Background

The World Engineering Day (WED) Hackathon is a global competition for engineering students who collaborate in teams towards solve a real-world problem with a solution that advances one of the UN Sustainable Development Goals. It is a unique international competition that provides engineering students with the opportunity to demonstrate their engineering knowledge and skills and to win global recognition.

The World Federation of Engineering Organizations (WFEO) is the peak international body for professional engineering institutions founded in 1968, under the auspices of UNESCO, with members from 100+ national professional engineering institutions and 12 international and continental/ regional professional engineering institutions, representing 30 million engineers. WFEO is a UNESCO affiliate and represents engineering at the United Nations.

Engineering education and capacity buildings has been a WFEO priority since its founding. This commitment was reinforced on its 50th anniversary, with the *Paris Declaration*, 4th March 2018, and in the recommendations of the second UNESCO Engineering Report – "Engineering for the SDGs", released on World Engineering Day, 4th March 2021.

World Engineering Day for Sustainable Development is celebrated annually on 4th March, WFEO's founding day, as a UNESCO international day, promoting the profile of engineers and engineering.

The WED Hackathon is part of the annual celebrations for WED, hosted by the World Federation of Engineering Organisations (WFEO), and its Young Engineers / Future Leaders (YE/FL) committee. In partnership with Engineers Without Borders International (EWB-I).

Established in 2022, this is an innovative opportunity for engineering students to develop sustainable engineering solutions for a global problem and demonstrate their capabilities against an internationally recognised engineering education benchmark.

Project Based Learning

THE WED HACKATHON AS AN OPPORTUNITY FOR
PROJECT BASED LEARNING

Project Based Learning (PBL) has been recognised as a teaching method where students learn by engaging in real-world and personally meaningful projects. This approach is particularly important in engineering education. The WED Hackathon provides a unique opportunity for project based learning and for engineering students to develop key employability skills, including critical thinking and problem solving, understand complex systems and the need for lifelong learning. It is recognised that while STEM skills are vital, good communication skills, the ability to collaborate and work in diverse teams are equally important.

Students that are involved in a project based-learning experience, develop key skills including to work collaboratively, organise and manage their tasks, and develop and implement their solution. They learn to engage in a diverse learning environment, support their peers, develop empathy, conversational and listening skills, connect complex ideas and develop systems thinking approaches. Creativity, divergent thinking and diverse perspectives are encouraged, providing students with opportunities to review and critically analyse proposals. The process is empowering, building confidence in the students' learning and other capabilities.

The WED Hackathon provides limited time to develop a solution, forcing students to research, prioritise and consider and eliminate possible solutions quickly. The situation mirrors real world work situations. Mutual support and collaboration is essential for success.
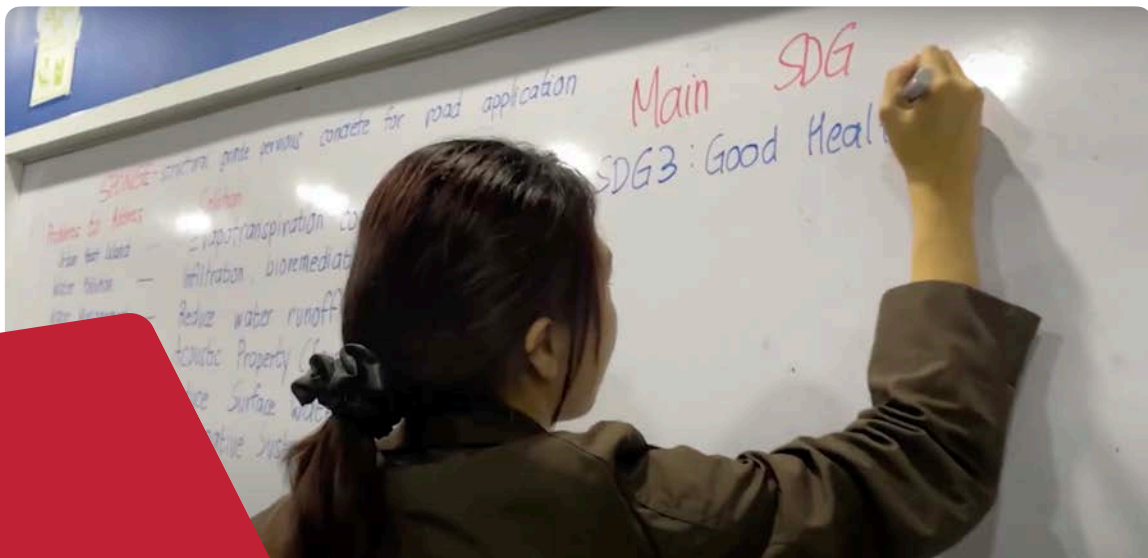
The Judging Criteria

