be fed directly into the CNC, thus minimising dimensional errors on the finished parts.

Pic by Satiman Jamin

Before each training session on the Full-Mission Ship Simulator, the students will be given a briefing about the waterway or port that they will be navigating through during the simulation.

Pic by Satiman Jamin



“Terengganu is famous for its thriving traditional shipbuilding industry and we intend to collaborate with the traditional shipbuilders in the state so that we can include the traditional shipbuilding characteristics in our inaugural Naval Architecture and Marine Engineering programme,” he said.

And the precision machining ability of the CNC will be put to good use designing boats with traditional characteristics but with modern facilities to tackle real-world problems.

“Under this programme students will design boats for either the transportation of goods or for the fishing industry which is more relevant for the local situation in Terengganu. We can help the local fishermen by coming up with good designs for deep sea fishing boats, complete with the relevant facilities so that their output will be maximized. This is our way of tackling real-world problems for fishermen, especially in Terengganu,” he said.

Dean of The School of Ocean Engineering

Prof. Ir. Dr. Ahmad Jusoh

Knowledge is power and innovation is how human beings put knowledge into practical applications in tackling the problems of everyday life. With 38 years of experience under his belt, the dean of Universiti Malaysia Terengganu (UMT) School of Ocean Engineering (SOE) Prof. Ir. Dr. Ahmad Jusoh, 61, has put the pursuit of knowledge and nurturing innovation as his core objectives.

School of Ocean Engineering dean Prof. Ir. Dr. Ahmad opening the Green Is A Lifestyle seminar on 24 May, 2015. The seminar to promote the awareness on environment protection was held at the Executive Seminar Room, UMT.

Prof. Ir. Dr. Ahmad was born in Kampung Sungai Rengas, Kuala Terengganu 61 years ago. His interest in engineering was sparked off by his pet subject, additional mathematics when he was in his alma mater, the Sekolah Alam Shah in Cheras, Selangor.

“As mathematics and additional mathematics are the core subjects in any engineering course, I chose to study Industrial Engineering when I pursue my tertiary education at Universiti Putra Malaysia (UPM), which was then still called the Universiti Pertanian Malaysia in Serdang, Selangor. When I graduated in 1979, UPM offered me the post of tutor in the Engineering Department and that was the start of my journey in the world of academia,” he said.

Originally he was in the Agricultural Engineering Department, focusing on water and waste water engineering, which also come under Environmental Engineering.

Prof. Ir. Dr. Ahmad excelled and rose through the ranks until he was made the Head of the Civil Engineering Department in UPM.

It was a homecoming of sorts for him when he was transferred to UMT, then still a branch of UPM called Universiti Pertanian Malaysia Terengganu (UPMT), in 1997 to set up an engineering programme. However, he ended up formulating technology-related courses instead.

“We cannot offer engineering courses because UMT was not gazetted as an engineering university. So we opted to offer technology programmes instead, where we focus on hard science and hands-on applications rather than the theory of doing things,” he said.

His hard work paid off and UMT started offering its inaugural Environmental Technology programme in the year 2000.

“Environmental Technology is part of green technology although the latter has yet to be a catchphrase back when I designed the programme for UMT in 1998. Sustainability is the focus of environmental technology, so that as human beings progress and create development projects, the environment will not be harmed. The objective is not to curtail development but to find ways of ensuring the sustainability of the environment while carrying out the needed developments,” he said.

Explaining further, he said in developed nations such as Japan, developments give minimum impact on the environment because they strictly follow the environmental technology procedures.

“In Japan, they are so concerned about the environment that the debris from a small excavation work for drainage purposes will be transported away immediately. This is why they have clean rivers running through their towns. In contrast, here we often see

Education minister Dato' Seri Idris Jusoh accompanied by UMT Vice Chancellor and School of Ocean Engineering dean during a visit to the areas badly affected by coastal erosion at the height of the monsoon season on 10 January, 2016.





My dream is for the same culture to flourish in Malaysia. However, there is still a long way to go because sustainable development and other environmentally friendly procedures have yet to be embraced by the community, let alone become a culture. What we have now is knowledge but on its own knowledge is not enough to make changes in the community. We have to inculcate the knowledge into the community so that over time, it will be translated into culture

Prof. Ir. Dr. Ahmad Jusoh

large-scale land clearing for agricultural purposes being left unattended for years, causing our rivers to be choked with siltation and debris. To the uninitiated, not following environmental procedures may seem like a short cut but if the cleared land were developed immediately the project will bring profits much faster with less impact on the environment,” he said.

The soft-spoken dean suddenly spoke in an excited tone and his face lit up when the conversation turned to innovation, attesting to his deep interest in the subject.

Being an innovator and tinkerer, Prof. Ir. Dr. Ahmad had invented two agricultural machineries during his time in UPM.

His first invention was the mechanical pepper thresher, which not only makes the task of separating the pepper from its stalk much easier, but also grades the pepper according to size as well.

“It was way back during my stint in UPM Sarawak from 1984 to 1986. As an engineering lecturer, I saw that pepper farmers in Sarawak need a better and faster way to separate the pepper beans from the stalk.

“I decided to innovate further and incorporate a hopper and grader into the machine, so that after being separated from the stalk the pepper beans will be graded according to size and from there they will enter separate hoppers for further processing,” he said, his eyes reflecting the excitement he felt as he recounted his first innovation project more than 30 years ago.

He had studied the pepper processing steps very closely before inventing the pepper thresher and it was no surprise that his second invention tackled another problem in pepper processing.

“I noticed that pepper farmers had to immerse dried pepper in water for a few weeks to get the skin or pericarp



Prof. Ir. Dr. Ahmad receiving the retiree appreciation award during the UMT's Awards Night 2015 which was held on 7 December 2016.

to come off. I conducted a study and came up with a depericarping machine that can peel off the pericarp in an instant. The machine was able to cut the pepper processing time drastically as the farmers no longer need to immerse the dried pepper in water and wait for the pericarp to come off,” he said.

He came up with the depericarping machine when he was already back in UPM Serdang and he succeeded despite having to travel to Sarawak and Johor to collect pepper samples for the project. To this day, Prof. Ir. Dr. Ahmad is still a very keen innovator and is very enthusiastic about promoting innovative thinking among students.

“We have to start early, so it is important that we inculcate innovative thinking among students in secondary schools through innovation competition. They are the nation's future innovators and should be nurtured and given encouragement,” he said.

His passion for encouraging youngsters to take up the challenge of being more innovative is not mere talk; he



Prof. Ir. Dr. Ahmad signing the memorandum of understanding document between UMT and Aerospace Malaysia Innovation Centre (AMIC) during the International Greentech & Eco Products Exhibition & Conference Malaysia (IGEM) on 10 September 2015 at the Kuala Lumpur Convention Center.

had been there and done it when he was the chairman of the Malaysian Invention and Design Society (MINDS) in 1998.

