eMARINA
The quarterly newsletter of
The Hong Kong Joint Branch of The Royal Institution of Naval Architects
and The Institute of Marine Engineering, Science and Technology,
and The Hong Kong Institute of Marine Technology
皇家造船師學會暨輪機工程及海事科技學會香港聯合分會
及香港海事科技學會季刊
Vol. 4 Oct - Dec 2022

HKJB & HKIMT Activities

STEM x Marine Vehicle Design and Construction Competition 2022-2023

This year HKIMT is holding the STEM x Marine Vehicle Design and Construction Competition for the third time to upkeep the efforts in 2018-2019 and 2021-2022 in promoting the maritime industries in Hong Kong. These competitions were organized by HKIMT and sponsored by Maritime and Aviation Training Fund (MATF). The last two events were very successful and were able to attract many primary and secondary school students to participate.

In preparing the next generation for the rapid development of the modern world, science, technology, engineering and mathematics are taught in primary and secondary schools. However, despite the profound history of the maritime background of Hong Kong leading to it becoming an important International Maritime Centre in the region, the primary and secondary school students are not sufficiently informed of these backgrounds in their studies. Through these competitions using STEM, we hope that students learn the maritime history of Hong Kong and understand the basic concepts of marine vehicle design and construction. It is our hope that students may be aroused by the challenge and studied to become professionals in the trade!

The launching ceremony of this year's competition was held on 23 November 2022 with almost 70 guests and participants. After the launching ceremony, there were a series of workshops held at each weekend from 3 December 2022 to 23 December 2022 for primary school and secondary school students in preparing them for the design and construction of marine vehicle. The workshops included topics on marine vehicle design, basic naval architecture, and a hands-on application of the software for the design.

We are thankful to our speakers Ir M.Y. CHAN, Ir Simon CHEN and Ms. Catherine FOK for conducting the workshops. Despite heavy commitments in their official duties, they managed to squeeze some time and contributed to nurturing the youth for the future development of the industry in Hong Kong.

Space has been allotted to accommodate a total of 20 teams from primary schools and 20 teams from secondary schools to participate in this competition. Each team has 4 students and will be led by a teacher. In February 2023, the participating teams will have to submit their design before starting the workshops for their fabrication. We look forward to what these teams have created this year! Judging the submissions in the past two years, we should never underestimate the imagination and creativity of our younger generation.

Like always, the STEM x Marine Vehicle Design and Construction Competition is organized by the HKIMT and co-organized jointly with the Department of Mechanical Engineering of Hong Kong University (HKU), Association of I.T. Leaders in Education (AiTLE), the Mechanical, Marine, Naval Architecture and Chemical Division of the Hong Kong Institution of Engineers (HKIE-MMNC), HKJB of RINA & IMarEST, Maritime Professional Promotion Federation (MPPF), Yuen Long Merchants Association Secondary School and BREED of HKU.

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Launching ceremony on 23 November 2022:

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(Reported by Yoyo CHAN)

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Seminar on Green Shipping and Maritime Technology

The Green Shipping and Maritime Technology seminar was jointly organized by HKIMT, HKJB of RINA & IMarEST and HKIE-MMNC Division in the morning of 26 November 2022 at HKIE Headquarters in Causeway Bay as one of the supporting events for the Hong Kong Maritime Week 2022. On-line participation was also arranged in parallel with the participants who attended in person.