DEMONSTRATING THE RESULTS OF AN OUTCOMES BASED
EDUCATION PROGRAM

The WED Hackathon is an opportunity for students to demonstrate their engineering knowledge, skills and attitudes, that are the outcomes of their engineering education programs and that align with **International Engineering Alliance (IEA) Graduate Attributes and Professional Competencies (GAPC) Benchmark.** This is the basis for mutual recognition of engineering qualifications, by the signatories of the IEA, across more than 30 nations.
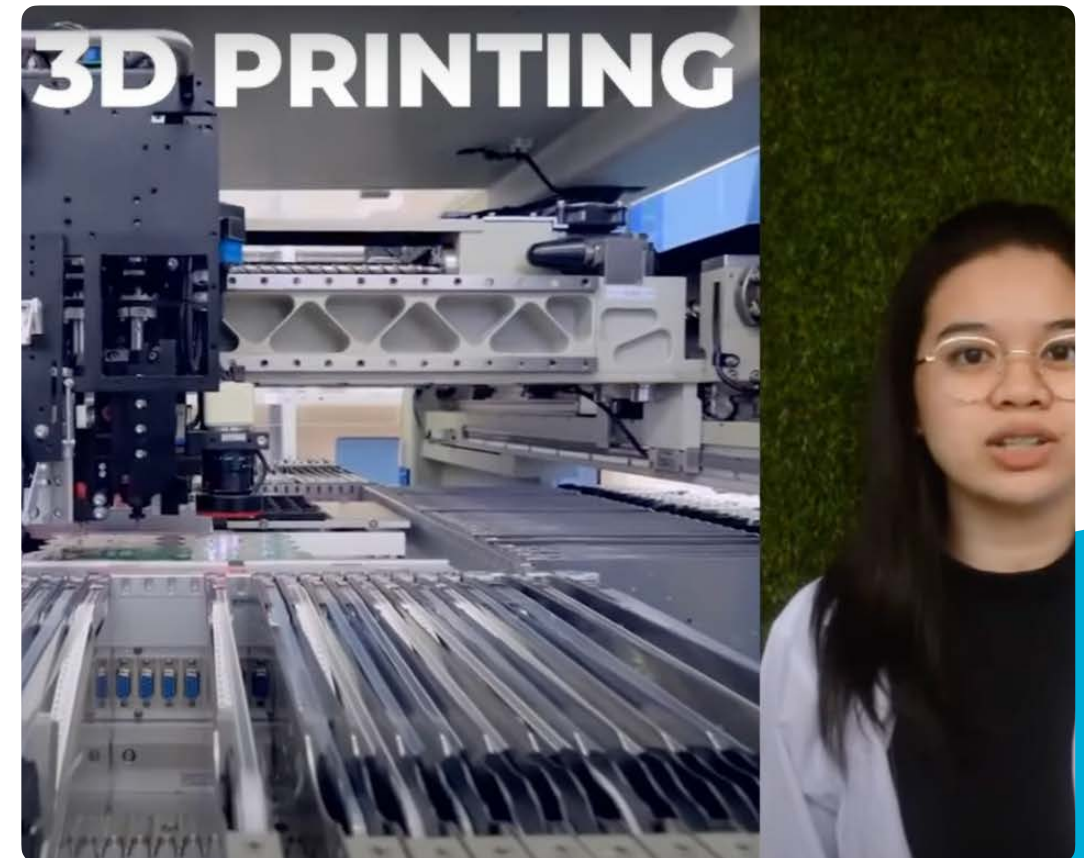
The GAPC Benchmark 2021 is a contemporary framework for an **outcomes based engineering program** that resulted from extensive review by IEA signatories, WFEO and its international engineering partners, including IFEES and GEDC and global consultation across 60 countries. Supported by UNESCO, it has been translated into the six UNESCO official languages, English, French, Spanish, Russian, Chinese and Arabic and is recognised as the pre-eminent global standard for engineering education.

Students need to demonstrate their intellectual agility, creativity, critical thinking and adaptive learning skills. Participation in the WED Hackathon is a wonderful opportunity for students to demonstrate these skills in a fun and exciting project.

The GAPC Benchmark accommodates future needs for engineering, with requirements for team work, communication, ethics and sustainability skills, in addition to core engineering skills. It requires students to develop digital and lifelong learning skills to adapt to rapidly emerging technologies and skills in using new tools such as AI and machine learning. Students also need to consider the impact of their work – technical, environment, social, cultural, economic, financial and recognize their responsibility to advance the UN Sustainable Development Goals (SDGs).

