THE Awards Arab World 2024

Research Project of the Year: STEM

Institution Name	National University of Science and Technology, Oman
Submission title or project name	Bio-hydrogen production from food waste using iron oxide catalyst in dark fermentation
Nominee / key personnel	Dr Shabib Sulaiman Al-Rashdi; Professor Dr Md Sohrab Hossain
URL	
Submission	Fossil fuel depletion is leading to a growing interest in alternative energy sources, particularly hydrogen. The energy content of hydrogen is 2.75 times higher than that of fossil fuels, offering a promising alternative. However, challenges include feedstock prices and suitable conversion technology. Currently, 96% of hydrogen is generated from fossil fuels. However, food waste can be used as a cheap substrate for hydrogen generation, promoting sustainable waste management and clean energy generation. This presents an opportunity to compete with rising energy demand and the depletion of fossil fuels.

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Research Project of the Year: STEM

Institution Name	American University of Sharjah
Submission title or project name	Multidisciplinary Research Empowering Innovative Solutions in Gas Sensing Applications
Nominee / key personnel	Dr Mehdi Ghommem and Dr Rana Sabouni, College of Engineering
URL	https://www.youtube.com/watch?v=OIA50QT3-tc
Submission	This interdisciplinary research project deals with the development of miniature sensors able to detect environmental pollutants and toxic gases: an innovation that could revolutionise multiple industries and improve the quality of life for many. To achieve this goal, we have integrated different technologies in our research. These include sustainable synthesis methods for nanomaterials - the eco-friendly and sustainable techniques used to produce Metal Organic Frameworks (MOFs) without hazardous chemicals or toxic solvents - and MEMS technology, a process technology used to create tiny integrated devices that combine mechanical and electrical components. In this project, we implemented a gas sensor to quickly detect CO2 leaks. We successfully demonstrated the functionality of our sensor in detecting CO2 gas and its potential deployment to monitor the air quality in indoor environments and other industrial applications. This is crucial for addressing environmental issues and ensuring compliance with regulations and safety measures.

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Research Project of the Year: STEM

Institution Name	Euromed University of Fez
Submission title or project name	Advancing Sustainable Manufacturing: M3DTP's Eco-Friendly 3D Printing Programme
Nominee / key personnel	Professor Mostapha Bousmina; Ms Rim Hannache; Mr Mustafa Maaizi; Mr Mostafa Tahiri
URL	
Submission	The Advancing Sustainable Manufacturing project, initiated by M3DTP at Euromed University of Fez (UEMF), aims to use 3D printing technology for eco-friendly manufacturing. Objectives include developing sustainable approaches, reducing waste and promoting eco-friendly materials. Challenges include sourcing such materials and optimising printing parameters. Research efforts have successfully reduced waste and minimised the carbon footprint. Economic benefits include reduced costs and improved product lifecycle management. The project has potential global impacts that could inspire the wider adoption of sustainable practices. It positions M3DTP as a leader in eco-friendly 3D printing, fostering future research and collaborations. The establishment of the Additive Manufacturing and Prototyping Platform enables ongoing innovation. Future goals include expanding partnerships with aerospace, automotive and biomedical industries. By championing sustainability in 3D printing, M3DTP and UEMF demonstrate the societal benefits of environmentally conscious practices.

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Research Project of the Year: STEM

Institution Name	Zewail City of Science and Technology
Submission title or project name	Photonic threshold alarm tool for water pollutants
Nominee / key personnel	Egypt Team (Centre for Photonics and Smart Materials, Zewail City of Science and Technology): Professor Salah Obayya (Egypt team leader); Professor Mohamed Farhat; Dr Bahaa Younes; Dr Ahmed Abdelqader; Dr Yusuf Gamal; Eng. Nada Yazeed UK Team (University of Nottingham): Professor Angela Seddon (UK team leader); Professor Trevor Benson; Professor Mark Farries; Professor David Furnies; Dr Sendy Phang
URL	
Submission	This research project was the fruit of a strong, longstanding collaboration between the UK and Egyptian teams. The teams worked together on a previous Institutional Link project recently funded by the British Council. Benson (UK-PI) and Obayya (Egypt Co-PI) have met frequently at conferences for over 20 years and have regular contact via their journal editorial and conference organisation duties. Obayya is a Special Professor at the UoN and Benson has been a Visiting Professor at Zewail City since 2017. This project aimed at sensing serious water pollutants which is very important in the agricultural sector and for human health in Egypt. The obtained results in this project were reported and presented in two journal publications and two conference proceedings where two different optical sensors for water pollution detection were introduced and analysed based on optical fibres and photonic crystal fibre platforms.

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Research Project of the Year: STEM

Institution Name	Nile University
Submission title or project name	Converting sugarcane waste (bagasse pulp) into sustainable, safe packaging and food packaging products
Nominee / key personnel	Dr Irene Samy Fahim Gabriel, Director of the Smart Engineering Systems Centre, and Associate Professor in the Industrial Engineering Department
URL	https://sesc.nu.edu.eg/ ">https://sesc.nu.edu.eg/
Submission	This is a sustainable approach to exploit the benefits of the sugarcane crop and produce wealth from waste. The project is based on an innovative drying and forming process (IP rights and patents under way) that reduces the carbon footprint in production. This method reduces energy and water use in the manufacturing process by about 50% and reduces several logistical steps including the transportation and treatment of raw materials. Environmentally, sugarcane absorbs more carbon dioxide during its lifecycle than almost any other plant. The research suggests that expanding sugarcane production could reduce global carbon dioxide emissions by up to 5.2%. The project also gives a new investment dimension to the bagasse pulp industry in Egypt, which is currently based on the declining paper market. Egypt produces about 3 million tons of bagasse annually, ranked 9th in the world.

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Research Project of the Year: STEM

Institution Name	University of Technology, Iraq
Submission title or project name	Cooperation project HydroDeSal: Forward Osmosis Desalination by Thermo-Responsive Hydrogels for Small Villages Close to the Persian Gulf
Nominee / key personnel	
URL	https://www.hydrodesal.uni-mainz.de/research/; https://www.hydrodesal.uni-mainz.de/team-project-area-3/
Submission	This project aims to develop membrane-based and membrane-free forward osmosis desalination processes (MbFO and MfFO, respectively) by developing charged, thermo-responsive hydrogels and new membranes. The targeted desalination approach is suitable as a basis for designing desalination set-ups on a lab-scale, with the intention of developing them at prototype-scale capacity. The process has reduced capital, operation and maintenance costs compared with existing desalination plants. With these characteristics, the target method should be suitable for providing fresh water for small villages close to salty water sources like seawater and can therefore be considered as a local solution for water scarcity, which is a global challenge specifically emergent in the Middle East region.

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Research Project of the Year: STEM

Institution Name	Abu Dhabi University
Submission title or project name	Salsal: Safeguarding Cultural Heritage Using Blockchain Technology and NFTs
Nominee / key personnel	Dr Adel Khelifi; Dr Mohammed Ghazal; Dr Hamdi Mustafa Sheibani; Dr Ghassan Aouad; Dr Hamad Ebrahim Ali Odhabi; Mr Stephen D'Cunha; Ms Merlyn Kulapurath
URL	https://edition.cnn.com/2023/07/31/world/ancient-treasures-are-being-looted-but-blockchain-could-help-protect-them/index.html
Submission	Cultural artefacts serve as vital links to our past, preserving our collective memory and enriching our understanding of human history. Our remarkable research project, "Salsal: Safeguarding Cultural Heritage Using Blockchain Technology and NFTs", addresses the threats of looting, illegal trade and disputes over ownership to safeguard cultural heritage. Our objectives were twofold: developing a robust system for verifying artefact authenticity; and establishing a secure method for tracking ownership history using blockchain technology. Salsal, a collaborative effort with institutions across Europe and the Middle East, achieves these goals. Supported by a grant from the ministry of education, Salsal is integrated into a course on AI and Cultural Heritage, currently taught to master's and senior students. Its innovative features combat artefact theft, fostering trust in cultural institutions worldwide. Our work, recognised by CNN and published in Heritage Science, signifies excellence in STEM research with profound implications for global heritage preservation.

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Research Project of the Year: STEM

Institution Name	Al-Ahliyya Amman University
Submission title or project name	The Global Influence of AAU: Shaping Smart Cities International Standardisation (AS 7739.2)
Nominee / key personnel	Dr Amer Hijazi; Professor Anas Ratib ALSoud; Professor Jamal Al-Nabulsi; Dr Nidhal Saada; Dr Sandra Matarneh; Dr Saba Alnusairat
URL	https://www.rissb.com.au/products/as-7739-2-digital-engineering-for-fixed-rail-infrastructure-part-2-technical-requirements/
Submission	Al-Ahliyya Amman University proudly stands as the first MENA region institution to contribute to the AS 7739.2 standard for digital engineering, enhancing smart city projects globally. Through Dr Amer Hijazi's expertise, the university collaborates with prestigious partners across academia, industry and government to develop these transformative standards. AS 7739.2 promotes seamless integration of digital solutions, aligning with critical SDGs to foster sustainable, efficient urban environments. Additionally, the standard has been integrated into the university's master's engineering programmes, preparing students for leadership in digital transformation. This initiative exemplifies our commitment to advancing global digital engineering standards, demonstrating significant international impact. Feedback is currently being collected from companies and partners involved in developing and implementing the standard, with the aim of refining its impact. This strategic approach could significantly boost the standard's adoption both nationally and internationally, promoting a collaborative approach to enhancing business, commercial and sustainability models through strategic digitalisation.