Solar-powered vehicle spurs new green sparks in town

A lot of new products started with ideas and concepts that might have initially seemed doubtful or even absurd, but with years of evolutionary development and technological improvements, many turned into world-changing inventions. The solar-powered vehicle (SOPHIE) developed by the Department of Engineering of the Hong Kong Institute of Vocational Education (IVE) could be a case in point.

"When we first started the project, we also wondered how we could bring the different teams of the Department together and turn the textbook theories into a real drivable car," said Kenny, student representative of the battery team. But now, four months into the project, the SOPHIE team is witness to how teamwork has brought Hong Kong’s first solar-powered vehicle to life, and is excitedly looking forward to enhancing its performance before the second version is launched in June this year.

Powered by solar energy, SOPHIE is a lightweight emission-free four-wheeler driven by a 750W DC motor that travels at 20 kilometers per hour. Ir Peter TANG, Principal Lecturer of the Department of Engineering, IVE (Tsing Yi) and Assistant Project Director of SOPHIE, said when the solar panel generates more energy than necessary, the extra energy will be stored in a lithium ferrous phosphate (LFP) battery. A fully charged battery can travel a maximum distance of 40 kilometers.
Green jumpstart

Ir Dr. Lawrence CHAN, Academic Director of IVE Engineering Discipline and Project Director of SOPHIE said the project aims to provide a hands-on learning experience for engineering students to apply textbook theories to real-life practice, while encouraging a ‘green’ mindset among them. “Through this project, we hope students will be able to develop a ‘go green’ mentality and to apply this concept to other products to build a sustainable future,” Dr. CHAN stressed.

As China and the European Union have set goals to generate 15% and 20%, respectively, of their energy from solar sources in the next 30 years, Dr. CHAN anticipated the development of solar-powered vehicles will be a new directive to achieve the worldwide target on the use of renewable energy.

While enhancing the speed, conversion efficiency and performance consistency of SOPHIE are the priorities at this stage, Dr. CHAN said a long-term goal is to participate in the World Solar Challenge, a solar-powered car race that covers 3,021 kilometers from Darwin to Adelaide in Australia.

Gathering strengths

In bringing the ‘green’ concept to life, Ir TANG said one of the biggest challenges that the team faces is time. “Today’s technology will be obsolete tomorrow,” he said, “so we’re racing against time and we’ve got to ensure every step is carefully planned and not miss any deadline.”

To do this, Ir TANG said teamwork is crucial. “The work and procedure of every unit of this team, from chassis design to battery and mechanics, affects the work of the others,” he noted. “Students are therefore encouraged to report their progress status and the difficulties they encountered proactively so that we can fix any issues at the earliest possible stage.”

Echoing Ir TANG’s sentiments, student representatives Joanne and Wilson from the mechanical engineering team said communication between different units is an integral part of the SOPHIE project. “You’ve got to have a thorough work plan before you get started and be prepared to communicate any work issues with your counterparts in order to prevent making errors at any stage of development,” said Wilson.

“While meeting the project timeline is essential, safety issues were not overlooked either at the development stage,” said Mr. HO Kin-fan, Lecturer of the Department of Engineering, IVE (Tsing Yi) and Project Leader of SOPHIE’s battery unit. “Therefore,” Mr. HO said, “numerous field tests were run to ensure the battery would not overheat during peak sunshine hours.” Similarly Project Leader Ir Dr. LO Ka-wah said the team was especially cautious in the choice of mechanical materials to ensure safety comes first.

Meanwhile, the team has a surmountable goal to improve the experimental version of SOPHIE into a more efficient and practical vehicle. Stay tuned for more exciting development from the SOPHIE team.