The judging criteria for the WED Hackathon are based on the GAPC Benchmark. Engineering educators can observe how their students perform in the Hackathon, relative to the GAPC Benchmark. The WED Hackathon thus fulfils a second objective, supporting educators, by providing the framework for a project based learning opportunity. For programs that are accredited by IEA signatories, this also demonstrates the results of the institution's outcomes based education program.

	Graduate Attributes that are addressed in the solution, referencing the International Engineering Alliance Graduate Attribute and Professional Competency (GAPC) Framework
1	Engineering Knowledge: Breadth, depth and type of knowledge, both theoretical and practical applied in developing the solution
2	Problem Analysis: Level of thoroughness in examining the problem and developing the solution
3	Design/development of solutions: The extent to which the solution is original and extent to which the solution uses new and emerging technologies
4	Investigation, research and ongoing learning: Breadth and depth of investigation, literature research and experimentation applied in developing a unique and innovative solution
5	Extent of use of digital tools and new technologies: The extent to which digital tools such as modelling, Computer Aided Design and Drawing etc. have been used to develop the solution
6	Contribution to UN SDGs: Contribution to sustainable development and description of the UN SDGs that are addressed by the solution
7	Consideration of broad ethical issues: The ethical issues that are addressed by the solution in terms of impact on the environment, different parts of society and economy and how the team has addressed ethical issues such as diversity and inclusion and how potential adverse impacts have been mitigated and positive impacts celebrated
8	Individual and Collaborative Team work: Examples of how the team collaborated to successfully develop the proposed solution and description of the broad range of diversity elements (gender, age, ethnicity, physical abilities, location rural/urban) in the team
9	Communication: Examples of how the team was resourceful in communicating with each indeveloping the proposal as well as the effectiveness of communicating the proposed solution
10	Project Management and funding for the solution: Level of project management and estimated cost of solution with suggestions for financing the proposed solution

The WED Hackathon Challenges

THE WED HACKATHON CHALLENGES RELATE TO ONE OF THE UN SDGS

Students are required to provide a solution to a global problem in a limited time frame. The challenges are developed by young engineers from Engineers Without Borders and the WFEO Young Engineers/Future Leaders Committee and are the starting point for the learning process, directing the student's engagement and research.

The Challenges are practical, relevant, authentic and scientifically based. They can be analysed and solved, with an interdisciplinary approach. The solution has no specific boundaries and the solution supports diverse approaches.

QUANSER SUSTAINABILITY AWARD

Challenges Released

WORLD ENGINEERING DAY HACKATHON 2023

2 ZERO HUNGER

6 CLEAN WATER AND SANITATION

3 GOOD HEALTH AND WELL-BEING

Entry Eligibility
& The Hackathon Process

ENTRIES ARE OPEN TO UNDERGRADUATE AND GRADUATE
STUDENTS, EXCLUDING DOCTORAL DEGREES.

Any student enrolled at a university, for the entire year of the challenge, is eligible to enter. Entries must be made by a group of 2 to 5 individuals working as a team with at least 50% of students enrolled in an engineering degree. An individual may only participate in a single team.

At Stage 1, the solution requires a 2-page written submission. The finalists (between 9 and 12) proceed to **Stage 2** and are required to submit a 5-minute video in any language with English sub-titles. Only two weeks elapse between Stage 1 and Stage 2. The finalists' videos are shown globally as part of the WED celebrations. A project report is not required.

Cash prizes to enable teams to progress their innovation have been provided, the total prize pool being **€7,000**. Every participants receives a certificate of participation from WFEO.

Hackathon Landing Page

WORLD ENGINEERING DAY WEBSITE 2022 & 2023

QUANSER SUSTAINABILITY AWARD

The Judging Process

THERE IS A COLLABORATIVE JUDGING PROCESS THAT INCLUDES UNESCO, WFEO AND ITS INTERNATIONAL PARTNERS.

For **Stage 1**, the judges are young engineers from WFEO Young Engineers/Future Leaders Committee, Engineers Without Borders and SPEED (Student body of the International Federation of Engineering Education Societies). Each submission is judged by two judges and the average score is used to rank the submissions. The top scoring submissions progress to Stage 2.