"In 1998, through collaboration with the Terengganu Education Department, we held a state-level secondary school invention competition. Sadly, there was no state-level competition after that and only the national-level one is still around," he said.

However, he has not given up on the idea of getting secondary school students to hone their inventive minds.

"I think invention competitions can still be held in secondary schools with the help of local universities," he said.

Sure enough, he was soon involved in another science-based competition involving secondary school students.

With his strong background in water and waste water engineering, he was one of the people behind the Love Our Rivers programme in 2008, 2009 and 2011.

"Under the programme, there was a competition among selected secondary schools to take readings that reflect the quality of the rivers in Terengganu. I was made the chairman of the Satu DUN Satu Sungai (One Constituency One River) competition. The state government sponsored it by giving the related

equipments to participating schools so that students can take and record periodic readings that reflect the rivers' quality," he said.

As the Dean of SOE, he is happy that students of courses under the school have been participating in various innovation and design competitions.

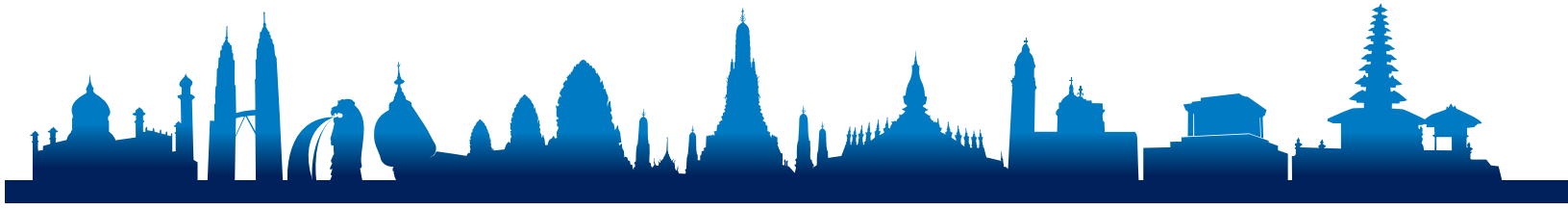
"SOE students, with the help of their lecturers, have entered many design competitions in the field of marine technology. Our students regularly win design awards for their boat models, which is not surprising because their designs were translated into precise machined parts for the boat models by our manufacturing-sized computer numerical control (CNC) machine," he said.

"Engineering and technology are there to solve problems that were identified by science. You will not be able to make cars or build ships going by science alone. Other schools provide knowledge about the world and SOE will collaborate with them to provide the solution for the problems they have discovered. Science is the basis for us to identify the problems that we face, while engineering and technology will solve the problem. This is the difference between hard science and soft science. We are employing hard science to use upstream knowledge provided by soft science to provide downstream solutions," he said.

Prof. Ir. Dr. Ahmad applied his belief that engineering could provide solutions for real-life problems when he proposed a coastal erosion and flood mitigation system for UMT after the campus and its surrounding areas were badly affected by the floods in 2014.

"The government had approved a grant of RM40 million for UMT to carry out the project. The UMT campus is the main passage for flood water from the surrounding area to flow out to the sea, so flood mitigation measures implemented in UMT will not only help the university lessen the possibility of future floods but will also improve the situation for the communities living nearby," he said.

It seems that the journey Prof. Ir. Dr. Ahmad started 38 years ago has continued bearing fruits, etching out new innovations not just for him and UMT, but also for the community, the environment and the nation.



A Fruitful Collaboration Among ASEAN Neighbours

The Association of Southeast Asian Nations (ASEAN) has long had collaborations in areas of education, politics, economy and security among its member countries. In the field of higher education, the ASEAN International Mobility Students (AIMS) programme was set up under the Southeast Asian Ministers of Education Organisation (SEAMEO) to achieve the aspirations of the ASEAN community.





Likewise, the two TNU exchange students in UMT have also voiced their satisfaction with the arrangement that we made to facilitate their studies here

Universiti Malaysia Terengganu (UMT) has taken the opportunity provided by AIMS to send some students to Vietnam so that they can have the experience of studying overseas and at the same time contributing towards the development of institutions of higher learning in Southeast Asia.

The School of Maritime Business and Management (PPPM) has taken part in the AIMS programme by sending two of their Maritime Management students to the Thai Nguyen University (TNU), Vietnam and at the same time PPPM received two students from TNU to study in UMT.

PPPM's Maritime Management Programme chairman Assoc. Prof. Dr. Mohamad Rosni Othman said the programme has four objectives, namely;

- i. To give exposure and experience to participating students
- ii. Motivate and train students as mini ambassadors for UMT and Malaysia
- iii. To enable students to learn not just academically from the partner university but to also immerse themselves in the local culture
- iv. To widen the opportunity for further collaborations like the signing of memoranda of understanding (MoU) and memoranda of agreement (MoA) between UMT and AIMS partner universities.

Explaining further, Assoc. Prof. Dr. Mohamad Rosni said the student mobility programme through the student exchange programme with TNU is part of the globalisation effort for PPPPM's Maritime Management students, in line with the National Higher Education Strategic Plan (PSPTN).

"This will also give UMT a value-added edge in the Higher Education Ministry's performance evaluation under the Research University criterion," he said.

"Participating students will be exposed to a different learning environment from what they have experienced in UMT. This will indirectly enhance their self-confidence and maturity as well as enriching the knowledge and technology transfer process between UMT and TNU," he said, adding that those selected are second year Maritime Management Bachelor's Degree students.

Assoc. Prof. Dr. Mohamad Rosni said the two Maritime Management students were selected based not only on their academic performance (minimum CGPA 3.5) but also their co-curricular activities.

"Out of 120 students, we chose two with the best combination of academic and co-curricular performance with the hope that the international exposure will help them excel further in their studies and also prove to be character-building," he said.

He said five elective subjects in TNU's International Bachelor's Course on Environmental Science and Management with 13 credit hours were added into the list of elective courses offered for the UMT's Maritime Management Bachelor's Degree programme.

"The subjects that our AIMS participants will take in TNU will be listed as international elective subjects in UMT, while five elective courses that will be taken by the TNU students in UMT have also been agreed upon," he said.

ACADEMIC COLLABORATION



The arrangement was agreed upon by both universities last year and the two UMT students have since taken up the elective courses at TNU since March 1 this year. They will stay at TNU until June 30, 2017. Assoc. Prof. Dr. Mohamad Rosni said the feedback received from the students in the AIMS programme with TNU has been very positive.

“Our students were invited to events organised by the Malaysian embassy in Vietnam and they are very happy with the exposure and experience that they have gained there. They have also learned a lot about the local culture in Vietnam,” he said.

“Likewise, the two TNU exchange students in UMT have also voiced their satisfaction with the arrangement that we made to facilitate their studies here,” he said.

