

HKCTC Special Award for Outstanding Project in Testing 2024

Science competition recognises student innovations that integrate testing to enhance quality of life

To heighten students' awareness of the integral role of testing and certification (T&C) in innovation, the Hong Kong Council for Testing and Certification (HKCTC) partnered with the Hong Kong New Generation Cultural Association to co-organise the "HKCTC Special Award for Outstanding Project in Testing". This award aims to draw students' attention to the importance of carrying out different tests during the development stage of any invention or product. This award was a component of the 26th Hong Kong Youth Science and Technology Innovation Competition which attracted nearly 3000 entries from over 4000 participants.

The competition on secondary school invention and research called for student teams to submit original research projects or inventions in one of five subject areas: mathematics and engineering; chemistry and materials; biology and health; energy and environmental science; and computer and information technology. Ten finalist teams were selected for the HKCTC Special Award in the consideration of how well-developed the project ideas with testing elements and/or extensive use of

testing to ascertain or determine the performance and properties of inventions.

The finalist teams presented their projects or inventions to the judging panel (the Panel) composed of members of the HKCTC, namely, Mr Robert Lui, Dr Cheung Kwai-chung, Mr Leung Kwan-ho, and Dr Lesly Lam.



The Judging Panel for the Award, (from left) Dr Cheung Kwai-chung, Dr Lesly Lam, Mr Robert Lui and Mr Leung Kwan-ho.

The Panel was impressed with this year's finalist entries, which demonstrated not only an increased breadth and depth of students' understanding of testing, but also their concern against current social issues and enthusiasm for coming up with innovative solutions.

"We are pleased to see that the finalist teams



Mr Robert Lui (centre), on behalf of HKCTC, presented trophies to the top three teams in the "HKCTC Special Award for Outstanding Project in Testing".

approached their projects in a comprehensive and thorough manner that they have already taken sustainability, durability, and even the cost of materials used into consideration during the early stage of invention," the Panel said. "Despite limited resources, the finalist teams used rigorous tests to demonstrate the effectiveness and quality of their prototypes according to international standards which are widely adopted in the market," the Panel commented. The HKCTC Special Award not only helps to raise students' awareness and exposure in T&C, but also provides them an opportunity to explore the realistic prospect of working in T&C sector through undertaking various laboratory-level tests.

First Place Grand Award

Project: Pure Breath



Christian Alliance SW Chan Memorial College:
Wong Wing-tung, Lai Hiu-wai, and Lok Wing

Driven by a shared passion to assist the less fortunate, particularly residents of subdivided units, the team developed a prototype of a smart air purifier designed for compact living spaces. The device is constructed from readily available, low-cost materials and integrates various scientific principles. These include the germicidal properties of copper, the specific gas adsorption capability of activated carbon, and the particle filtration function of masks. The purifier, which can filter over 70 percent of PM 2.5 particles, ammonia, bacteria, viruses, and odours, is activated automatically via a mobile app that collects and analyses air pollutant data.

The Panel praised the team's comprehensive research into the materials and their incorporation of Internet of Things (IoT) technology into the sensor for real-time detection of air pollutants and viruses. They also highlighted the team's meticulous testing to measure the impact of varying air pollutant levels on the device's effectiveness. The team referred to international standards for their ammonia tests (detecting urine smell in the air) when designing the smart sensor. They repeatedly conducted odour tests and virus cultivation experiments to ensure consistency and accuracy.

Describing the project as a rewarding learning experience, the team learned to use programming for IoT, experimented with welding and 3D printing to create individual components, and gained insights into big data analytics. The team added, "As our goal was to develop a practical and affordable device to enhance people's quality of life, especially for people who live in subdivided flats, we carefully considered the costs associated with different materials and developed two prototypes at different costs."

Second Place Grand Award

Project: OkraHeal



St. Paul's Convent School:
Monica Pei Yuetong, Ellie Chiu and Megan Jane Kwok

The team, united by a shared passion for healthcare innovation, developed OkraHeal, a bandage designed to address the issue of slow-healing wounds. OkraHeal, a three-layered hydrocolloid bandage containing okra mucilage, releases medicinal substance at a steady rate over an extended period, aiding wound healing. Okra mucilage, a gel-like substance naturally found in okra pods, is incorporated into the wound dressing due to its significant drug retention and anti-inflammatory properties. Alginate, a biocompatible hydrogel, is included for its excellent absorbent properties, which allow for the absorption of wound exudate.

The Panel commended the team for their in-depth research, which included a review of related research papers, and their systematic and meticulous testing and data analysis during the development of their innovation.

The team stated that in vitro tests were conducted to confirm the anti-inflammatory properties of okra. The team overcame technical challenges in developing a viable design by conducting repeated experiments. They eventually developed a three-layer design and determined the optimal combination of various substances. "Safety standards for healthcare products are our priority, so we were conscientious on the testing methodology. We analysed all the data collected from the repeated tests to verify the results, which we included in our final report," the team supplemented. In addition to gaining a deeper understanding of biology and scientific report writing, the team valued the opportunity to practise excellent teamwork and time management skills during the project.

Third Place Grand Prize

Project:

Biodegradable food ware and coating

Maryknoll Fathers' School:
Chong Wing-chi



Although Chong is not studying biology at school, she has zest for the subject which led her to read numerous university textbooks for self-study. Her research culminated in an award to this competition, where she presented an invention centred on the unique properties of pea starch, a potential eco-friendly alternative to plastic.

Pea starch, primarily composed of amylose and amylopectin, uses water as a solvent. The gelatinisation and cooling processes yield a natural polymeric material. The bioplastic in this study is produced by heating a mixture of the biopolymer and additives. Chong suggested this bioplastic as a replacement for conventional plastic. Chong identified pea starch and deionised water as the fundamental materials for creating tableware and coatings. She concluded their feasibility after conducting a series of tests to verify the physical and chemical properties of pea starch, including heat resistance, moisture absorbance, waterproofing, oleophobicity, and reactivity with acids, bases, and alcohol. Part of the prototype developed also encompassed experiments with hot plates and steam heating. Even though Chong conducted the project by herself, she did not compromise the quality. "The tests she carried out for her invention far exceeded our expectation," said the Panel.

Given that the materials were intended for tableware, Chong, who had started the project a year prior, also evaluated whether they would affect the flavour of food. The Panel were astounded that Chong had preserved her earliest sample to assess its durability and mould-resistance.