Stage 2, Judges are leaders including representatives from the UNESCO Natural Sciences Division Capacity Building Section, WFEO Board, and leaders representing WFEO Partners including Engineers Without Borders, International Federation of Engineering Education Societies, International Federation of Consulting Engineers, International Network for Women Engineers and Scientists.
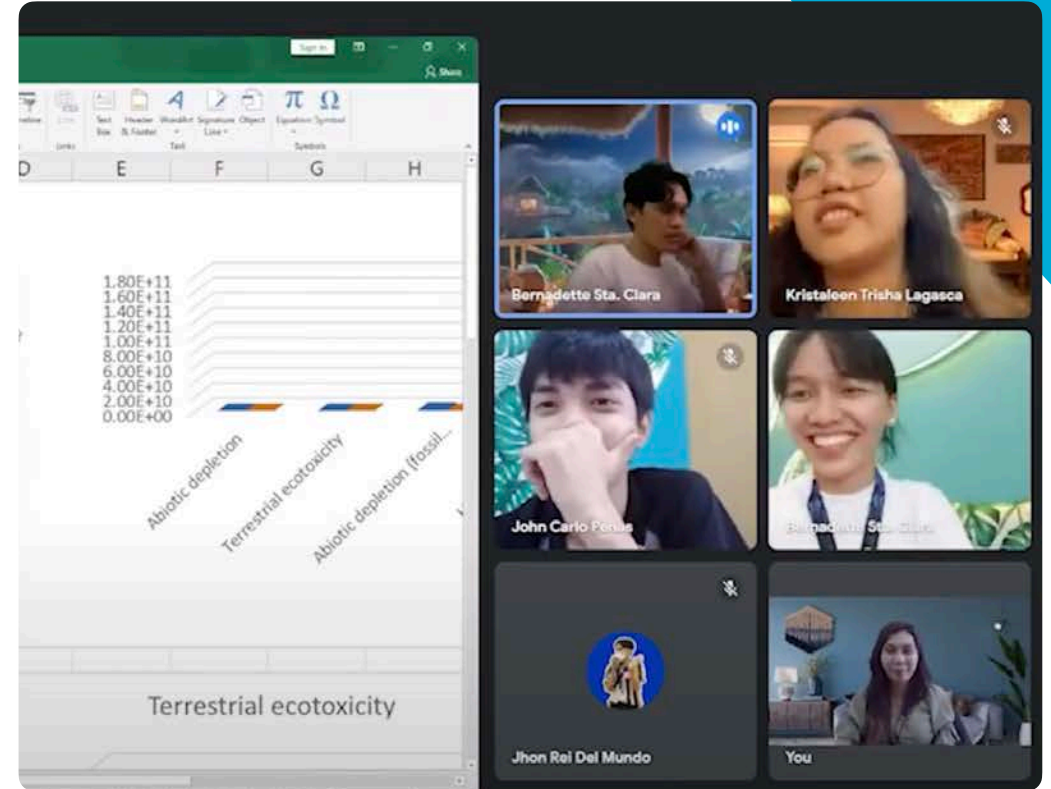
The Award Stage Judging Platform (third party software) is used to capture judging scores and comments to ensure robust and transparent judging and commentary, enabling international reach and scalability. The scores by the judges are moderated at each stage to discuss any scoring outliers and judges feedback, to ensure consensus among the judges on the finalists and the winner.

WED Hackathon 2022

THE CHALLENGES FOR WED 2022 WERE DEVELOPED
AROUND UN SDG 12, SDG 9 AND SDG 6

Challenge 1 related to UN SDG 12 – "Responsible Consumption", for
solutions for the innovative use of materials to reduce of non-
biodegradable waste.

Challenge 2 related to UN SDG 9 – "Industry Innovation and
Infrastructure", requiring a solution that used Biomimicry for an
engineering solution for healthy and improved living.

Challenge 3 involved SDG 6 – "Clean Water and Sanitation", for
solutions for climate-resilient, safe water access.

The solutions also had to be consistent with the theme for WED
2022, **"Engineering a Sustainable Future".**