“We selected and assigned local students as their buddies to help them with their daily activities and

to explain the local culture, so they could adapt more quickly to campus life in UMT. The TNU students’ interactions with the local students and faculty members provided an additional benefit; it gave the Maritime Management programme an international feel and atmosphere,” he said.

As the exchange students could pave the way for more cooperation and collaborations in the future, not just between the two universities but also between Malaysia and Vietnam, their study in UMT is not limited to the classroom.

Assoc. Prof. Dr. Mohamad Rosni said they were also taken to visit UMT’s research centre on Bidong Island, relevant government agencies and even the Terengganu state museum.

“They are so happy with what they have seen, experienced and studied here that they have expressed their intentions to come back here for a visit after they have finished their studies,” he said.

“We are delighted that our inaugural AIMS programme with TNU has gone very smoothly. We have also learned a lot as organiser and host for the programme. The experience we have gained will help us expand and improve the programme in the future,” he said

Judging from the feedback of the participants, both from UMT and TNU, it is clear that most of the objectives that PPPM outlined in the beginning of the student mobility programme has been achieved.

As PPPM gets ready for the next stage of the AIMS programme, the final objective of enhancing UMT’s international collaboration with foreign universities will likely be achieved soon.

KOMPLEKS PENYELIDIKAN INOS DAN AKUATROP

Disseminating An Ocean of Knowledge Globally

The Institute of Oceanography and Environment (INOS) in Universiti Malaysia Terengganu (UMT) etched a major achievement when it was selected as Southeast Asia's Regional Training Centre (RTC) for the Ocean Teacher Global Academy Project.

The Ocean Teacher Global Academy (OTGA) Project is an initiative by the International Oceanographic Data and Information Exchange (IODE), an organisation under the Intergovernmental Oceanographic Commission (IOC) of the United Nations Education, Scientific and Cultural Organisation (UNESCO).

According to the IODE website <https://www.iode.org>, the aim of the project is to develop a global network of training centres and utilise this network to increase national capacity in coastal and marine knowledge and management.

It will do so by (i) promoting the establishment of Regional Training Centres as well as their close collaboration through advanced information technology; and (ii) further developing the Ocean Teacher Learning System.

«
INOS Director Assoc. Prof. Dr. Aidy M Muslim is also
the co-chairman of the OTGA.

RESEARCH AND DEVELOPMENT

Actually the project is an extension of the Ocean Teacher Academy project that was conducted from 2009 to 2013 at the IOC Project Office for IODE in Oostende, Belgium.

The initial project has successfully developed a Learning Management System and Teaching Programme that has enabled 1,300 participants from over 120 countries to take part in 42 courses on ocean data and information management which were organised between 2009 and 2013. The Ocean Teacher Global Academy Project builds on the great success of that initial project.

The Ocean Teacher Global Academy project is funded by the Government of Flanders (Kingdom of Belgium) through the UNESCO/Flanders Funds-in-Trust for the support of UNESCO's activities in the field of Science. Funding has been committed for the period 2015-2018. In addition funds are being identified through partnerships with a wide variety of partner organizations and projects.

The Ocean Teacher Global Academy is a paradigm shift in the sense that it seeks to change training culture from the predominantly unidirectional “north to south” model traditionally used to one where the dissemination of knowledge and skills is multidirectional. In other words, where training was traditionally based on experts from developed regions (mostly situated in the northern hemisphere) to visit and teach students in developing countries, the Ocean Teacher Global Academy will promote the expertise available in many developing regions of the world.

More specifically, the Ocean Teacher Global Academy seeks to do the following:

- i. Promote the establishment, and assist with the start-up, of RTCs that will plan, organize and implement training courses that are of relevance and serve needs within their region and teach these in locally relevant languages;
- ii. Promote the use of local experts as lecturers and training assistants by the RTCs;
- iii. Promote the collaboration between the RTCs by enabling (through advanced information technology) lecturers from multiple regions to contribute lectures;
- iv. Further develop the Ocean Teacher Learning Management System to cover multiple IOC (and associate) programmes.



IOC consultant from the UNESCO IOC Perth Regional Programme Office, Greg Reed (standing, right) is one of the trainers during the OTGA Metadata using GeoNetwork training course held at INOS in November 2016.



A map showing the Regional Training Centres (yellow arrows) and the Headquarters (blue arrow) for the Ocean Teacher Global Academy.

The Ocean Teacher Global Academy will further promote collaboration and expertise exchange through new internet-based technologies such as video conferencing, video streaming etc. between the RTCs.

INOS director and Ocean Teacher Global Academy co-chairman Assoc. Prof. Dr. Aidy @ Mohamed Shawal M Muslim said the selection of INOS as an RTC has brought many benefits to UMT.

“As this is an international project linked to UNESCO, there are various direct and indirect benefits to INOS and UMT. Funding is the most obvious benefit as we get to organise training that are fully-funded by the Ocean Teacher Global Academy,” he said, adding that he himself received a funding of USD120,000 for six training sessions.

RESEARCH AND DEVELOPMENT



INOS Director and OTGA co-chairman Assoc. Prof. Dr. Aidy M Muslim (fifth from right, front row) with the OTGA steering committee.



INOS Director and OTGA co-chairman Assoc. Prof. Dr. Aidy M Muslim (front row, right) with the OTGA steering committee.

“Funding is very crucial for any training programme to take off and in this aspect the Ocean Teacher Global Academy has seen to it that there is sufficient funding for its planned training sessions,” he said.

“Furthermore, we get high-calibre international experts to conduct Ocean Teacher training at UMT. At the same time, our local experts in the relevant fields have been roped in to conduct training under the programme, which gives them a great chance to collaborate and be recognised in the international circle of experts. So far, there are five to six lecturers from various schools at UMT that have been recognised as Ocean Teachers,” he said.

Assoc. Prof. Dr. Mohamed Aidy said the international nature of the project does not mean that locals do not get a chance to participate.

“As this is essentially a global project with local contents, it gives as much emphasis to local participants where training is concerned. Let’s say we have 10 international participants for a particular training, then we will also sponsor 10 local participants. Thus, locals also get to enjoy the same benefits as the international participants,” he said.

He said the training sessions use a hands-on approach as much as possible.

“If the training is about Geographic Information System (GIS), then the participants are shown all the practical aspects of GIS. We do have lectures, group activity and assignments but hands-on training is the main approach of Ocean Teacher training,” he said.

He said there were three Ocean Teacher training sessions in UMT last year and there will be three more this year.

“The unique thing about the Ocean Teacher training is that all the lecture notes and assignments are available online as we make full use of the available communication and information technology to make it more accessible from anywhere around the world. This is a move towards the internationalisation of Research and Development,” he said.

As the co-chairman of the Ocean Teacher Global Academy project, Assoc. Prof. Dr. Mohamed Aidy gets to speak at various international forums and events, which also gives him the opportunity to spread the word about what UMT has to offer.

