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It was during a renewable energy course that Universiti Tenaga Nasional (Uniten) Bachelor of Mechanical Engineering student, Irwan Nizam Ismail, learned some intriguing facts about electricity generation in Malaysia.

"From the Malaysia Energy Statistics Handbook 2017, which was published by the Energy Commission Malaysia, the lecturer cited that the 43.5 per cent of electricity in Malaysia was generated by gas, 42.5 per cent by coal and less than 0.3 per cent. I found this fact staggering," he said.

Irwan discussed the matter with course-mate Muhammad Nur Adha Arimi in their robotics class, upon which the latter suggested designing an automated solar PV (photovoltaic) system.

As they walked home after class, the two friends passed by the Uniten lake and the idea of the automated solar PV system on water came across. This idea, they felt, would be the best solution to the inefficiency of the current solar PV system and the land scarcity issue in Malaysia.

"We did some research and found there is an abundant amount of water areas in the country, and most of these spaces are not being fully utilised. There are more than 50 lakes in Selangor alone, and 90 per cent of these lakes are under-utilised. Therefore, we thought that it would be a great idea to fully exploit the unused area of water and create a floating platform that is automated so that solar energy can be efficiently harvested.

"We want to improve the green technology in Malaysia and eventually increase the percentage of the solar power generation in the Malaysia energy mix. Since then we have actively developed the smart and sensitive solar floating platform called Senslar," said Irwan.

Senslar, coined from a combination of two words: solar and sensitive, recently clinched the top prize at the national level James Dyson Award 2018 competition.

The James Dyson Award runs in 27 countries. The contest is open to university level students (and recent graduates) studying product design, industrial design and engineering. The award encourages ideas that challenge convention, lean engineering - less is more, and design with the environment in mind.

Senslar is a floating platform system that is sensitive to sunlight and can smartly move according to the sun's position. Irwan, together with his teammates, Adha, Muhammad Haikal Aznan, Muhammad Aidil Aizad Kamarulsahar, Ahmad Zulfadhli Dzulkifli, Muhammad Faris Mohamad Rosle and team adviser Dr Hassan Mohamed, believe that Senslar can have a valuable impact on the renewable energy industry in Malaysia and globally as this will promote the use of solar panels on underutilised surface areas of lakes, dam reservoirs and oceans.

The group first worked on Senslar to join a mini design competition held in Uniten. The prototype, which was a single and small unit of a floating solar platform (5cm by 5cm) got the group the second place.

Then they improved the design by adding innovative features to the original prototype and challenged themselves to compete at the International Invention, Innovation and Technology Exhibition (ITEX).

"Four months before the event, we generated many conceptual designs, optimised the programming code for the tracking system and added features such as the tilting motion, modular function, 'brain' module, electrical ring connector and the anchoring pole for the

The current model of Senslar is an eight watt solar floating platform system.

Harvesting solar energy on water

vertical motion.

"We also tested the efficiency of the improved automated design with 8 Watt solar cells, and it was proven that this concept can harvest about 60 to 80 per cent more energy than a static module.

"During the proof-of-concept model development process, we spent roughly around RM1,200 (including materials, manpower, fabrication and manufacturing cost). The cost seems inexpensive since we always thought about the design manufacturability and cost-effectiveness throughout the development process. Alhamdulillah, we won a silver medal in ITEX 2018," said Irwan.

Since then, the group has built a small model of four Senslar platforms with each platform housing a two-watt solar cell, totalling to an eight-watt Senslar system. This small system can basically power up an LED light or a clock. It can also be used to charge a power bank to a full level for more than 40 hours with direct sunlight depending on the power bank capacity.

Installing the system on water not only overcomes the issue of limited space, but the water also plays the role of a cooling agent for the solar PV, reducing maintenance costs incurred by conventional PV systems.

"But, bear in mind that Senslar is not designed for small applications. We foresee Senslar replacing old, inefficient, stationary, solar floating farms in Malaysia. One of the examples is the solar floating farm on Sungai Labu, Selangor, which has about 432 panels (108kWp) that theoretically can provide electricity for 20 houses annually. With Senslar, the energy harvesting efficiency can be improved to more than 40 per cent and the number of houses that receive the electricity can be potentially doubled," said Irwan.

The team has tested the proof-of-concept model, and it was proven that system works very well as the model can optimally tilt and rotate while effectively harvest direct sunlight, increasing the efficiency of solar energy harvesting to more than 40 per cent based on their lab test.

"We are very grateful and thankful to James Dyson Award UK and Dyson Malaysia for be-



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IRWAN NIZAM ISMAIL
Mechanical engineering graduate from Uniten

lieving in our project. With the prize money of £2,000 (RM11,000) received from the award, we will build full sized Senslar platforms (larger than 2m by 2m size installed with commercial 250-watts solar panels). The development process, including designing, manufacturing, testing and commissioning, will be completed before the end of the year so that it can be first installed on the UNITEN's lake," Irwan said, who has recently graduated.

He said the team has a big dream supported with a structured plan for Senslar.

"We have started a company called Senslar Tech. We are actively looking for partners or investors through competitions and meetings to support this project. Our next appearance will be at iGEM2018 at Kuala Lumpur Convention Centre from Oct 17 to 20," Irwan shared.

With the initial prize money from the James Dyson award, the team will complete the construction and testing of the first large prototype by the end of 2018.

"Starting next year, we will be installing and rigorously testing a few Senslar units on various targeted lakes. In five years, we plan to install Senslar on several lakes in Malaysia, especially in Selangor, Putrajaya and Cyberjaya. In the next 10 years, we aim to be one of the leading power supply companies in Malaysia by having our solar panels installed in Peninsular Malaysia.



(From left) Hassan Mohamed, Muhammad Nur Adha Arimi, Irwan Nizam Ismail, Muhammad Aidil Aizad Kamarulsahar and Muhammad Haikal Aznan with the current model of Senslar.