There were more than **1000 pre-event registrations, with 125
teams from 23 countries.** Stage 2 had nine teams from six
countries: Australia, Canada, China, India, Kenya and the Philippines
40 young engineers from 16 countries volunteered as judges for
Stage 1 and there were five judges, form UNESCO, WFEO, and its
international partners.
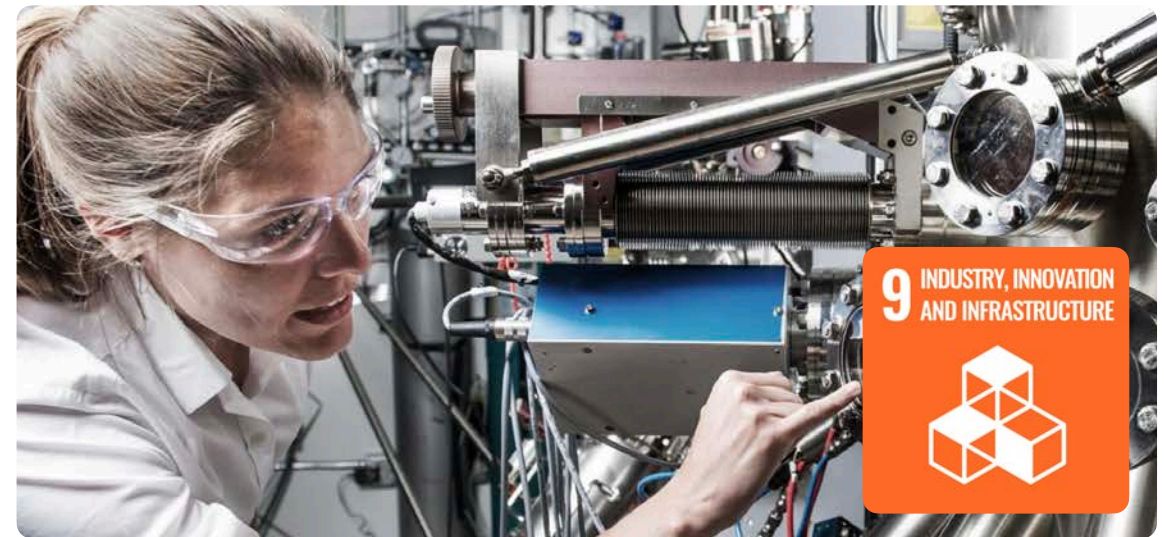
The Winners

WORLD ENGINEERING DAY 2022 HACKATHON

The winner of the WED 2022 Hackathon developed a water treatment process using recycled PET bottles that are chemically transformed into metal organic framework adsorbents, addressing Challenge 1, developed by an all-female team from Batangas State University, Philippines.

In 2nd Place, a mobile rain water harvesting system for use by remote Canadian indigenous communities, addressing Challenge 2, was developed by a team from The University of British Columbia, Okanagan, Canada.

In 3rd Place, the team from Egerton University, Kenya developed a biodegradable alternative to single use plastic product using a problematic water weed, addressing Challenge 1.

WONDERPETS - 1ST PLACE OF THE 2022 WED HACKATHON

The Winners

2022 HACKATHON – 1ST PLACE, 2ND PLACE AND 3RD PLACE

WONDERPETS

Philippines

Batangas State University

WATCH SUBMISSION

MOBILE RAIN WATER HARVESTING

Canada

The University of British Columbia Okanagan

WATCH SUBMISSION

HYAPAK

Kenya

Egerton University

WATCH SUBMISSION

WED Hackathon 2023

THE CHALLENGES FOR WED 2023 WERE DEVELOPED
AROUND UN SDG 2, SDG 6 AND SDG 3

Challenge 1 related to UN SDG 2 "No Hunger", for sustainable food access.

Challenge 2 related to UN SDG 6 "Clean Water and Sanitation", for a solution for clean water access in scarce and polluted situations.

Challenge 3 related to UN SDG 3 – "Good Health and Wellbeing" for improved city design and infrastructure.

The solutions had to be consistent with the WEC 2023 theme, **"Engineering innovation for a more resilient world".**

Social media promotion for WED Hackathon 2023 **reached more than 6.4 million** with more than **1000 pre-event registrations resulting in 150 team entries in Stage 1 from 23 countries.**

27 young engineers judged Stage 1. Five judges from UNESCO, WFEO and its international partners judged the Stage 2.

The Winners

WORLD ENGINEERING DAY 2023 HACKATHON

The winner of the 2023 WED Hackathon was Team Sponge, Ateneo Naga University, The Philippines who addressed Challenge 3 with an innovation to repurpose waste materials to produce a permeable road surface that can absorb rainwater runoff, reduce flooding and improve catchment health.

In 2nd place, Team Aquam Soils, University of British Columbia – Okanagan Canada, addressed Challenge 2 with a low-cost, portable water treatment device for use in areas hit by natural disasters.

In 3rd place, Team Aqua-Smart, University of Mauritius, developed an innovative solution for water treatment for remote and rural areas.