“In August last year I was invited to speak at the United Nations about the Ocean Teacher Global Academy project and recently I did a presentation about the project in China. I will usually take the opportunity to include snippets about UMT during such events,” he said.

He said he had also received invitations for overseas projects from the networking gained under the Ocean Teacher Global Academy project.

“For example, a friend from Kenya has invited me to join a project there. This shows that the Ocean Teacher Global Academy is a door opener for so many opportunities, not just for me but also for INOS, UMT and Malaysia,” he said.

Mapping The Wind of Change for Renewable Energy

The Sustainable Energy Development Authority (SEDA) is working hand in hand with Universiti Malaysia Terengganu (UMT) towards realizing the goal of harnessing wind power as a source of renewable energy (RE).

Being a maritime university facing the South China Sea and having talented scientists and equipments for the task, UMT is the perfect university to conduct RE research on wind, waves and ocean currents. In the past, UMT had collaborated with the Ministry of Science, Technology and Innovation (MOSTI) to do research on wind power as an RE resource.

On the other hand, since its inception in 2011 SEDA has formed numerous collaborations, partnerships and networking to achieve its vision of promoting the deployment of sustainable energy measures as part of the solution towards achieving energy security and autonomy.

Speaking to Voyages of Discovery, SEDA's Renewable Energy Technology Division director Azah Ahmad said the collaboration with UMT is focused on wind power research.

"We have many collaborations with other universities for different RE resources such as with UiTM for solar photovoltaic (PV), UNITEN and UTM for both biomass and biogas. The only university that we are collaborating with on wind power is UMT," she said.

"More specifically, our collaboration with UMT is for wind mapping or mapping the wind power potential for Malaysia. Our three-year memorandum of understanding (MOU) on the national wind map study started in 2013. The MOU ended last year but we renewed it for another three years early this year," she said.

Explaining further, she said wind power is a source of renewable energy but it has not been tapped on a commercial basis.

"As an agency under the Energy, Green Technology and Water Ministry (KeTTHA) we have been tasked with implementing and encouraging the use of RE. To date, wind power remains an untapped RE resource, because we have yet to verify its technical potential in Malaysia. Whereas, other RE resources such as solar PV, biomass, biogas and small hydro had gained prominence," she said.

Explaining further, Azah said extensive studies have to be conducted first before locations that have viable wind power can be identified.

"Unlike solar power which can be determined very easily because it is obviously there, the availability of wind power is very hard to determine," she said. She said UMT was chosen as SEDA's partner in the wind power study because UMT had previously conducted wind energy assessment for five sites in Malaysia under the Techno-fund scheme of the Ministry of Science, Technology and Innovation (MOSTI).

"SEDA also has a grant from Amanah Akaun Industri Bekalan Elektrik (AAIBE) for wind assessment but it is only enough for six sites. By pooling our resources with UMT, we have enough funds for 11 sites and this is a true win-win arrangement," she said.

UMT's School of Ocean Engineering lecturer Assoc. Prof. Dr. Mohd Zamri Ibrahim said there are a few layers of studies that have to be conducted in order to asses wind energy.



« Renewable Energy Technology Division Director, Mrs. Azah Ahmad

INDUSTRY COLLABORATION



Assoc. Prof. Dr. Mohd Zamri nodded his agreement and said the site on Pulau Mantanani had surpassed the minimum requirements as a potential wind farm location.

“The first layer is a general study of its availability, after that we will erect 70-metre tall wind masts to collect wind data at the specified heights,” he said.

He added that the wind speed must be at least five meters per second for it to be considered viable to generate electricity.

“This is vastly different from making a casual observation about a place being windy. A place can be windy but without enough speed to turn the blades of a wind turbine we cannot use it to generate electricity,” he said.

However, Assoc. Prof. Dr. Mohd Zamri said identifying potential sites to tap wind power to generate electricity is only half the battle because further testing with real, electricity-generating turbines is needed to confirm it.

Commenting on this, Azah said SEDA is now conducting wind assessment at Pulau Mantanani in Sabah as the



Single pole wind mast at 60m height for wind measuring at selected site



Demonstration small scale wind turbines installed at identified location.

island is fully reliant on diesel. If the assessment results show feasibility, the electricity for the island could be supplied by a solar PV-wind power hybrid system.

Assoc. Prof. Dr. Mohd Zamri nodded his agreement and said the site on Pulau Mantanani had surpassed the minimum requirements as a potential wind farm location.

“We are confident that the site has a wind factor of between 20 to 30 percent viability, which is more than sufficient according to wind energy standards,” he said.

Moving Towards Renewable Energy Awareness

Azah said while SEDA is powering the drive towards more RE in the nation’s energy needs, the agency is also working hard to increase the general public’s awareness about it.

“It has only been six years since SEDA was established and it is understandable that our surveys found that generally the public is still unaware of our existence. We want to have a more holistic approach to promote SEDA and why it was set up,” she said.

“Technology-wise, the cost of RE is steadily decreasing. The electricity tariff in Malaysia is highly-subsidised, but hopefully the technology cost will come down enough to enable more people to participate in its implementation,” she said.

She said even the nation’s power company Tenaga Nasional Berhad (TNB) has started to embrace RE. “One of SEDA’s goals is to increase public awareness about RE so that the people of Malaysia will embrace RE too, because it is the way forward,” she said.

She gave an example of how most people in Malaysia are not aware of the 1.6 percent levy for the RE Fund in their monthly electricity bills.

“This means every electricity user is contributing to the advent of RE. The levy is then used to pay for each units of electricity sold to the national utility (TNB or SESB) at premium prices,” she said.

Azah said SEDA’s partnership with UMT and other universities could also pave the way for more awareness about RE, especially among students.

“We are aware that UMT has its own Green Campus Blueprint and this is a very encouraging development. SEDA supports such initiatives by universities as it can increase the awareness about RE,” she said.

Echoing her sentiments, Assoc. Prof. Dr. Mohd Zamri said UMT is planning to have student-centric facilities that are powered by RE.

“For example, we have plans to have solar or wind-powered gazebos where students can charge their mobile phones and laptops,” he said.

Looking at the advantages of RE and UMT’s commitment to make it a part of its campus, it is safe to say that the winds of change will bring the university to the forefront of RE research and usage.

ABOUT TERENGGANU

Traditional Boat Building A Terengganu

Heritage



Hauling tons of heavy chengal planks is just a normal routine for Yusof Nawi. Picture by Satiman Jamin

ABOUT TERENGGANU

As a state flanked by the South China Sea on its Eastern side with more than 280 kilometres of white, sandy beaches, maritime activities has always been synonymous with Terengganu.

Maritime activities mean boats, and from time immemorial Terengganu has been known for its skilled boat builders; not just the dainty, colourful ones that often lend their grace to postcards but also large, ocean-going wooden juggernauts that can brave the churning waves of the open sea.