On-line presentation of Shipping and Digitalisation by Mr. Kaushik Roy

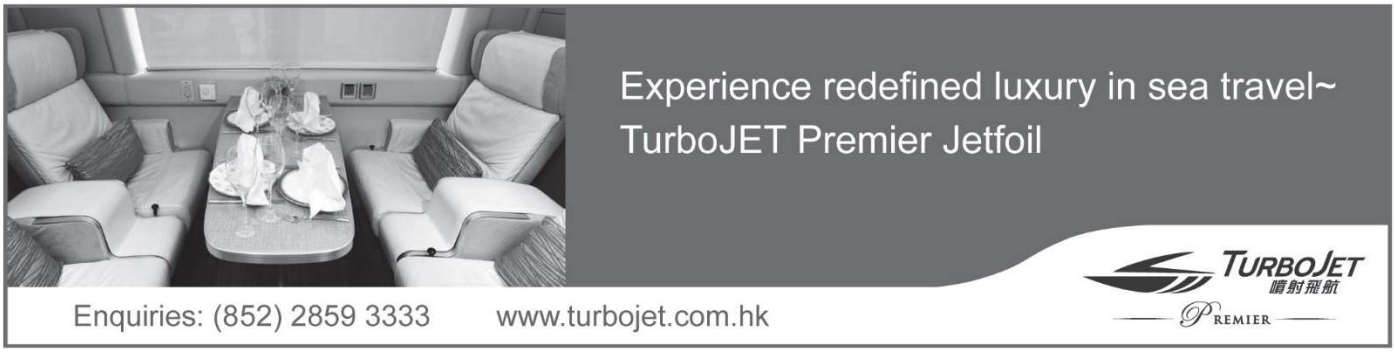
Three themes were presented in this half-day seminar: (i) "Shipping and Digitalisation" by Mr. Kaushik ROY from Mitsui OSK Lines; (ii) "Offshore Development in Hong Kong for Decarbonisation" by Ir Dr. Daman LEE from CLP Power and (iii) "Recent Trend of Technical Development for Ship's New Designs" by Mr. Bin TIAN from Lloyd's Register. These issues and the key points discussed are highlighted below for reference.

(i) Shipping and Digitalisation

Digitisation of the shipping business has been going on for many years, the most notable one being the smart implementation of maritime information and communication technology (ICT) in data simulation and optimisation. Covid-19 pandemic had hindered global trade. Ships were delayed in berthing alongside and discharging in terminals! There was a need to fast track and improve efficiency across global operation by on-line processes. They helped to create a connected, efficient and integrated industry. Going digital will provide real time data and transparencies, enhancing safety, security, performance and conservation of the environment as well as attracting and retaining skilled crew.

The ability to track cargoes plays an important part in the delivery of time sensitive perishable cargoes. Digitalization is also expected to improve operational and environmental performance. Through the installation and monitoring of key sensors, potential failures of machineries can be foreseen and predicted. Planned maintenance, which was once a key method, to arrest inadvertent machinery failures became obsolete. This method took things apart just for the sake of inspections by surveyors and staff to keep their peace of mind. Digital monitoring of machineries has become a proactive approach in predictive maintenance. Parts can be utilised close to their service limits thereby reducing unnecessary environmental pollution caused by these parts.

However, the use of ICT is not without challenges! In its implementation, existing infrastructures have to be modified to suit and additional training is necessary to train shore and ship staff on the use of ICT. It is expected that a transition period is required for staff to stay on top of these rapid advancements. Cyber security is another issue associated with ICT. These issues of digitalisation are expected to be addressed and resolved in the near future. Nevertheless, a basic understanding and the knowledge and of the business remain the keys to the successful implementation of ICT!



(ii) Offshore Development in Hong Kong for Decarbonisation

China Light & Power (CLP), as one of the power giants in Hong Kong (HK), has its statutory obligations to align with HK's decarbonisation initiatives in reducing HK's carbon intensity by 65% to 70% by 2030 using the value of 2005 as base. Therefore, the use of coal, fuel mix and associated carbon footprint in power generation has to be reduced accordingly. The use of LNG to substitute coal and fossil fuel as an alternative energy source is the way forward to meet this initiative. However, the production source of LNG is far away from HK and LNG has to be shipped in for consumption. The need for the construction of an LNG terminal at sea to meet the demand is imminent!

Ir Dr Damen LEE from CLP presented the construction of the LNG Terminal in HK. He explained how this concept came about. The design philosophy, fabrication, installation and the current commissioning status were also displayed. He also highlighted the various challenges encountered by the project, which included the influence of COVID-19 global pandemic during its construction.

LNG terminals can be found in countries with oil and gas industries. They are offshore constructions to reduce its hazards to the environment and the community when it leaks. HK has no experience in the construction of such offshore LNG terminals. Being the first of its kind, this offshore project posed great difficulties to the project team especially in the application of existing onshore terminal local design standards and guidelines to the current project.

Dr LEE focused his efforts in explaining to the audience on how international standards were adopted and adapted to suit the local environment. The stakeholders like the government bodies, ferry operators, fishermen etc. were unfamiliar with pipelaying, jacket and module installation operations. Communication and liaison with the interested parties were therefore vital throughout the project to avoid misunderstanding. Offshore terminal construction is fundamentally different from land terminal construction. The project team also lacked the local expertise and experience in this field and had to go through a sharp learning curve as the project progressed.

The speaker also discussed the lack of local facilities and provisions to cope with the rising offshore developments in the region. Unlike the North Sea and the Gulf of Mexico which have lots of experience in the construction of offshore terminals in adverse weather conditions, the construction regulations for HK is catering for onshore and nearshore construction which works during typhoon and monsoon seasons. They are not quite suitable for use on offshore construction projects which cause a lot of construction downtime for the project and require a lot of management skills to bridge the gaps.

Presentation of souvenir by HKJB Chairman Mr. Simon Chen to speaker Ir Dr Daman Lee

Offshore support vessels with heave compensatory gangways which can operate at higher sea states are also unavailable for charter locally. This is a challenge to the safe transfer of personnel at high seas. A full bridge simulator has been constructed to study the navigation safety of visiting vessels to prepare the terminal for such operations.

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Workers' safety on offshore facilities should not be overlooked. It was found that existing mandatory 'Blue Card' training for shore workers is insufficient for the offshore industry. The increasing population and the desire for a cleaner living environment, HK is expected to have more offshore developments in the near future. It is necessary to ensure that the workforce is well-prepared to tackle the challenges ahead. To raise the safety awareness of workers working on offshore terminals, the project team implemented a dedicated 'Are you safe 360 ™' safety for the purpose.

(iii) Recent Trend of Technical Development for Ship's New Designs

Mr. Bin TIAN from Lloyd's Register explained in his presentation the current scenario, the target of decarbonisation and the timeline of IMO regulations related to emission control. Various types of vessel are in development using different alternative fuels such as Liquefied Natural Gas (LNG), Methanol, Ammonia, Hydrogen, LPG, Bio Fuel, Electricity and Nuclear were explained and discussed in detail.

Presentation of souvenir to Mr. Bin TIAN by the Intermediate Past Chairman of HKIE-MMNC Mr. Stanley Lui and co-organisers' representative from HIMIT and HKJB of RINA & IMarEST

A particular case study on the use of four electric driven ferries approved by the Swedish Transport Administration in October 2022 was introduced. Each vessel has an overall length of 86m and is categorised according to IMO as an Autonomous Level 2 vessel. It can be operated remotely from a control center in Stockholm. Of course, seafarers on board can also take control of the ferry as and when necessary. To meet the requirements of an Autonomous Level 2 ship, dedicated auto-mooring facilities and shoreside charging stations were designed and constructed for these ferries. The charging system enables the vessels' batteries to be recharged in about four minutes.

Another interesting case is a vessel using Wind Assisted Flettner Rotors. Flettner rotor ship, is a ship designed to use the Magnus effect of the rotor for propulsion. The Magnus effect is a force acting on a spinning body in a moving airstream, which acts perpendicularly to the direction of the airstream. The vertically mounted rotors are powered by engines. The cylinders on deck spined by the engine will develop a Magnus effect as wind blows across. The application of this technology is suitable for ship with sufficient free deck surface. Its application should also take into consideration the cargo loading/unloading access and operational air draft limitation. Readers who wish to know more about this novel design may refer to https://flettner.lr.org/ for reference.

(Reported by Catherine Fok and Leslie Lee)

Cross Strait Conference on Nautical Technology and Ocean Engineering on 1 December 2022

HKJB and HKIMT facilitated members participation to the captioned conference organised by the Fujian Society of Naval Architecture and Marine Engineering (FSNAME) on 1st December 2022. The event was originally planned to be held in the hybrid format i.e. physically and online in August 2022. However, due to the pandemic situation in Fu Jian province, the conference was postponed a number of times and eventually re-arranged in an online format only. It was held in Ji Mei University on 1st December 2022.

The maritime history of Fu Jian Province could be traced to the Song Dynasty (960 – 1276) which was a part of the Maritime Silk Road. Fuzhou was also home to the first modern shipyard (馬尾船廠) in China which flourished in the Ching Dynasty between 1644 and 1911. No wonder, Fu Jian Province became the birth place of Jimei University (JMU) and FSNAME.

The Conference commenced soon after JMU, Fujian Association for Science and Technology, China SNAME and China Institute of Navigation expressed their gratitude to the participants in taking part in the conference.

The dean of nautical factory of JMU, S. F. Yeung gave the welcome

The conference had a number of interesting subjects in its agenda. They included: marine accident research, ballast water monitoring, LED light for squid fishing and neuro network in Dynamic Position System for Barge.

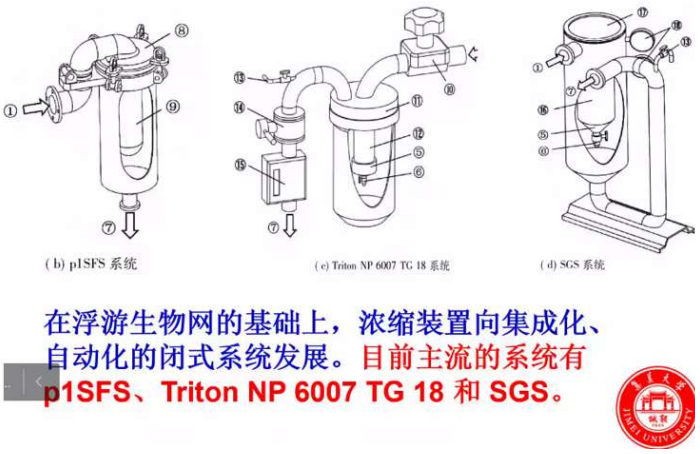
全球压载水管理项目（**IMO Globallast**）列举了由压载水携带的十种典型入侵生物

序号	名称	英文名	标志
1	霍乱（霍乱弧菌）	Cholera (Vibrio cholerae)	
2	携带水蚤类生物的动物（水蚤）	Cladoceran Water Flea (Cercopagis pengoi)	
3	绒螯蟹（绒螯蟹）	Mitten Crab (Eiocheir sinensis)	
4	有毒藻类（赤/棕/绿潮）	Toxic algae (red/brown/green tides)	
5	圆虾虎鱼（圆虾虎鱼）	Round Goby (Neogobius melanostomus)	
6	欧洲绿蟹（岸蟹）	European Green Crab (Carcinus maenas)	
7	亚洲海藻（海草）	Asian Kelp (Undaria pinnatifida)	
8	斑马贝（斑马贝）	Zebra Mussel (Dreissena polymorpha)	
9	北太平洋海星（海星）	Northern Pacific Seastar (Asterias amurensis)	
10	北美栉水母（水母）	North American Comb Jelly Fish (Mnemiopsis leidyi)	

10 major invasive alien species carried in ship ballast water listed by IMO GloBallast.

Professor S. C. Zhong from the Marine Engineering faculty of JMU explained how ballast water in ships could be inspected by port states to confirm that it does not contain the 10 common invasive alien species listed in IMO GloBallast.

Sampling difficulties were raised in plenary on the amount of sample to be collected, method of sampling, method of testing etc. All these would affect the inspection results. Prof. Zhong advised on the solutions to these problems. These difficulties could be resolved by increasing the sampling quantity by concentrating the ballast water, installing uniform facility on vessel and developing test technology and establish standard of ballast water quality from various trading routes in the Ocean.

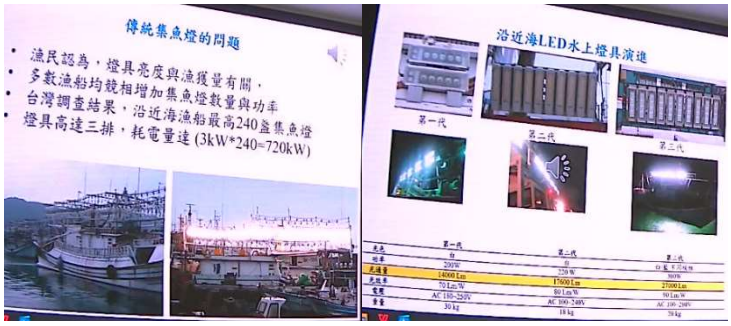


Concentration device for ship ballast water

Ballast water test kit.

Professor S. C. Shen from the National Taiwan Chen Kong University presented the application of new LED fishing light for fishing vessel. From his research, the favourite length of light wave was studied in attracting Cololabis Saira (needle fish) and Illex Argentinus (shortfin squid). The favourite light wave for Cololabis Saira is 650nm which is close to red light, while 478 nm for Illex Argentinus which is close to blue light.

He also compared these LED lights with the traditional lights using the same power. LED lights not only save energy but also have other advantages compared with traditional lights, e.g. less diffusive and stronger illumination intensive.



Traditional fishing luring light. LED fishing luring light.

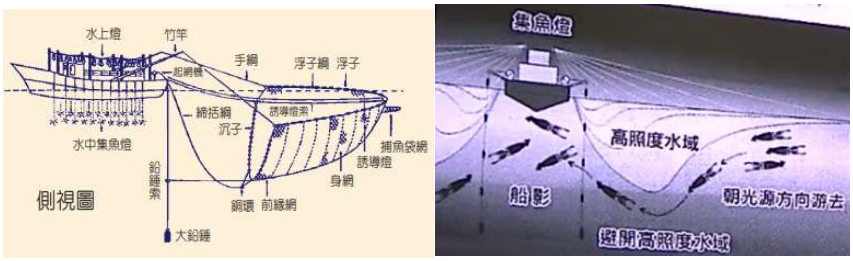
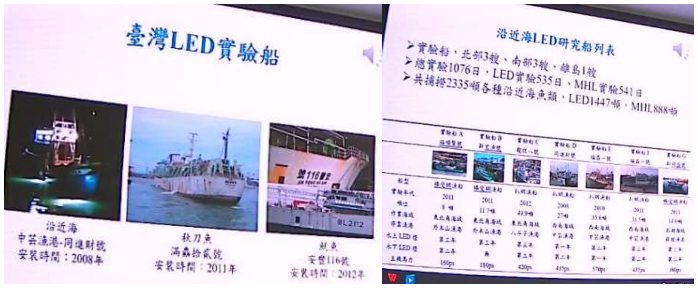


Illustration of Light Fishing

Traditionally, in order to increase the luminosity of light in seawater to attract fishes, fishman usually end up using more powerful lights. As a result, greater capacity generators would be required on board leading to higher fuel consumption and carbon emission.

The research lasted for more than 1000 days. Seven fishing vessels with LED were deployed in different sea areas. It was concluded that the application of LED fishing lights not only save energy but also increase the catching efficiency by 63%.

This FSNAME was considered as part of the Continuing Professional Development (CPD) programme for HKJB members. Certificate of attendance was provided to participant who registered via HKJB/HKIMT.



Experiment fishing vessel. Experiment data collected.

Due to the COVID-19 pandemic, only on-line access was possible for HKJB/HKIMT members. Nevertheless, this was a good beginning and would pave the way to improve attendance for future conferences. As COVID-19 travel restrictions appear to ease off quickly, we look forward to participating in FSNAME/HKIMT/HKJB joint activities in person soon in 2023!

(Reported by Simon Chen and Leslie Lee)

Incubation and Commercialization Summit at HKUST on 6 December 2022

HKIMT and HKJB delegates attended the third summit of the Five Summit Series co-organised by HKUST Department of Ocean Science. The Five summit series cover a broad spectrum of marine broad subjects which aimed to gather different stakeholders (including practitioners, industry stakeholders, scientists, engineers, investors, and service providers in the marine sectors) to promote Industry-University-Research Cooperation and to bring benefits to the

community of Hong Kong and the Greater Bay Area. The target is to enhance the competitiveness of Hong Kong Marine Science and Technology, as well as Marine Economy which fostered the sustainable development and knowledge transfer in the process. Readers may refer to eMARINA Vol 2 2022 and eMARINA Vol 3 2022 for details on the previous summits.

The following paragraphs highlight the concept of deep tech incubation, technology transfer and the commercial outlook as explained in the summit which might be of interest to the HKJB/HKIMT members who were unable to attend.

HKJB Chairman Mr. Simon Chen (right) and members of HKJB and HKIMT

Dr. Shin Cheul KIM, Associate Vice President for Research and Development (Knowledge Transfer) of HKUST explained the use of Deep Tech for the development of current technologies. Their organisation aims to overcome the limitations of these technologies and make them commercially viable to produce. In short, Deep Tech offers significant advances over the current technologies by investing more on R&D in the technologies. These technologies were originally either hard to reproduce or so protected that create barriers to be overcome. Usually Deep Tech was able to demonstrate significant improvement of performance or solve problems with entirely new approaches. MRI, GPS and mRNA were successful examples that have applied Deep Tech. Many of these technologies could address great social and environmental challenges and would shape the way on how we resolved some of the most pressing global problems.

There is established collaboration in science and technology research among universities in Hong Kong and mainland China. Incentives like cost-of-living allowance, employment or company start-up subsidies as well as other preferential policies are in place to attract talents joining the trade. In the maritime aspects, they include the opportunities in the developments of (i) high-end marine equipment manufacturing, (ii) seawater desalination and (iii) marine new energy such as offshore windfarm. These developments are supported by state policies and research institutions, e.g., Ocean University of China - featured with ocean science and aquaculture discipline, Institute of Oceanology - Chinese Academy of Sciences, which is one of the largest and most comprehensive marine research institutions in China, HKUST - a world-class international research university. According to latest reference from World Bank, the Global Ocean Economy is a US$ 2.5 trillion market including tourism, high end technology, sea transport, ships, ports, fisheries, seafood and sea minerals processing. The potential of ocean economy of Greater Bay Area is huge and is comparable in scale to countries like Canada, South Korea and Russia. Hong Kong marine scientists can jointly apply for national research projects, making full use of the national scientific research resources.

All successful technological innovations undergo a development journey. From the beginning of a concept to the development and to become a proven idea requires a lot of R&D. This is the most difficult part of a development journey. Many products never arrived at the end of the development journey to see the dawn of the day. This period is therefore known as the “valley of death” for technological innovations. Even after this stage, success does not come easy. The Government, industry and academia is required to collaborate to drive Deep Tech development to make them commercially viable. Science and Technology and Hong Kong Cyberport are those at the forefront in assisting Deep tech incubation and commercialisation in Hong Kong.

HKJB/HKIMT Past Chairman Mr. Alan Tsang (left), HKJB Chairman Mr. Simon Chen (right) and Mr. Thomas Gnocchi – Ambassador/Head of Office, European Union Office to Hong Kong and Macao

Mr. Simon Chen met Mr. Thomas Gnocchi – Ambassador/Head of Office, European Union Office to Hong Kong and Macao during the summit. He took the opportunity to introduce the recent activities and forthcoming plan of the HKJB. Views on the development and opportunities of the marine engineering and naval architecture profession in Europe and Greater Bay Area were also exchanged.

Members may consider joining the forthcoming sections of summit and visit to the Greater Bay Area with HKIMT and HKJB together.

(Reported by Leslie Lee and Simon Chen)

Members' Corner

HKSOA 65th Anniversary Celebration

Hong Kong Shipowners Association (HKSOA) hosted the first-ever singing contest, as part of its 65th anniversary celebrations on 11 November 2022 at the Arca, Wong Chuk Hang, Hong Kong. HKJB Chairman, Mr. Simon Chen was present to cheer our members participating in this event.

HKJB member Mr. Leslie Lee teamed up with his colleague from Hongkong Salvage & Towage Mr. Chau Sing Tim and competed in the

HKJB member Mr. Leslie Lee (right) and his colleague Mr. Chau Sing Tim (left)

HKJB Chairman Mr. Simon Chen (left 1) and other members

Prize presentation from HKSOA Chairman Mr. Wellington Koo, JP (middle)

Duet/Group. Their shimmering guitars and their melancholy voices were in perfect harmony in the presentation of the song "Imagine". The judges loved their performance and they were awarded as 2nd Runner-Up in the competition. Like what the lyrics of the song said: "Imagine all the people, living life in peace …", it was a true reflection of the wills of many people living in this world today.

We look forward to seeing the performance of Leslie and Tim in other occasions!

(Reported by Dr Miller Hui)

HKJB & HKIMT Coming Activities

Date	Event
17 January 2023	Annual General Meeting of Hong Kong Joint Branch of RINA & IMarEST
11 February 2023	STEM x Marine Vehicle Design and Construction Competition (Software Application Session for Primary School Participants)
18 February 2023	STEM x Marine Vehicle Design and Construction Competition (Software Application Session for Secondary School Participants)
25 February 2023	STEM x Marine Vehicle Design and Construction Competition (Model Fabrication Session for Secondary School Participants)

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