The Winners

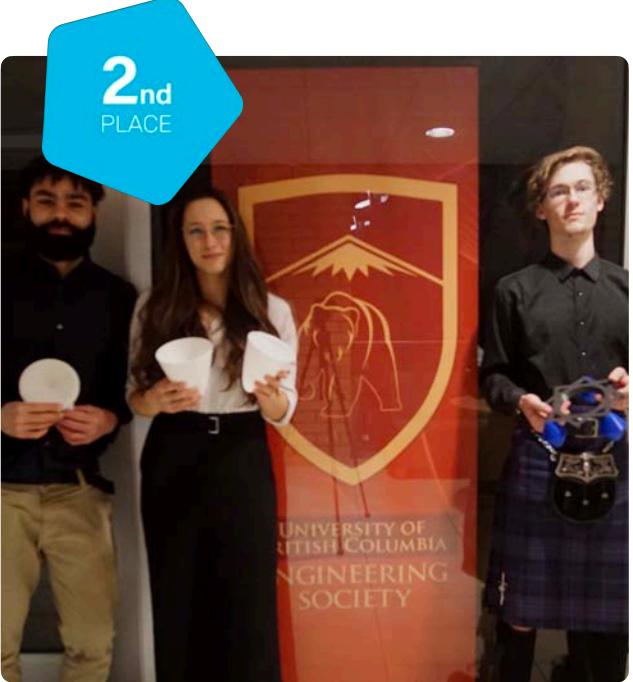2023 HACKATHON – 1ST PLACE, 2ND PLACE AND 3RD PLACE
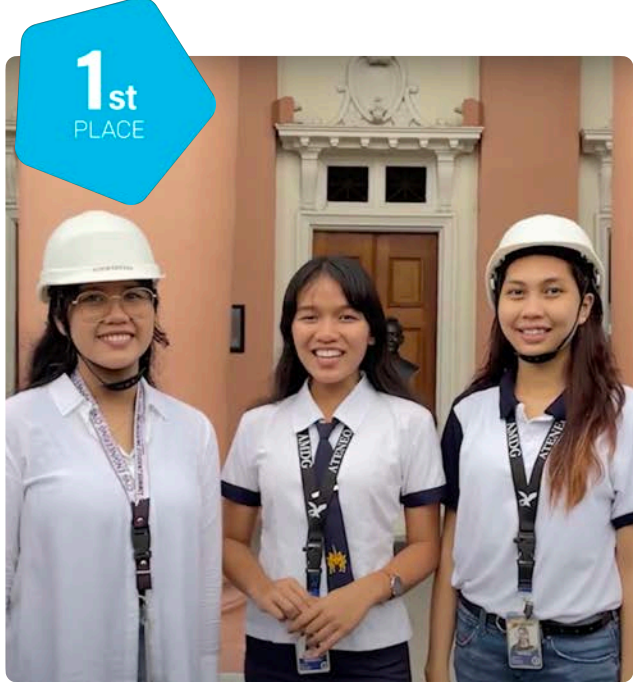
SPONGE
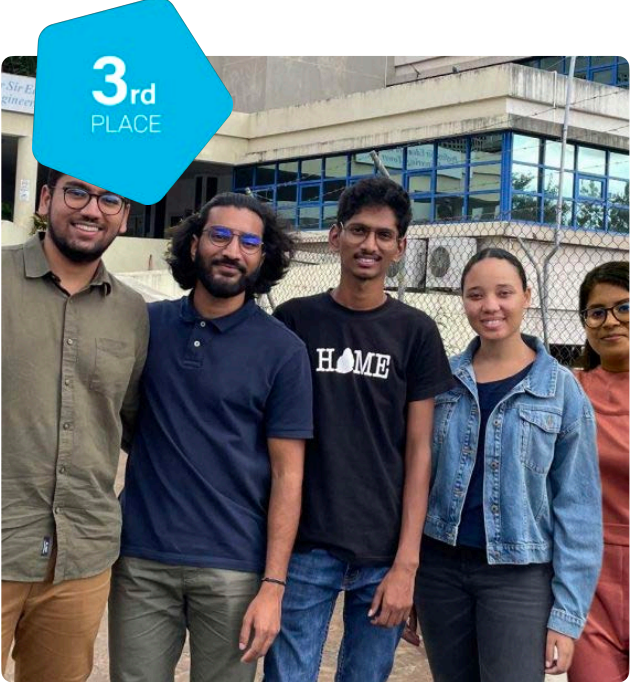
Philippines