Although maritime activities still play an important role for the economy of Terengganu, over the years traditional boat builders have been slowly disappearing due to the popularity of modern, factory-produced small boats and steel, shipyard-built ocean-going ones.

Fortunately, the art of building traditional boats is still much alive in Kuala Nerus. The newly-minted district boasts not one but two traditional boatyards – a well-known one in Pulau Duyong and another one in Kampung Seberang Bukit Tumboh.

Although the latter caters to smaller sea-going fishing boats weighing up to 50 tons, it is unique in the sense that most of the works are still done manually using traditional tools.

Second Generation

Second generation boat builder Yusof Nawi, 46, cuts a lonely figure as he toils in his riverside boatyard in Kampung Seberang Bukit Tumboh. The vast, hangar-like structure that houses the boatyard is barely enough to contain the 60-foot long fishing boat Yusof is building.

Hauling, shaping and putting together heavy chengal (*Neobalanocarpus heimii*) wood have been part of Yusof's daily routine since he was 15 years old.

"I started out just observing my late father building boats. After that I moved on to help him with simple tasks like making the wooden pegs used to join the wooden planks together. Little by little, my skills grew until I could build a boat from scratch", he said.

A piece of flat steel with round holes is used as the die to round off the thousands of wooden pegs needed to build a large boat.

"We cut and split penaga (*Mesua ferrea*) logs to make the wooden pegs and then drive each one through the steel die. The ends of the wooden pegs will be cylindrical, matching the shape and size of the holes we drilled into the wooden planks," he said.

Yusof Nawi built this huge C Class fishing boat all by himself. Picture by Satiman Jamin

Yusof Nawi measuring the dimensions of the boat before selecting the wood for the deck. Picture by Satiman Jamin



ABOUT TERENGGANU



Yusof Nawi showing some of the traditional woodworking tools he inherited from his late father. Picture by Satiman Jamin



This flat piece of steel have round holes that help shape the wooden pegs that hold the wooden planks of the boat together. Picture by Satiman Jamin



Yusof Nawi showing the rough wooden pegs before they are put through the round holes of the peg-shaping steel plate. Picture by Satiman Jamin



Rust-resistant steel nails are used to attach the wooden planks to the boat frame. Picture by Satiman Jamin

If making the thousands of wooden pegs is tedious and time consuming, the task of shaping, forming and fitting the thick chengal planks that form the hull of the boat is even more so.

Yusof uses a gas torch to heat the plank he is shaping to make it pliant and supple before applying force to it in the direction he wants to shape it.

"Some planks are not so difficult to shape but sometimes I can spend a whole day coaxing a plank to follow the shape of the boat," he said, adding that he must control the torch in such a way that the heat is enough to make the wood pliant without burning it.

The plank will first be fitted to the keel before it is heated and then force will be applied to it in the desired direction.

"The work requires great precision as the planks of wood must be correctly aligned so that the wooden pegs I have hammered into the bottom plank will slide into the holes drilled into the upper plank. After that I will hammer the two planks into a tight fit," he said.

The tight fit of the planks forming the hull of the boat is of great importance as it will ensure the boat will not leak.

"Before hammering the planks shut, I will insert a few layers of the gelam tree (*Melaleuca cajuputi*) bark. The paper-like bark will expand when it comes into contact with water, ensuring a tight seal," he said.

Although the planks are held together by wooden pegs, they are nailed to the sturdy frame by galvanised nails. The thick zinc coating on the nails helps keep rust at bay. "Ordinary steel nails cannot be used for boat building as they will rust immediately upon contact with sea water," explains Yusof.

A Strong and Gritty Boat Builder

Hauling logs of up to half a ton a day all by himself has earned him the nickname "Badang Moden", or Modern Day Hercules.

He dismissed the name with a smile and a wave of his sinewy hands.

"The heavy work is good for my physique but I don't actually have superhuman strength. I use pulleys and chain blocks to help me haul the heavy timber," he said. After his father fell ill last year, he has built three boats all by himself.



A small A Class fishing boat is almost ready to be delivered to a customer. Picture by Satiman Jamin

“Early this year my father passed away so I am now the only one in my family who has inherited his skills. Doing this alone is the only way to go as nobody else has the necessary skills or willingness to continue with the boatbuilding craft,” he said.

“All the boats that I have built cost between RM400,000 to RM1.2 million, depending on the size. Orders keep coming in but I prefer to concentrate on building one boat at a time to ensure its quality as it is of utmost importance to keep my customers satisfied,” he said.

He still remembers the time when he had to seek a loan of RM50,000 from the Malaysian Timber Industry Board (MTIB) to make the frame of a small Class A boat.

“A customer agreed to invest RM200,000 to complete the boat after seeing the frame that I built. From then on, I have had no problems getting orders for boats,” he said.

Challenges Ahead

“This is the biggest problem for traditional boat builders like me,” said Yusof as he slapped a large section of chengal wood.

He said it is very hard to get chengal wood that has the quality and size required for boat building.

“A 60-foot boat will require a straight, heavy keel measuring 60 feet. It is common to have to wait for months before I can get chengal of that size,” he said.

“If I were to build a wooden house using chengal, the dimensions will be much smaller. Shorter lengths of timber can be joined together if a long beam is needed but we cannot use that technique in boat building. The keel of the boat must be one solid piece of wood to ensure it has the required strength to hold the whole boat together,” he said.

As the chengal wood has become scarce and hard to come by, the price has also naturally climbed higher.

“Even without a deck, I have used around 30 tons of chengal to build this 60-foot boat. As the price of chengal is around RM10,000 a ton now, the cost incurred for the wood to build the boat now stands at RM300,000,” he said.

With such very high costs, Yusof has no room for error in building his customers’ boats.

“However, I doubt there will be any orders of big, Class C deep sea fishing boats like the 60-footer that I am building now as the government has stopped issuing new permits for them. I guess I will only have orders for the smaller Class A and B boats in the future,” he said.

Continuing A Tradition, Despite The Odds

Despite all the challenges, Yusof said he will continue building boats the traditional way as long as he is physically able to do so.

ABOUT TERENGGANU

As he scans the length of the big wooden boat he was building, he said he would accept anyone wishing to be his apprentice.

"The apprentice must be of a young age because it takes time to learn even the basic skills of boat building. Besides, it requires the energy, drive and passion of youth to learn the craft. There is no classroom lesson, all must be learnt on the job, by doing the job," he said.

However, so far there have been no takers.

"Even my kids have not shown any interest in continuing my work, so I guess there is very little hope of getting youngsters who are interested in acquiring my skills," he said.

Yusof said he does not think too much about whether he will get an apprentice to pass on his skills.

"I enjoy building boats and I am taking it one day at a time. As long as I am healthy enough and my customers are there with new orders for traditional boats, I will be building them," he said.



Yusof Nawi is uncertain about who will take over the traditional boatbuilding business as the younger generation had not shown any interest to learn it from him. Picture by Satiman Jamin

It is hard to imagine that Yusof Nawi built this 30 tons, 60-foot long wooden boat all by himself. Picture by Satiman Jamin. Picture by Satiman Jamin



« Yusof Nawi still uses traditional tools such as this wood planer he inherited from his late father. Picture by Satiman Jamin

All Charged Up On Supercapacitor Research

Imagine an electric vehicle (EV) that can be fully charged in about the same time as a car being refueled with a full tank of petrol. That would pave the way for the phasing out of the fossil-fuel-powered vehicles that we have now as the long downtime for battery recharging is one of the main issues preventing the advancement of EVs.

As the world moves towards renewable energy, the methods of storing electrical energy become a much-researched area as scientists search for better ways to power up EVs and other environmentally-friendly technologies.

Although the lithium-ion battery is currently the backbone of electrical energy storage, supercapacitors has long been touted as its likely successor due to the latter's large power density, excellent cyclability and fast charging time. The importance of research

in supercapacitors and their components had driven Universiti Malaysia Terengganu (UMT) School of Ocean Engineering senior lecturer Dr. Nurul Hayati Idris to focus her research on graphene, a potential supercapacitor material that could secure its place as the holy grail of electrical energy storage.

"Graphene became a hot topic in the circle of supercapacitor researchers around the world after it was discovered by two scientists in the United Kingdom in 2007. Graphene rose to greater prominence after the two scientists who discovered it were awarded the Nobel Prize in 2010," she said.

She said graphene is derived from graphite, which has been the preferred material for supercapacitors.

"Graphite, which is actually formed by graphene layers stacked together by a weak Van Der Waal bond is a good supercapacitor material but it still has

limitations. When unstacked, graphene nanosheet is a two-dimensional layered hexagonal lattice of carbon atoms with a large surface area of 2,630 square metre per gram, excellent for ion interpolation. It is a potential supercapacitor material as this electrical double-layer capacitor (EDLC) has a high conductivity and good mechanical properties," she explains.

However, Dr. Nurul Hayati said more research still need to be done on graphene to further enhance its capabilities and overcome its weaknesses.

"Graphene is carbonaceous, it has a high power density and but relatively low capacitance; its corresponding capacitance has a common value of less than 40μ Farad per square centimetre. This is an immense weakness that needs to be addressed," she said.

Her research involves the combination of graphene with nickel as the latter can impart high specific capacitance.

"Nickel is a pseudocapacitor. Many researchers in this field had experimented with the combination of graphene and other pseudocapacitors but I chose nickel as it is cheap and widely available," she said.

She said graphene also has the tendency to restack, forming the Van Der Waal bond to become graphite again.

"Here is where nickel comes into play as it will help prevent the graphene nanosheets from restacking," she said. Dr Nurul Hayati was proven right when the test results showed very promising improvements.

"When we tested the nickel-decorated graphene nanosheets, there was almost a 50 percent jump in its capacitance.

A graphene-only supercapacitor displayed a capacitance of 140 Farads per gram while the reading of the nickel-decorated sample showed 270 Farads," she said.

And that was not all. It turned out that the nickel, being a metal, had also helped reduced the resistance in the graphene nanosheets.

"The graphene-only sample has a charge-transfer resistance of 10 ohms while the reading for the one with nickel is only 6 ohms," she said, highlighting the 40 percent reduction in resistance.

"The test results show that the EDLC and pseudo capacitor hybrid was successful in maximizing the graphene performance," she said.

She said the nickel inclusion increased the surface area of graphene, thus increasing capacitance by maximizing the area for ion intercalation. Furthermore, with nickel being metal, its conductive property increased performance by minimising resistance.

Dr. Nurul Hayati said the material for her research project was made in-house by ball-milling a mixture of graphite and nickel.

"Ball-milling is an effective and cheap way of getting the nickel decorated graphene that we needed for the experiment. We mill the mixture for 20 hours and we got more than nine grams of material with an input of 10 gram. This means that the process have very small material loss," she said, adding that she used chemically-inert zirconia balls for the milling process to prevent the possibility of material from the balls contaminating the sample.

"Most researchers employ chemical methods to produce the graphene for their experiments but it would require the end product to be washed to let out the solvents used





The supercapacitor technology is full of potentials and I intend to pursue it further and contribute to its development. In the end, the community, the nation and humanity at large will reap the benefits when the technology became fully matured,” she said.

Dr. Nurul Hayati

during the process. This could give rise to significant material loss, a problem that we did not face as only a small fraction of material had stuck to the ball mill,” she said.

Her effort had won the silver medal in last year’s UMT Innovation Contest. She had won a gold medal at the national level contest previously for another research, also on graphene.

However, she is not one to dwell on the past as she has better plans for the future.

“We had just literally scratch the surface as far as supercapacitor research is concerned. After researching the potentials of nickel-decorated graphene, we are now going to test it in a real application, that is, in a real supercapacitor,” she said.

Dr. Nurul Hayati said the race to find a really good supercapacitor material is still on.

“A supercapacitor material that can at least match the performance of the lithium battery has yet to be found. Most supercapacitors in the market now use graphite as electrodes as graphene is still being researched. This is why commercially available supercapacitors are too expensive; a watch-battery-sized supercapacitor is sold at around USD30,” she said.

She said she will continue her research on graphene because she is still far from her goal of testing graphene-based supercapacitors in an EV.

“The fast charging, high capacity properties of a really good supercapacitor will be very useful for EVs,” she said.

She said researchers around the world, including in UMT are now testing the viability of using supercapacitors

in tandem with batteries to store electrical energy in hybrid vehicles.

“In hybrid cars, the petrol engine is supposed to run only if the vehicle goes faster than a threshold limit, say 80 kilometres per hour. However, if the battery that is supposed to power the vehicle has insufficient charge to run the vehicle, the engine will still be powering the car even at low speed,” she said.

“The electric motor that runs the car will charge the battery during braking but this is insufficient because the battery takes a long time to charge. In contrast, a supercapacitor can be fully charged in just a few minutes so it is more likely to be fully charged and able to take over when the car runs at peak acceleration,” she explains.

She said it is her dream to test a supercapacitor/battery hybrid system in a car.

“There is still a long way to go. Maybe my dream can be realized in about 15 years,” she said.

Aside from powering vehicles, she said supercapacitors can be very useful in other applications.

“During the devastating floods in Kelantan a few years ago, one of the problems faced by rescuers was how to recharge their walkie talkies as the powerlines were down. If supercapacitors were available, perhaps they could be used to quickly harvest solar energy and then charge the walkie talkies’ battery. Better still, with sufficient technology maybe the batteries could be replaced with supercapacitors,” she said.

Closer to home, she said a similar technology could help fishermen to charge their handphones while at sea.

**Assoc. Prof.
Dr. Yeong
Yik Sung**

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An expert in Applied Biological Science at Universiti Malaysia Terengganu (UMT)'s Institute of Marine Biotechnology (IMB) research into microscopic molecules could hold great breakthroughs for the aquaculture industry by helping the fight against marine organism diseases, thus providing great economic impact by improving the productivity of the fisheries industry as a whole.

Watching him work with cutting-edge equipments at the IMB laboratory, one may not guess that Assoc. Prof. Dr. Yeong Yik Sung's research has anything to do with fish or other marine organisms because he spends most of his time analysing biochemicals.

Assoc. Prof. Dr. Yeong's work falls under IMB's Immune and Molecular Therapeutics research and it centres on studying the relationship between heat shock proteins (HSPs), pathogen resistance and the immune system in aquatic organisms, with application of new tools and existing molecular methodologies to dissect their complex relationships. He also works on RNA interference in shrimps to study the putative role of HSP70 in disease tolerance. In other HSPs, his study focuses on the detection of hormone peptides for sex identification in Arowana, an important and valuable ornamental fish species.

His current study focuses on exploring the differential expression of HSP70 and cross-protection effects of shrimp (*L. vannamei*) larvae upon exposure to thermal stress. This includes the augmentation of HSP70 with relation to induced thermotolerance, heavy metals resistance and their

effect on the host's immune response. The findings are essential in aquaculture where the development of procedures to prevent environmental stress and bacterial infection of commercially important fish or shrimp could be devised.

"HSPs are present in all living things. Their main function is to repair other proteins damaged by stress," said Assoc. Prof. Dr. Yeong.

"For example, if an organism experiences a physical or biological stress, the stress will damage the proteins in the organism," he said.

"Let's say a fish living in 28 degree Celsius water was suddenly transferred to a container with water at 50 degrees Celsius. The fish will definitely die from the heat shock (physical stress) as a high level of proteins in its body is damaged by the stress," he said.

Assoc. Prof. Dr. Yeong said the amazing thing about HSPs is that they could prevent excessive protein damage if they were secreted before the introduction of the stress.

"Not only do they repair damaged proteins but the HSPs also significantly increase the organism's resistance to physical and biological stresses," he said.

«
Assoc. Prof. Dr. Yeong Yik Sung with some of the numerous medals and awards he had won for his research.



YOUNG ACADEMICIAN

"In the case of the fish, if we induce the secretion of HSPs before increasing the water temperature to 40 degrees Celsius, it will survive the experiment," he said.

He said increased HSPs secretion will also protect fish or shrimp against other physical stresses such as salinity change and biological stresses such as diseases.

According to Assoc. Prof. Dr. Yeong, this characteristic can be used to increase aquatic organisms' ability to resist diseases and it could also give them the ability to thrive in environments that are normally not conducive for them.

"Protection against vibriosis, a deadly aquatic disease caused by the vibrios bacteria was significantly enhanced in animals primed with a non-lethal heat shock, with extensive data supporting a causal link between HSP70 induced by abiotic stress and enhanced resistance to infection, perhaps via stimulation of the immune system".

"Though HSP70 has a role in protecting the fish against physical stresses, the mechanism involved in the induced disease tolerance is still unknown. HSP70 has different sub-families and in this context, it is crucial to identify which HSP70 isotypes contribute to immunity," he said.

Assoc. Prof. Dr. Yeong said his team had achieved another breakthrough in their research into HSPs when they successfully exploited ribonucleic acid (RNA) interference to knock-down HSP in shrimp.

"This will help us extend our investigation into studying the mechanistic role of HSP in stress and disease tolerance," he said.

He said improving the organisms' immunity is the second way in which HSPs work.

"If a person gets a fever, the body temperature will rise as HSPs are secreted to help repair the cells that were damaged by the onset of the fever. However, if



the HSPs secretion was increased before the onset of the fever, then the fever can be prevented as the person's immune system will be boosted," he said, adding that HSPs are molecules that can activate human or aquatic organisms' immunity system.

However, there is a big problem with the use of HSPs to increase a human or animal tolerance to stress.

"The most effective way to increase HSPs secretion is by heat shock but this is not a good method as it could be lethal if incorrectly administered," he said.

"So now we are working to identify bioactive compounds that can mimic the effects of heat shock to increase HSPs secretion," he said.

"We do not have any product yet but we do have the fundamental data supporting HSPs ability to increase organisms' tolerance to stresses," he said.

"We had just started our quest to find non-lethal methods to increase HSPs secretion," he said, adding that this could be a big help for the aquaculture industry.

"If we could find a bioactive compound that can increase HSPs in fish and shrimps, we can incorporate this into their feed, thus increasing their tolerance to diseases and environments that are previously less conducive for aquaculture," he said.

Assoc. Prof. Dr. Yeong said such developments could also have a value-added aspect to aquaculture.

"Live fish fetches higher prices but it is difficult to transport live fish as the stress of being transported from one place to another could easily kill them,"

"However, with increased HSPs, the fish will have a better survival ratio as they would be able to tolerate the physical stresses of transportation," he said.

He revealed that the research in HSPs could also lead to a cure for cancer.

"Researchers have been pursuing HSPs as an alternative treatment for cancer. Cancer cells need HSPs to replicate, so if we can block the particular HSPs then we can stop the cancer," he said.

His work has also won a string of international recognitions, starting with bagging one gold and one silver medal at the Seoul International Invention Fair (SIIF 2016).

More recently, he was appointed as a Visiting Professor to the Tianjin Agricultural University and Ocean University of China. Besides that, he was also appointed as visiting scientist to Tianjin University of Science and Technology in China and Dalhousie University in Canada.

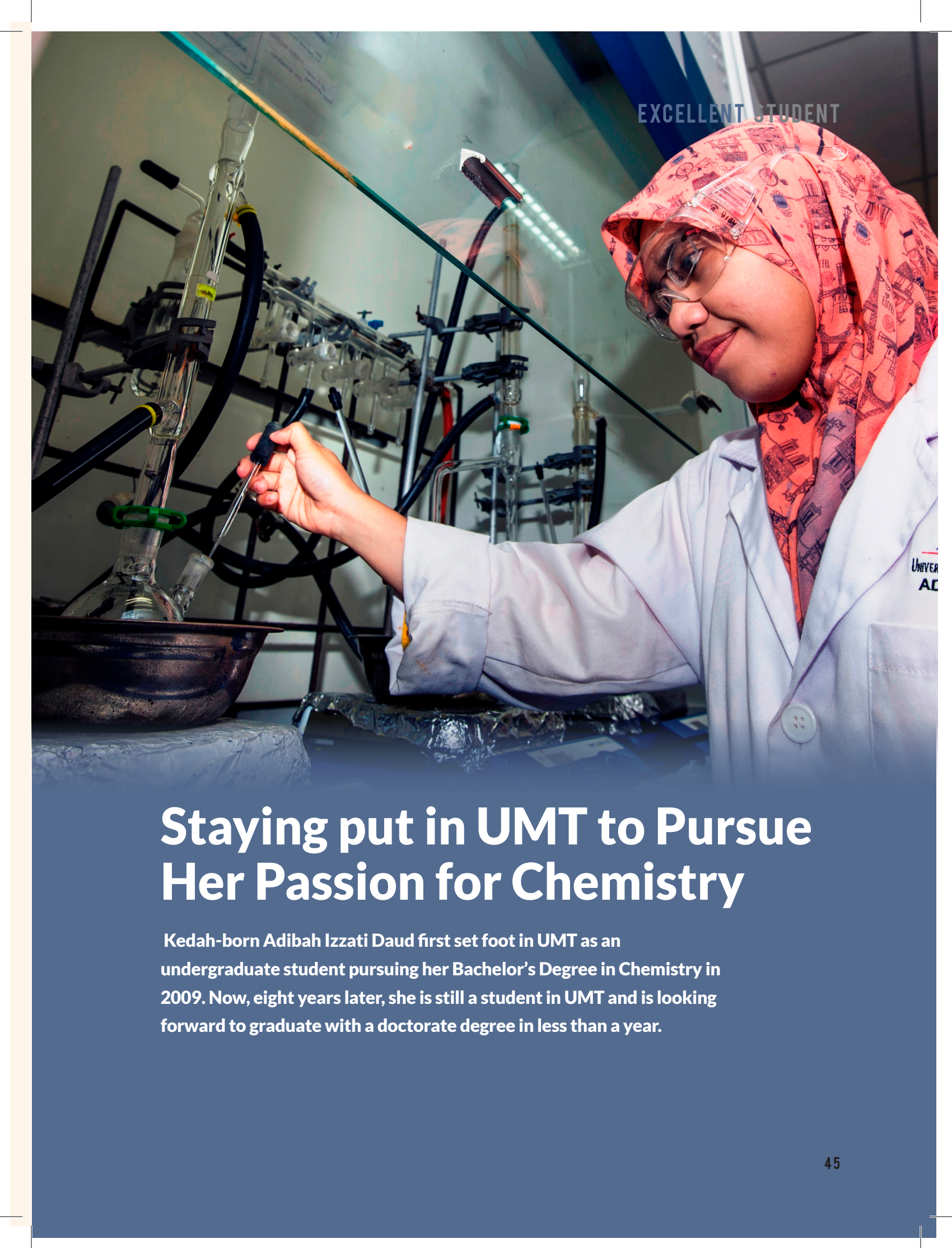
One of the most important things for researchers is research grants as it would enable them to conduct further research in their respective fields.

In this aspect, Assoc. Prof. Dr. Yeong's research has been proven to hold huge potentials when he secured not just one but three major international grants, namely Horizon 2020 from the European Union, 1000-Young Talent Professors Awards from China and Contract Research from Virbac SA, France.

All in all, the future looks very bright for Assoc. Prof. Dr. Yeong as he continues ahead with his quest for more exciting discoveries.

The availability of cutting-edge equipments at UMT's Institute of Marine Biotechnology laboratory is a great help for Assoc. Prof. Dr. Yeong Yik Sung in conducting his research into heat-stress proteins.



A female chemistry student, Adibah Izzati Daud, is shown in a laboratory setting. She is wearing a white lab coat, a red patterned hijab, and safety glasses. She is using a glass dropper to add liquid to a round-bottom flask that is part of a reflux apparatus. The background shows various laboratory equipment, including glassware and metal stands. The text "EXCELLENT STUDENT" is visible in the top right corner of the image.

EXCELLENT STUDENT

Staying put in UMT to Pursue Her Passion for Chemistry

Kedah-born Adibah Izzati Daud first set foot in UMT as an undergraduate student pursuing her Bachelor's Degree in Chemistry in 2009. Now, eight years later, she is still a student in UMT and is looking forward to graduate with a doctorate degree in less than a year.

“After finishing my Master’s degree here in 2014 I did consider whether to pursue my PhD in UMT or in another university. However, the good rapport I have with the lecturers here and their willingness to help me whenever I faced problems in my research made me decide to do my PhD here. Alhamdulillah, my studies went smoothly and if everything goes as planned I will finish my PhD in February 2018,” she said.

In fact, her studies in UMT has been so smooth that from the time she did her Master’s degree until now she had published 13 papers in various indexed and non-indexed journals including conference proceedings.

Adibah’s prolific publications had earned her a good reputation within the academic and research circles. This resulted in her being appointed as one of the judges for the Asian Conference on Chemical Sensors organised by Universiti Malaysia Perlis (UniMAP) and as a facilitator for Novel Research and Innovation Competition (NRIC) 2016, an undergraduate innovation programme organised by Universiti Sains Malaysia (USM).

Conducive environment

Adibah also made full use of the conducive environment and her good rapport with the academic staff in UMT’s School of Fundamental Science to excel in her studies.

This was proven when her thesis on the synthesis and characterisation of acetylide-thiourea fabricated onto interdigitated electrode for the detection of carbon dioxide gas won the gold medal at the 27th International Invention and Innovation Exhibition (ITEX) in 2016.

“The thesis is in collaboration with the National R&D Centre in ICT (MIMOS) and it is to study the use of the organic semiconductor thiourea as a carbon dioxide sensor in the environment,” she said.

Explaining further, she said her research could lead to a better sensor of carbon dioxide level which could lead to a better understanding of the environment.

“The accumulation of greenhouse gases especially carbon dioxide has been identified as the main culprit for global warming and the ability to detect and measure the level of carbon dioxide in a given area is paramount if we want to monitor its distribution in the environment,” she said.

Won Gold Medal

The gold medal that she won was an improvement over the bronze medal she got at the 14th International Conference and Exposition on Inventions by Institution of Higher Learning (PECIPTA) in 2015.

Adibah credited her excellent performance to a number of factors, from





having a good supervisor to personal discipline and time management.

“Assoc. Prof. Dr. Wan Mohd Khairul Wan Mohamed Zin is the supervisor for my bachelor’s degree final year project (FYP), my Master’s degree and my PhD. Having the same supervisor for all three degrees plays a big part in ensuring I produce consistently good results,” she said.

“While my strong passion for chemistry also helps, it would not have been enough to propel me further without self-discipline especially where time management is concerned,” she said.

As a UniMAP scholarship holder under the Bumiputera Academic Training Scheme, Adibah will become an academic staff of the university once she completed her PhD.

“One of the terms of the UniMAP scholarship that I received in 2015 is that I must complete my PhD within three years. Alhamdulillah, with all the support I get in UMT, I am expecting to complete my PhD in February next year, well within the three year time limit,” she said. Having studied for almost a decade in UMT under the guidance of impeccable mentors, there is no doubt that she will continue her excellence when she made the transition to become a great mentor for her future students.



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