Ateneo Naga University

WATCH SUBMISSION

AQUAM SOLIS

Canada

The University of British Columbia Okanagan

WATCH SUBMISSION
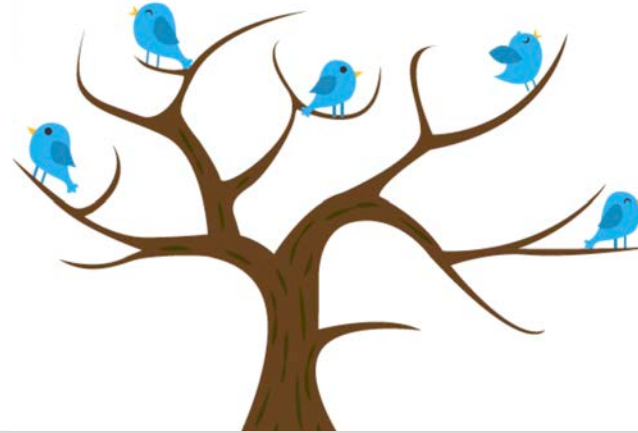

AQUA SMART

Mauritius

University of Mauritius

WATCH SUBMISSION

Social Media Reports

WORLD ENGINEERING DAY 2023 HACKATHON

In 2023, the Hackathon finished with the highest Holistic Potential Reach yet, with more than **58 million** viewers.

Hackathon advertising across social media platforms resulted in **3.6 million ad impressions and 135,000 link clicks.**

HOLISTIC POTENTIAL REACH

2023 - **58,400,000**

2022 - **56,100,000**

2021 - **32,060,000**

2020 - **17,000,000**

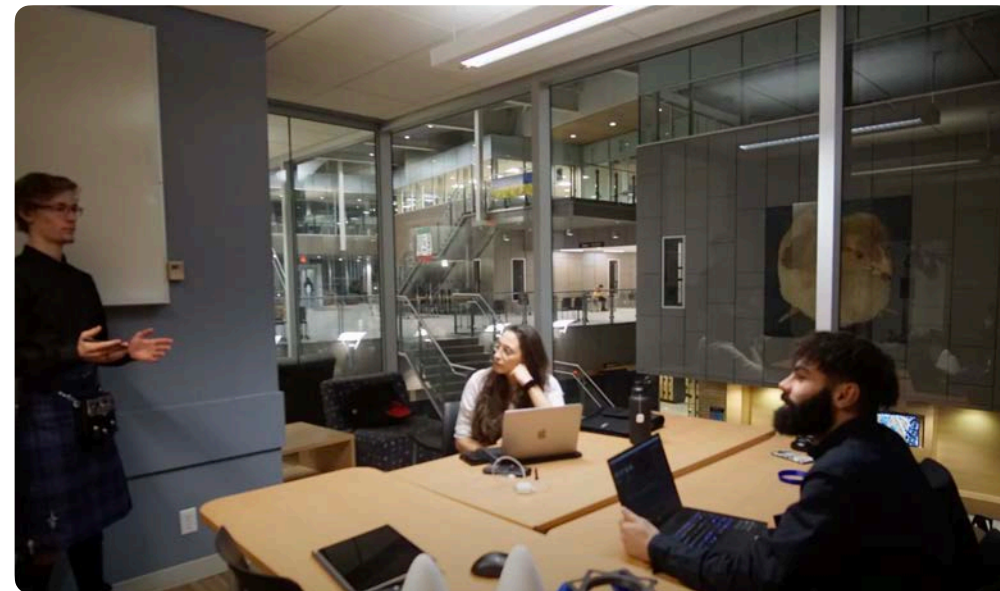| Ad		Attribution setting	Results	Reach	Impressions	Cost per result
Post: "March 4th is #WorldEngineeringDay ...		7-day click or...	9,580 Link Clicks	63,824	87,647	$0.002 Per link click
Register Your Event	7:...	7-day click or...	52,034 Link Clicks	355,136	540,989	$0.01 Per link click
Register Your Event		7-day click or...	6,301 Link Clicks	45,528	53,807	$0.01 Per link click
Post: "March 4th is #WorldEngineeringDay ...		7-day click or...	852 Link Clicks	29,048	31,188	$0.01 Per link click
Post: "It's time to register your global eve... ✏ ⠿ View Charts ✏ Edit 📋 Duplicate 📌 Pin		7-day click or...	573 Link Clicks	28,336	30,022	$0.01 Per link click
Post: "FINALISTS ANNOUNCED! What an e...		7-day click or...	1,152 Link Clicks	114,187	122,991	$0.02 Per link click
Hackathon Registration Ads		7-day click or...	404 Link Clicks	26,593	38,505	$0.01 Per link click
Hackathon Registration Ads	':01	7-day click or...	64,172 Link Clicks	3,046,950	6,413,067	$0.01 Per link click
Results from 8 ads ⓘ		7-day click or ...	135,068 Link Clicks	3,612,735 Accounts Centre acco...	7,318,216 Total	$0.01 Per link click

International Participation

WORLD ENGINEERING DAY 2023 HACKATHON ENTRIES

In 2023, the Hackathon received **112 team registrations** coming from **23 different countries,** with a total of **429 individual participants.**

|				
Cameroon	2		Nepal	1
Canada	5		Nigeria	2
China	1		Peru	1
Colombia	1		Philippines	9
Croatia	1		Portugal	1
Ghana	1		Singapore	17
Hong Kong	3		Taiwan	1
India	45		Uganda	6
Indonesia	1		United Kingdom	1
Kenya	8		U.S.A	1
Mauritus	2		Zimbabwe	1
Mozambique	1			

The Growing Global Impact of the WED Hackathon

The Hackathon competition is a unique tertiary level challenge that provides engineering students with the opportunity to integrate their knowledge and skills, to address a global sustainability problem in an exciting global competition.

The judging criteria are based on the International Engineering Alliance (IEA) Global Graduate Attribute and Professional Competencies Framework, the international benchmark for engineering education that develops technical, and essential skills relating to communication, team work, critical thinking and lifelong learning. The judges are representatives of international engineering organisations, for a truly global challenge. The outcomes showcase the achievements of engineering education programs and the success of educators in developing future engineers.

For participating engineering students, the WED Hackathon is a project that supports their personal development, with learning outcomes that develop employability skills. They are exposed beyond their university campus and gain an international perspective on the context of their engineering skills.
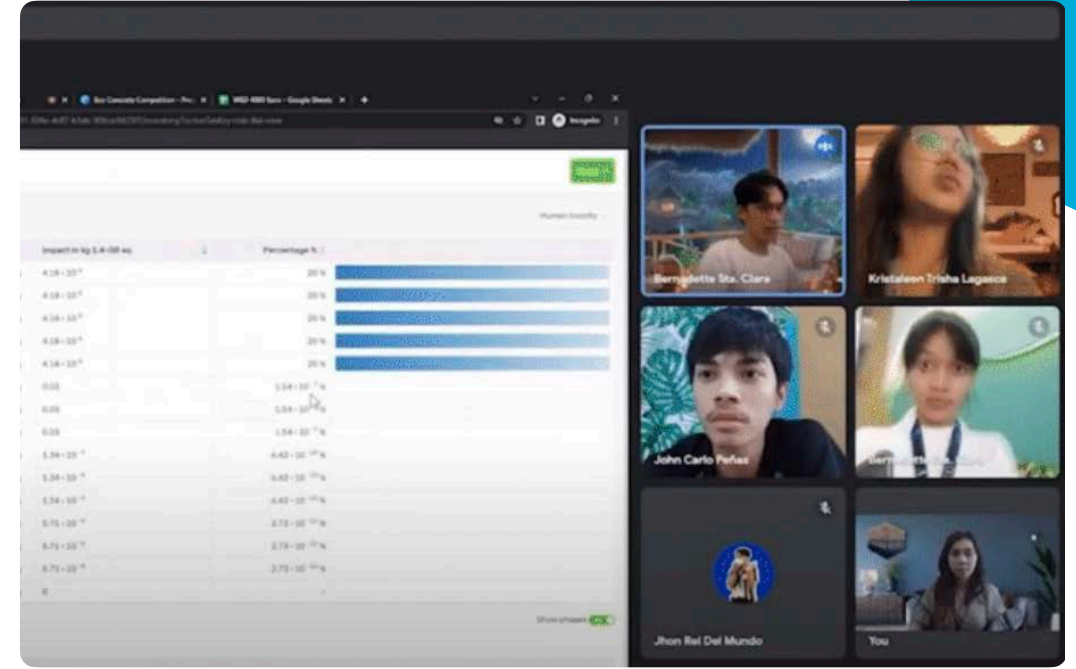
The Hackathon has attracted diverse student teams from developed and developing countries with the **winners from developing countries in 2022 and 2023: The Philippines (2), Kenya, and Mauritius**. It shows that intellectual capacity can be developed anywhere and engineers with limited resources can develop innovative solutions to address the world's most pressing problems.

Women have participated in significant numbers with an **all-female winning team in 2022**. This demonstrates the capacity of women to contribute equally to engineering solutions and provides further empowerment for them.

The Hackathon is scalable and transferrable, delivered at no cost across all countries, every university or engineering school in the world can participate, in an inclusive global competition.

The power of the finalist's videos that are shown around the world informing the community and prospective students about the power of engineering, and how it provides the essential skills that can be applied anywhere in the world without barriers to make a difference for a better world.

Thank You

WORLD ENGINEERING DAY Hackathon

World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs