



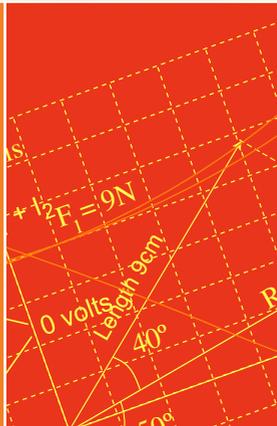
SciFest

Inspiring and Promoting Excellence in STEM Education



PROGRAMME

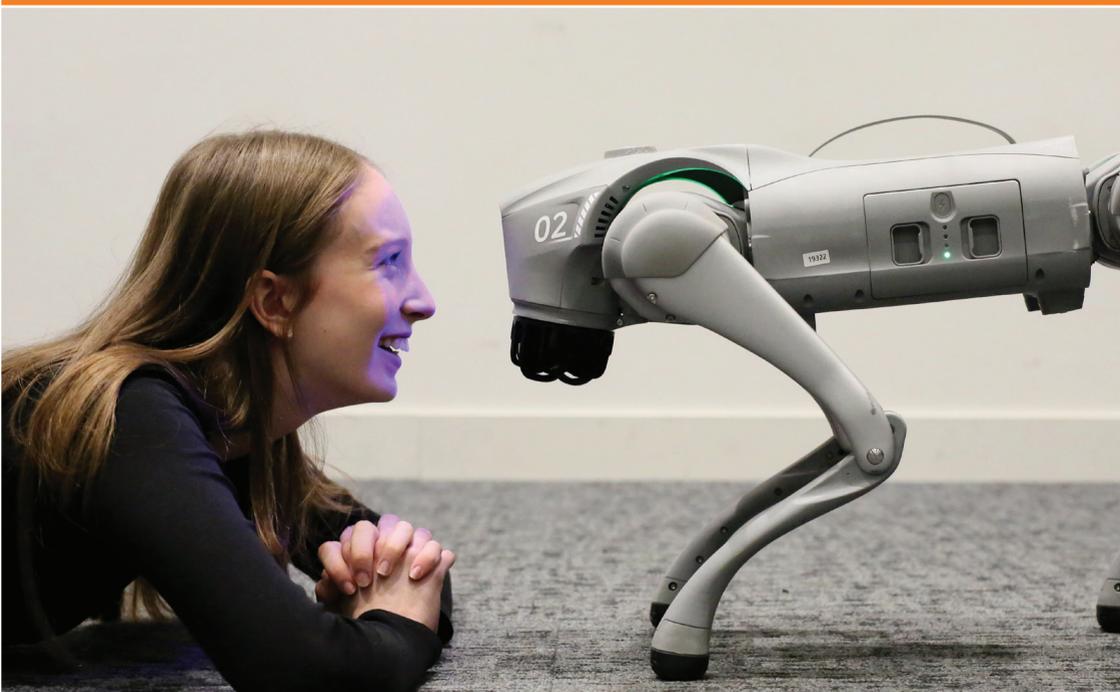
SciFest 2025
National Final





SciFest 2025 National Final

SciFest 2025 was funded primarily by Intel Ireland, Boston Scientific, EirGrid and Mallinckrodt (now Keenova), and by the Department of Education and Youth and Research Ireland. The programme was also supported by a number of other companies and organisations. The SciFest STEM fairs were hosted locally in schools and regionally in the Technological Universities (12 venues), Dundalk Institute of Technology, DCU and St Mary's College, Derry. SciFest symbolises a highly successful collaboration between education, Government and enterprise and between the second and third level education sectors.



Foreword

Sheila Porter

Founder and CEO, SciFest



It is a great pleasure to welcome everyone to the SciFest 2025 National Final. This event marks the culmination of another remarkable year of scientific curiosity and innovation and, as we bring our 19th year to a close, we look forward with great anticipation to celebrating our 20th anniversary in 2026. Since SciFest was established in 2006, more than 130,000 students have taken part, exploring STEM in creative, practical and inspiring ways.

During the 2024/2025 academic year, more than 16,000 students from schools across Ireland participated in 165 SciFest fairs, from local SciFest@School events to regional SciFest@College fairs and a National Final. The students participating in this year's National Final are all award winners from the regional SciFest@College fairs. They represent the very best of our young innovators, students who have demonstrated curiosity, creativity and a deep commitment to using STEM to understand and improve the world around them.

This year, we are also delighted to welcome international students representing Sri Lanka and South Africa to the SciFest National Final. Their online participation marks an exciting new chapter for SciFest, reflecting our growing connections with the global STEM community and our shared commitment to fostering collaboration and innovation among young people worldwide.

I would like to extend my heartfelt thanks to the teachers and parents who have supported and encouraged the students throughout their SciFest journey, to the regional coordinators who give so generously of their time and expertise, and especially to the judges, not only those judging here today at the National Final, but also the many hundreds who judged at SciFest fairs around the country. Their dedication and enthusiasm help make SciFest the vibrant, inclusive and inspiring initiative it is today.

As we look toward to our 20th anniversary, I am filled with pride and optimism. The creativity, passion and perseverance of the young people of Ireland give us every reason to be confident about the future.

Congratulations to all our SciFest 2025 finalists. Wishing them every success at the National Final and in all that they do in the future.

A Message from Helen McEntee TD

Minister for Education and Youth



As Minister for Education and Youth, I am delighted to celebrate the SciFest National Final this year and to extend my warmest congratulations to all involved - the organisers, mentors, teachers, families, and, most importantly, the extraordinary young people taking part. Today's event stands as a powerful showcase of the imagination, curiosity, and determination that define our students and our schools.

The enthusiasm for Science, Technology, Engineering, and Mathematics (STEM) demonstrated through SciFest continues to grow each year. This surge of interest is deeply encouraging. It reflects a generation eager to understand the world, to question how it works, and to find new ways to improve it. Each of the many projects submitted this year is a testament to the creativity and commitment that thrive in classrooms across Ireland.

At the heart of SciFest is a spirit of exploration. Every student who experiments, tests ideas, and challenges assumptions helps to push the boundaries of what is possible. You are part of a global movement of young innovators whose work will help to shape the solutions to the challenges facing our world, from climate change to healthcare to sustainable development.

The importance of STEM has never been greater. These disciplines provide the foundation for innovation and progress, and they equip our students with the skills to think critically, act responsibly, and lead with purpose. The work presented at SciFest goes beyond academic achievement - it represents a contribution to a more informed, resilient, and sustainable society.

To SciFest, I offer sincere congratulations on your continued success in fostering a national passion for STEM. And to the students who stand proudly as finalists today: your curiosity and creativity are the driving forces of discovery.

Let us celebrate your achievements and the bright future they herald for Ireland and for the world.



An Roinn Oideachais
agus Oige
Department of Education
and Youth

A Message from Sarah Sexton

*Director of Public Affairs,
Intel Ireland*



Intel Ireland is proud to continue our support of SciFest. We are a science and technology company with people at the core of what we do. Every day we use science, technology, engineering, and maths (STEM) in pursuit of world-changing technology that improves the life of every person on the planet.

SciFest provides an important platform for student-centred, inquiry-based learning and skill development. The competition empowers students to pursue their interests in the fields of STEM, to pursue their own scientific investigations, to create models and analyse data, and to defend their results while receiving expert feedback in their investigations.

Scifest offers an inclusive environment for students to create innovative projects while developing a wide range of vital skills. In a world characterised by constant change, these skills will benefit students in whatever path they choose in the future.

At Intel, we recognise the value in educating young people to help them flourish and reach their full potential. It is the inquisitive minds of today that will create the innovations of tomorrow. Having seen the excellent work done by students participating in SciFest, we are confident that the future of the STEM industries in Ireland are in very capable hands.

Congratulations to SciFest for another incredibly successful year, and to those participating today, we wish you all the best of luck. Everyone involved, from students to parents and teachers, should be extremely proud of their accomplishments.

A Message from Orla Keady Giblin

Director of Human Resources

& Michael Walsh

*R&D Manager,
Boston Scientific*



On behalf of Boston Scientific, we warmly welcome everyone to the SciFest 2025 National Final. Every year, students showcase projects that are not only exciting and innovative but also consistently impressive. The creativity and resourcefulness displayed by these students is truly inspiring.

As a company specializing in medical devices and deeply committed to research, development, and innovation, Boston Scientific continually seeks outstanding talent in science, technology, and engineering. Supporting STEM subjects, especially at the secondary school level, is a key priority for us. We aim to ignite students' passion for these fields, ensuring a steady flow of science and engineering enthusiasts into higher education. In doing so, we help shape the next generation of scientists and engineers.

SciFest offers students a valuable opportunity to investigate, experiment, and develop their own ideas. The event encourages students to cultivate a love for STEM and make a positive difference in their communities. At Boston Scientific, we are dedicated to advancing healthcare and giving back to the community where our employees live and work.

STEM education is essential for our business, our patients, and our communities. We are thrilled to see such exceptional talent participating in this year's National Final. Events like SciFest inspire young people to pursue studies in STEM-related areas, helping to build a brighter future for all. We see this every day in our work—the diligent STEM students of today become tomorrow's leaders in healthcare innovation.

Boston Scientific congratulates all the students on their outstanding projects. We wish you great success in today's competition and in your future careers.

A Message from Órlaith Diamond

Head of Sustainability
EirGrid



EirGrid is thrilled to once again support SciFest and warmly welcomes you to the SciFest National Final 2025.

This marks our fifth year partnering with SciFest, and it has been inspiring to witness the program's remarkable growth, as students across Ireland dedicate time to research and develop groundbreaking projects.

In a world facing increasingly complex environmental challenges, encouraging students to explore STEM through the lens of sustainability helps foster critical thinking, innovation and a sense of responsibility for the world around them. This aligns so closely with EirGrid's values.

As the operator and developer of Ireland's electricity grid, EirGrid is preparing the grid to support 80% renewable energy, a mission that demands expertise, creativity, and a commitment to lasting positive change.

EirGrid is dedicated to guiding Ireland's electricity grid transition to low-carbon, renewable energy, and we engage actively with communities and stakeholders across Ireland. Our partnership with SciFest is a meaningful part of this engagement.

We are proud to support initiatives like SciFest that connect education, industry and society to help create a skilled, informed and motivated generation of problem solvers and innovators. Congratulations to all the students on their projects, and we wish you all the best of luck today.

A Message from Paul O'Neill

*Executive Vice President and Chief Operations Officer,
Keenova Therapeutics*



Keenova Therapeutics is delighted to welcome you all to the SciFest National Final 2025. As an innovation-driven specialty pharmaceutical company, we are delighted to partner with SciFest to promote STEM subjects across second-level education in Ireland. Science, technology, engineering, and mathematics are essential disciplines in today's world, and we are honoured to be a new partner in this year's competition.

Keenova has a proud history of operations in Ireland for over 30 years. Our Blanchardstown, Dublin facility is home to our corporate headquarters and global functions including manufacturing, global device engineering and innovative research and development. Our focus is on developing, manufacturing, and commercialising branded therapeutics that help patients with rare or unaddressed conditions live happier lives.

Our commitment to improving patient outcomes is grounded in science, innovation and R&D. This makes SciFest an ideal fit for supporting our shared mission to nurture young STEM talent in in schools all over Ireland. In partnership with SciFest, our ambition is to inspire young students to pursue future careers in STEM and to see the opportunity before them, equipped with these disciplines, to enhance human health and improve the lives of patients all over the world.

We commend all students for their participation in SciFest's STEM fairs this year and congratulate those exceptional projects that have qualified for the National Final 2025. We also acknowledge parents, caregivers and teachers for igniting a spark of curiosity, creativity, and critical thinking in these young minds, which will inspire the healthcare scientists, engineers, and innovators of tomorrow.

Table of Contents

Programme [page 13]

SciFest 2025 Judges [page 14]

Awards [page 15]

SCIFEST 2025 NATIONAL FINALISTS

PROJECT ABSTRACTS [pages 17 - 56]

[STAND 1] **ADDRESSING WHEELCHAIR INACCESSIBILITY IN URBAN ENVIRONMENTS THROUGH QUANTITATIVE MODELLING**

SciFest@TUS Thurles [page 18]

[STAND 2] **CRIES TILL IT'S CHRONIC - AN INVESTIGATION INTO THE POTENTIAL GENDER BIAS IN THE DIAGNOSIS AND TREATMENT OF CHRONIC PAIN CONDITIONS IN IRELAND**

SciFest@SETU Carlow [page 19]

[STAND 3] **NEUROGAZE: USING EYE-TRACKING AND AI FOR EARLIER ADHD DIAGNOSIS**

SciFest@SETU Waterford [page 20]

[STAND 4] **SURVIVING THE STORM: ARE IRELAND'S HOUSES READY FOR CLIMATE CHANGE?**

SciFest@MTU Kerry [page 21]

[STAND 5] **MICROPLASTICS IN OUR MEALS: RAISING AWARENESS OF MICROPLASTIC CONTAMINATION THROUGH USE OF PLASTIC KITCHEN UTENSILS**

SciFest@TUS Moylish [page 22]

[STAND 6] **DO WE EXPERIENCE MAGIC THE SAME WAY? FACTORS AFFECTING OUR SUSCEPTIBILITY TO MAGIC TRICKS**

SciFest@TU Dublin Grangegorman [page 23]

[STAND 7] **KELP HELPS**

SciFest@NorthWest [page 24]

[STAND 8] **DUST DYNAMICS: ANALYSING PLANETARY BODIES THROUGH THE BALLISTIC MOTION OF LOFTED DUST PARTICLES**

SciFest@MTU Kerry [page 25]

- [STAND 9] **M.A.N.T.I.S., “MUON ANALYSIS FOR NON-INVASIVE TOMOGRAPHY AND IMAGE SIMULATION”**
SciFest@DCU [page 26]
- [STAND 10] **TALKTIME: ACCELERATING PAEDIATRIC SPEECH-LANGUAGE DEVELOPMENT THROUGH GAMIFIED LEARNING, INTERACTIVE TECHNOLOGIES AND REAL-TIME FEEDBACK**
SciFest@ATU Sligo [page 27]
- [STAND 11] **ADVANCING POST-QUANTUM LATTICE-BASED CRYPTOGRAPHY BY DEVELOPING EFFICIENT SHORTEST VECTOR PROBLEM APPROACHES**
SciFest@TU Dublin Tallaght [page 28]
- [STAND 12] **THE ARCHIVE – USING VR TO ASSIST IN JUNIOR CYCLE STUDY**
SciFest@TUS Moylish [page 29]
- [STAND 13] **MOULD METRO: REDESIGNING IRELAND’S RAIL NETWORK USING SLIME MOULD**
SciFest@TU Dublin Grangegorman [page 30]
- [STAND 14] **TINTEÁN: A TECHNOLOGICAL INTERVENTION IN HOMELESSNESS MITIGATION**
SciFest@MTU Cork [page 31]
- [STAND 15] **CAS - A WEARABLE CAPSIZE ALERT SYSTEM**
SciFest@ATU Donegal [page 32]
- [STAND 16] **WASTE NOT, WANT NOT: AN INVESTIGATION INTO THE USABILITY OF STERILE MEDICAL SUPPLIES POST-EXPIRY**
SciFest@ATU Galway [page 33]
- [STAND 17] **CROSHA (CARDIAC RESUSCITATION, OXYGENATION AND SMART HEALTH ASSISTANT)**
SciFest@ATU Donegal [page 34]
- [STAND 18] **WHICH TYPE OF ROTOR IS BEST FOR WIND GENERATION?**
SciFest@MTU Cork [page 35]
- [STAND 19] **MEDSYN+: IDENTIFYING PATTERNS IN PATIENT DATA TO SUPPORT EVIDENCE-BASED CARE**
SciFest@ATU Galway [page 36]

SCIFEST 2025 NATIONAL FINALISTS

BOSTON SCIENTIFIC MEDICAL DEVICES FINALISTS

PROJECT ABSTRACTS [pages 37 - 45]

[STAND 20] **CAPILL: COMPLIANCE AID PROMOTING INDEPENDENT LIVING
LONG-TERM**

SciFest@TUS Athlone [page 38]

[STAND 21] **EEG & BCI: A CHEAPER HARDWARE CONTROL**

SciFest@Dundalk IT [page 39]

[STAND 22] **DEMENCIA SHIELD - THE FUTURE OF AR AND AI IN MEDICINE**

SciFest@MTU Cork [page 40]

[STAND 23] **WRIST WELLNESS: PRESSURE ALERT SYSTEM**

SciFest@SETU Waterford [page 41]

[STAND 24] **FEEL THE WAY**

SciFest@DCU [page 42]

[STAND 25] **NEUROSYNC: AI POWERED SUPPORT FOR COGNITIVE AND
NEUROLOGICAL CARE**

SciFest@ATU Galway [page 43]

[STAND 26] **CHILL 'N' HEAL BANDAGE**

SciFest@TUS Moylish [page 44]

[STAND 27] **SMART WOUND DRESSING AND CONTROLLED DRUG RELEASE**

SciFest@ATU Donegal [page 45]

SCIFEST 2025 NATIONAL FINALISTS

EIRGRID CLEANER CLIMATE FINALISTS

PROJECT ABSTRACTS [pages 47 - 56]

- [STAND 28] **MICROBIAL FUEL CELLS (MFCS)**
SciFest@NorthWest [page 48]
- [STAND 29] **SEA SAVERS: ENGINEERING SUSTAINABLE ARTIFICIAL CORAL REEFS**
SciFest@MTU Kerry [page 49]
- [STAND 30] **ENERGY CRISIS - LET ME KELP YOU!**
SciFest@ATU Sligo [page 50]
- [STAND 31] **BIOVOLT: THE MOSS POWER REVOLUTION - HARNESSING NATURE'S
SOFT POWER FOR A SUSTAINABLE FUTURE**
SciFest@ATU Galway [page 51]
- [STAND 32] **ENGINEERING A NEW VERTICAL AXIS WIND TURBINE DESIGN FOR USE
IN URBAN AREAS TO PROMOTE SUSTAINABLE ENERGY PRODUCTION**
SciFest@TUS Thurles [page 52]
- [STAND 33] **DESIGN OF AN INTELLIGENT, RENEWABLE ENERGY-HARVESTING
SYSTEM TO POWER THE VEHICLES OF THE FUTURE**
SciFest@TU Dublin Grangegorman [page 53]
- [STAND 34] **UV INDEX CALCULATION: INTEGRATING CLOUD CLASSIFICATION AND
MACHINE LEARNING FOR PRECISION IN UV FORECASTING**
SciFest@DCU [page 54]
- [STAND 35] **INVESTIGATING WAYS OF REMOVING MEDICATION FROM WATER
SYSTEMS**
SciFest@NorthWest [page 55]
- [STAND 36] **ARE VERTICAL AXIS WIND TURBINES A VIABLE SOLUTION FOR
IRELAND'S WIND ENERGY NEEDS?**
SciFest@MTU Kerry [page 56]

INTERNATIONAL FINALISTS

PROJECT ABSTRACTS [pages 57 - 62]

[STAND 37] **ENGLISH ASSESSING SYSTEM (EAS)**

Sri Lanka Science and Engineering Fair [page 58]

[STAND 38] **MATTRESS VENTILATION SYSTEM**

Sri Lanka Science and Engineering Fair [page 59]

[STAND 39] **PASTURE-BASED SHEEP FARMING SYSTEM: BIOACCUMULATION OF HEAVY METALS AND THE IMPLICATIONS FOR LIVESTOCK, LAMBING RATES, GROWTH MARGINS AND HUMAN HEALTH**

South Africa Eskom Expo for Young Scientists [page 60]

[STAND 40] **GARLIC: NATURE'S SECRET TO FOOD PRESERVATION**

South Africa Eskom Expo for Young Scientists [page 61]

[STAND 41] **COMPARATIVE EVALUATION OF *MORINGA OLEIFERA* SEED FORMS FOR LOW-COST WATER TREATMENT**

South Africa Eskom Expo for Young Scientists [page 62]

Previous Winners 2011 - 2024 [page 63]

The SciFest Team [page 69]

Partners, National Sponsors and Supporters [page 71]

SciFest 2025 National Final

A CELEBRATION OF EXCELLENCE IN STEM

PROGRAMME

THURSDAY 20 NOVEMBER 2025

ONLINE: www.scifestnationalfinal.ie

- | | |
|-----------|---|
| 7.00 p.m. | <i>Welcome to the SciFest 2025 National Final</i>
Philip Smyth, Broadcaster and Science Communicator |
| 7.05 p.m. | <i>From Research to Society: Skills that Shape a Scientist's Journey</i>
Dr. Pinar Arpaçay, Project & Education Programme Manager
Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany |
| 7.30 p.m. | <i>Will We Cure All Diseases by Targeting Inflammation?</i>
Prof. Luke O'Neill, School of Biochemistry and Immunology (TCD),
Author, Entrepreneur and Science Ambassador |
| 7.55 p.m. | <i>From Curiosity to Creativity: How Kids Learn to Code</i>
Joan McCann, Founder & STEM Educator at The Code Lab |

FRIDAY 21 NOVEMBER 2025

VENUE: Marino Conference Centre, Griffith Avenue, Dublin 9

- | | |
|------------|--|
| 8.00 a.m. | Arrival and set up of projects |
| 9.40 a.m. | Opening of Exhibition |
| 9.45 a.m. | Judging (09.45 - 11.00 – Judges only) |
| 11.00 a.m. | Judging and viewing of projects
(exhibition hall open to invited guests, parents and teachers) |
| 1.00 p.m. | Lunch |
| 2.00 p.m. | Awards Ceremony <ul style="list-style-type: none">~ Introduction: Philip Smyth, Broadcaster and Science Communicator~ Tracey Nolan, Alumni Events Manager at UCD Foundation and Member of the SciFest Board~ Maura Moore-McCune, SciFest STEM Champion 2024 |
| 2.30 p.m. | Presentation of Awards <ul style="list-style-type: none">~ Achievement in STEM Awards~ Main Awards |
| 3.30 p.m. | ~ SciFest STEM Champion 2025 Award
~ Teacher of Excellence Award |
| 3.45 p.m. | Photographs |

SciFest 2025 Judges

National Finalists Judging Panel

Mr Gerard Hughes	<i>Chair</i>
Mr Colin Mac Hale	<i>Customer Manager for Lenovo in Ireland</i>
Ms Catherine McGinn	<i>Department of Agriculture, Food and the Marine (DAFM)</i>
Mr Paul Hennessey	<i>Commercial Consultant, University of Galway</i>
Prof Paul McCabe	<i>School of Biology and Environmental Science, UCD</i>
Mr Paul Nolan	<i>Group Development Manager, Dawn Meats Group</i>
Dr Joanna Kacprzyk	<i>School of Biology and Environmental Science, UCD</i>
Dr Ailbhe Brazel	<i>School of Natural Sciences, TCD</i>
Ms Noelle Campbell	<i>Senior Management Consultant, Dublin</i>
Mr Colm O'Hehir	<i>Education, Training & Public Engagement Manager (SSPC)</i>
Ms Michelle O'Flaherty	<i>Director QP Quality Operations, Vertex Pharmaceuticals</i>
Ms Michelle Bolger	<i>Education Officer, NCCA</i>
Dr Joe Mac Donagh	<i>Lecturer, TU Dublin and Research Ethics board at St James's Hospital and Tallaght Hospital</i>
Dr Brian Smith	<i>National Treasurer of ISTA</i>
Mr Timothy McGrath	<i>SciFest STEM Champion 2019, Software QA Engineer at Motorola Solutions</i>
Mr Eoin Collins	<i>Process Engineer, Intel Ireland</i>
Mr Pdraic Heneghan	<i>PhD Candidate of Systems Biology and Bioinformatics</i>
Ms Laura Callinan	<i>Process Sciences Director, Regeneron</i>
Ms Grainne Power	<i>Senior Director Programme Operations Leader (haem-onc)</i>
Ms Emma Griffin	<i>Professional Learning Leader, Oide</i>
Mr James Stephens	<i>Professional Learning Leader, Oide</i>
Mr Jonathan Boylan	<i>Chief Technology Officer at FINEOS</i>
Dr David Lillis	<i>Associate Professor, School of Computer Science, UCD</i>
Ms Gillian Place	<i>ISE Public Engagement Officer, UL (Immersive Software Engineer)</i>
Mr Jim Cooke	<i>Teacher of Mathematics</i>
Prof Kevin McGuigan	<i>Director of the RCSI Solar Disinfection Research Group</i>
Mr Declan Cahalane	<i>Assistant Chief Inspector, Dept of Education and Youth</i>
Ms Dymrna McCoy	<i>Post-primary Inspector, Dept of Education and Youth</i>
Mr Shane Flanagan	<i>Post-primary Inspector, Dept of Education and Youth</i>
Prof Martin Henry	<i>DCU</i>
Dr Martina Moyle	<i>Senior Design Verification and Validation Manager, Keenova</i>

Boston Scientific Medical Devices Finalists Judging Panel

Ms Catherine Tattersall	<i>SciFest</i>
Mr Kevin Byrne	<i>Senior Project Manager, Boston Scientific, Cork</i>
Mr Eoin Hayes	<i>Medical Device Engineer, Boston Scientific, Clonmel</i>
Mr Mike Walsh	<i>R&D Manager, Boston Scientific, Galway</i>

EirGrid Cleaner Climate Finalists Judging Panel

Ms Kate Duffy	<i>Alumna, PhD Student, Cancer Biology, UCD</i>
Ms Abbey Corr	<i>Future Network and Strategic Offshore Planning Engineer, EirGrid</i>
Ms Suzanne Jackson	<i>Sustainability Analyst, EirGrid</i>
Ms Noreen Clifford	<i>Graduate Engineer, EirGrid</i>
Ms Órlaith Diamond	<i>Head of Sustainability, EirGrid</i>

Awards

SCIFEST STEM CHAMPION 2025

Trophy, €500 and an all-expenses-paid trip for the winning student/s to represent Ireland at the Regeneron International Science and Engineering Fair (ISEF) in Phoenix, Arizona from 9-15 May 2026.

SciFest Partner Awards

BOSTON SCIENTIFIC MEDICAL DEVICES GRAND AWARD

Trophy and €500.

This award is available only to winners of the regional Boston Scientific Medical Devices Award. From these winning projects a panel of judges selects the projects to compete for the Grand Award at the National Final. *Sponsored by Boston Scientific.*

EIRGRID CLEANER CLIMATE GRAND AWARD

Trophy and €500.

This award is available only to winners of the regional EirGrid Cleaner Climate Award. From these winning projects a panel of judges selects the projects to compete for the Grand Award at the National Final. *Sponsored by EirGrid.*

INTEL TECHNOLOGY AWARD

Trophy and €500. *Sponsored by Intel Ireland.*

KEENOVA STEM EXCELLENCE AWARD

Trophy and €500. *Sponsored by Keenova Therapeutics.*

Travel Awards

REGENERON ISEF AWARDS (2 AWARDS)

Trophy and an all-expenses-paid trip for the winning students to represent Ireland at the Regeneron International Science and Engineering Fair (ISEF) in Phoenix, Arizona from 9-15 May 2026. *Sponsored by Regeneron.*

BERLIN LONG NIGHT OF SCIENCE AWARD

Trophy and an all-expenses-paid trip for the winning student/s and their teacher to attend the Long Night of Science in Berlin on 6 June 2026. *Supported by the Department of Foreign Affairs and Trade.*

Additional Awards

SCIFEST STEM OUTREACH VIDEO AWARD

Trophy and €300.

National finalists are invited to submit a short video of their project. These videos are posted to the web to be voted on by members of the public. The project receiving the highest number of votes receives the award. Entry for this award is optional.

SCIFEST SOCIAL SCIENCES AWARD

Trophy and €150.

SCIFEST LIFE SCIENCES AWARD

Trophy and €150.

THEA AWARD

Trophy and €75. *Sponsored by the Technological Higher Education Association.*

ISTA AWARD

Trophy and €75. *Sponsored by the Irish Science Teachers' Association.*

SCIFEST JUNIOR SCIENTIST OF THE FUTURE AWARD

Trophy and €75.

SCIFEST JUNIOR TECHNOLOGIST OF THE FUTURE AWARD

Trophy and €75.

International Student Awards

SCIFEST ISF 2025 INTERNATIONAL AWARD

Dublin Crystal Trophy.

SCIFEST 2025 ISF RUNNER-UP INTERNATIONAL AWARD

Dublin Crystal Trophy.

All participating international students will receive a SciFest ISF 2025 International Certificate.

Note: These awards are only available to students representing international STEM fairs.

Achievement in STEM Awards

Engraved plaques. Each student receives an engraved plaque to mark their success at the regional fairs.

TEACHER OF EXCELLENCE AWARD

This award is presented to the teacher of the student/s who win/s the SciFest STEM Champion 2025 title. The winning teacher, as the mentor of the winning student/s, receives an engraved trophy and will accompany the SciFest STEM Champion/s 2025 to the Regeneron International Science and Engineering Fair (ISEF) in Phoenix, Arizona from 9-15 May 2026.

SCIFEST 2025 NATIONAL FINALISTS

PROJECT ABSTRACTS

...where creativity meets innovation...

intel

Boston
Scien
Advancing

EirGrid

Mallinckrodt
Pharmaceuticals



SciFest@TUS Thurles 2025

[STAND 1] Title of Project	ADDRESSING WHEELCHAIR INACCESSIBILITY IN URBAN ENVIRONMENTS THROUGH QUANTITATIVE MODELLING
Student	Luke Blackwell
School	C.B.S. Thurles, Thurles, Co. Tipperary
Teacher Mentoring Project	Danielle Slattery

Abstract

Accessibility for wheelchair-users is a major problem in Ireland, limiting independence and inclusion. This project assessed the wheelchair accessibility of various urban environments to examine how physical inaccessibility - including Whole-Body Vibration exposure from uneven surfaces - affects the wellbeing of wheelchair users.

A survey measured the social, emotional, financial and physical impacts of inaccessibility on wheelchair users' lives. Also, real-world vibration data was collected using a wheelchair-mounted accelerometer. From this, a supervised Python Random Forest classifier was created to extract statistical features and conduct a Fast Fourier Transform to distinguish and identify various obstacles such as cobblestones and dished kerbs. Finally, spatial autocorrelation analysis quantified how inaccessible areas cluster geographically, while calculus-based diffusion models examined how inaccessibility spreads through urban systems.

Results showed a strong positive correlation ($r = 0.98$) between distances travelled by wheelchair users and inaccessibility. The supervised Python Random Forest classifier achieved an accuracy of 82% in identifying specific obstacles encountered from vibration data. Survey analysis revealed that inaccessibility has substantial negative impacts on wheelchair users' quality of life, particularly in social participation, finances and emotional wellbeing.

In conclusion, inaccessibility remains a significant problem, extending beyond mobility limitations to impact wheelchair users' quality of life. The vibration-based classifier and machine learning methods proved to be effective in assessing and analysing accessibility, providing objective, data-driven insights into the challenges wheelchair-users face. Investigations also revealed how urban design patterns and infrastructure impede accessibility. Overall, combining quantitative modelling with real-world data offers a powerful approach to identifying, understanding, and ultimately addressing the systemic nature of urban inaccessibility.

SciFest@SETU Carlow 2025

[STAND 2] Title of Project	CRIS TILL IT'S CHRONIC - AN INVESTIGATION INTO THE POTENTIAL GENDER BIAS IN THE DIAGNOSIS AND TREATMENT OF CHRONIC PAIN CONDITIONS IN IRELAND
Students	Colleen Waters, Katie Franklin
School	Ramsgrange Community School, New Ross, Co. Wexford
Teacher Mentoring Project	Alanna Roche

Abstract

Our project investigates potential gender bias in the diagnosis and treatment of chronic pain conditions in Ireland, inspired by the concerning headlines regarding the quality of care for Irish chronic pain patients. We researched this issue and found that despite a large amount of data globally, there is a lack of data on this issue applicable to Ireland.

We surveyed chronic pain patients in Ireland on their experiences with the Irish healthcare system. We reached a total of 139 women, 15 men and 3 nonbinary patients. We found out from these results that 66.66% of men had been taken seriously by their practitioner, compared to 35.25% of women. Women faced longer wait times for diagnosis at 20 months, compared to an average wait time of 11 months for men (almost double the delay). Both men and women experienced the highest rates of dissatisfaction with their treatment in GP offices, with over half of the women (54%) and 80% of men reporting dissatisfaction with their treatment here.

Our results show that gender bias does exist in the diagnosis and treatment of chronic pain conditions in Ireland. There is a notable difference in the quality of care provided to male and female patients, based on whether they were taken seriously and their wait for diagnosis. Links can be drawn between certain healthcare settings and the number of patients who had a negative or positive experience. These results highlight the need for greater awareness and further research to address inequities in the care of chronic pain patients in Ireland.

SciFest@SETU Waterford 2025

[STAND 3] Title of Project	NEUROGAZE: USING EYE-TRACKING AND AI FOR EARLIER ADHD DIAGNOSIS
Student	Erin Mills
School	St Mary's College Arklow, Arklow, Co. Wicklow
Teacher Mentoring Project	Joanne English

Abstract

The purpose of 'NeuroGaze' is to explore how eye-tracking technology and artificial intelligence can be used to help identify signs of Attention Deficit Hyperactivity Disorder (ADHD) earlier and more accurately. Currently diagnostic methods often rely on interviews, questionnaires and observations, which can take time and have no defined answer. NeuroGaze aims to offer a faster, more objective tool that supports clinicians in making decisions.

This involves creating a web-based system where participants will do simple tasks, such as reading a paragraph, finding objects in a visual search, or reacting to changes on the screen. While performing these tasks, the system records eye data about their eye movements, how long they focus on certain points (fixations), how often their eyes move between points (saccades), and how consistently their eyes follow moving objects (smooth pursuit). Reaction times and attention shifts are also measured.

The data is stored in formats and analysed with machine learning algorithms to identify patterns that may be linked with ADHD. As an example, people with ADHD often show shorter fixation durations, higher saccade frequency and more irregular scanning behaviours. These differences can be used to distinguish between ADHD-like patterns and those seen in non-ADHD individuals.

In conclusion, NeuroGaze demonstrates how combining technology and AI can provide valuable, more objective insights into attention and focus. While not a replacement for professional diagnosis, it has the potential to support clinicians, reduce diagnosing times and open a pathway for more accessible ADHD diagnosing into the future.

SciFest@MTU Kerry 2025

[STAND 4] Title of Project	SURVIVING THE STORM: ARE IRELAND'S HOUSES READY FOR CLIMATE CHANGE?
Student	Clodagh de Búrca
School	Gaelcholáiste Chiarraí, Cluain Mhór, Trá Lí, Co. Chiarraí
Teacher Mentoring Project	Triona Uí Mhaolchatha

Abstract

This project assessed the preparedness of Irish homes for increasingly severe and unpredictable weather. Ireland's architectural history reflects climate adaptation—from Bronze Age crannógs built to withstand flooding, to post-1839 homes constructed in hollows, and traditional designs featuring small windows and multiple fireplaces for heat retention.

Secondary data was sourced from the CSO, Climate Ireland, Radio Kerry and Met Éireann, alongside expert input from Mark Bourke, architect and lecturer at MTU Kerry. This data helped analyse recent climate trends in wind, rainfall and temperature.

Two surveys were conducted to evaluate household impacts from Storm Eowyn. The first, distributed in February, captured immediate responses. A second, broader survey in June reached over five times more participants. Both gathered data on power outages, property damage and household resilience.

Analysis focused on the second survey due to its larger sample size. Using Excel and SPSS, results showed that over 50% of respondents lost electricity for at least one day, with many experiencing outages of three days or more. Regional differences were noted, with Tralee among the least affected areas in Kerry.

The findings highlight a pressing need for proactive climate resilience strategies in housing and infrastructure. As extreme weather events become more frequent, integrating historical awareness with modern planning is essential to protect Irish communities.

SciFest@TUS Moylish 2025

[STAND 5] Title of Project	MICROPLASTICS IN OUR MEALS: RAISING AWARENESS OF MICROPLASTIC CONTAMINATION THROUGH USE OF PLASTIC KITCHEN UTENSILS
Student	Grace Foley
School	Presentation Secondary School, Listowel, Co. Kerry
Teacher Mentoring Project	Jessica Keane

Abstract

Degradation of plastic waste leads to the release of microplastics which are small particles or fibres 1 micrometre to 5 millimetres in size. Microplastics are a growing cause for concern due to their presence in the environment, our food, body tissues and organs. Laboratory research suggests that they may have a negative impact on human health.

This project investigated if the use of plastic kitchen utensils such as chopping boards, jugs and bowls could generate microplastics. Water from chopping, stirring and blending activities was filtered and the filter paper viewed using a microscope. Plastic chopping boards produced an average of 250 – 4506 microplastics from a single chopping event. No microplastics were detected from the use of wood, steel, glass or titanium chopping boards. Use of plastic jugs produced no more than 34 microplastics while bowls produced no more than 15 microplastics. Glass bowls or jugs produced no microplastics.

Titanium chopping boards, glass jugs and bowls were identified as the most effective option for reducing microplastic production in the home. However, this approach is not suitable for commercial kitchens, where coloured chopping boards are required to ensure proper food segregation. Anodisation of titanium chopping boards to produce a range of coloured chopping boards suitable for commercial kitchens may be a solution to this problem.

SciFest@TU Dublin Grangegorman 2025

[STAND 6] Title of Project	DO WE EXPERIENCE MAGIC THE SAME WAY? FACTORS AFFECTING OUR SUSCEPTIBILITY TO MAGIC TRICKS
Student	Ella Nicholson
School	Loreto Secondary School, Balbriggan, Co. Dublin
Teacher Mentoring Project	Brian Higgins

Abstract

The purpose of this project was to investigate whether people experience magic in the same way and how factors such as age, gender, mindfulness, personality and sport participation affect attention and susceptibility to magic tricks. Experiments were conducted with members of the school community, including students aged 8–17 and teachers. Participants viewed three magic videos designed to test visual attention, cognitive processing under pressure and awareness of background changes. I tested mindfulness, sport, and the Big Five personality traits, age and gender.

Data were collected from multiple groups, and analysis using chi-square tests and Mann–Whitney U tests examined associations between these variables and participants’ responses to the tricks. The results showed statistically significant associations between age and noticing changes in the Three-cup Monte video, and between age and naming Denmark in the maths trick. Higher conscientiousness was linked to giving the prototypical answers “elephant” and “grey.” Sport participation was also significantly associated with giving fewer prototypical answers, suggesting that post exercise effects may influence cognitive processing. Gender and mindfulness did not show significant associations, though limited sample sizes may have affected these outcomes.

Overall, the project demonstrated that certain traits and experiences, particularly age, personality and sport, can influence how people perceive and respond to magic tricks, offering insights into attention and cognition in everyday life.

SciFest@NorthWest 2025

[STAND 7] Title of Project	KELP HELPS
Student	Isobel Meenan
School	St Cecilia's College, Derry
Teacher Mentoring Project	Dr Kerry Conaghan

Abstract

My project is based on whether “seaweed can be used as an antibacterial product” and how this could benefit our world and community. My first thought when starting this project was, “What is the goal I want to reach?” That goal was to create a safe and eco-friendly alternative substance that would be as effective as the antiseptic brand Dettol at sterilising surfaces. I aimed to make a strong antibacterial product that could be locally sourced and free to make using something that is accessible to people all around the world.

My hypothesis is that seaweed holds antibacterial properties that can kill or inhibit the growth of bacteria, which could make this project challenging. My aim was to investigate the antibacterial properties of seaweed, starting with three different species: bladderwrack, sugar kelp and gutweed, three common seaweeds found in many coastal areas. I collected my samples in Greencastle. Throughout my research, I carried out practical work such as incubating extracts from the three seaweed types alongside 2.5% and 10% Dettol solutions for comparison. The incubation lasted 72 hours and was conducted against *Staphylococcus aureus*. After 72 hours, both gutweed and bladderwrack showed very small clear zones, while both Dettol mixtures were effective, with the 2.5% solution averaging around 3.33 mm. The sugar kelp, however, produced results over three times greater, averaging around 10.66 mm. These findings suggest that sugar kelp could safely be used as an antibacterial cleaning agent. Furthermore, using seaweed in combination with spinneret technology could allow the production of fibres for medical applications such as wound healing and bandages.

SciFest@MTU Kerry 2025

[STAND 8] Title of Project	DUST DYNAMICS: ANALYSING PLANETARY BODIES THROUGH THE BALLISTIC MOTION OF LOFTED DUST PARTICLES
Students	Eoin Cashman, Alex Thompson
School	Scoil Phobail Sliabh Luachra, An Ráth Mhór, Co. Chiarraí
Teacher Mentoring Project	Kevin P McCarthy

Abstract

This project investigates how the motion of dust particles can be used to determine key physical properties of planetary and lunar environments using only video footage. Our aim was to develop a low-cost, camera-based method to measure environmental characteristics such as acceleration due to gravity (g) and atmospheric density (ρ).

Video analysis software (Tracker) was used to examine Apollo 16 footage of the Lunar Roving Vehicle during the "Lunar Grand Prix." The apex of the lofted dust cloud produced on the lunar surface was tracked frame by frame and fitted to ballistic equations to calculate the lunar acceleration due to gravity. We applied the same method to Earth based footage of a Can-Am vehicle on the Utah Salt Flats, and by observing key differences in particle motion due to drag we derived a mathematical model to approximate atmospheric density.

The lunar analysis produced a value of $g = 1.72 \text{ m s}^{-2}$, within 5.85% of the accepted figure. The Earth model yielded an atmospheric density of $\rho = 1.31 \text{ kg m}^{-3}$, within 6.7% of the reported value.

These results confirm by direct analysis that ballistic dust motion in a vacuum follows ideal parabolic trajectories and that deviations caused by drag can be used to infer atmospheric properties. The findings demonstrate a novel, accurate and lightweight technique for remotely determining gravitational and atmospheric conditions on other worlds using only optical data.

SciFest@DCU 2025

[STAND 9] Title of Project	M.A.N.T.I.S., “MUON ANALYSIS FOR NON-INVASIVE TOMOGRAPHY AND IMAGE SIMULATION”
Student	Zack O’Leary
School	Clongowes Wood College, Clane, Co. Kildare
Teacher Mentoring Project	Yvonne Nolan

Abstract

This project pursued two objectives: developing a fully remote, desktop-based subsurface imaging method using natural atmospheric muons—eliminating on-site hardware and minimising costs—and creating an automated simulation workflow to optimise detector type, placement, energy range and environmental conditions for underground settings. Together, these aims demonstrate that muon tomography can be entirely virtual, establishing the foundation for a precise new imaging technique.

The project set a control site at the SURF mine in South Dakota. Geo-environmental mapping, 3D modelling, and a Geant 4 pilot simulation were developed. Muon data and geo-environmental variables were added to the system. Multiple validations, based on visualisation of the data, were performed on the SURF mine. The project was further enhanced to a full-stack system design, including the required software development and code script enhancements. Machine learning on 5 million custom data sets was carried out, resulting in an advanced, intelligent AI system. The output from MANTIS simulation sources from twenty-six different data reference feeds, such as inSAR, GRACE and Sentinel 2 was recorded. Final system enhancements included a simple user interface, data modelling and full validation across several non-test sites.

The project confirms muon-based subsurface imaging is viable and fully computer-simulated, establishing a new technique. Simulations showed that optimal detector placement requires surrounding targets with high-resolution, low-noise sensors. Validated real-site tests prove remote modelling of muon interactions can reveal hidden structures. This groundbreaking, non-invasive cost-effective method has wide applications in mining, archaeology, construction and national security.

SciFest@ATU Sligo 2025

[STAND 10] Title of Project	TALKTIME: ACCELERATING PAEDIATRIC SPEECH-LANGUAGE DEVELOPMENT THROUGH GAMIFIED LEARNING, INTERACTIVE TECHNOLOGIES AND REAL-TIME FEEDBACK
Students	Dana Carney, Abigail Killeen
School	Mount St Michael Secondary School, Claremorris, Co. Mayo
Teacher Mentoring Project	Stephanie Hogan

Abstract

Over 10% of children require speech and language therapy at some point, but with waiting lists exceeding 30,000 in Ireland alone, not all children can access care in a timely manner. Studies have shown that children with untreated speech-language difficulties often fall behind their peers socially and academically and tend to have lower levels of self-confidence. Even when intervention occurs later, these difficulties are associated with challenges such as anxiety during adolescence and adulthood.

Our research revealed a critical need for a tool to support early intervention and bridge the gap for children awaiting professional services. We hypothesised that a gamified, interactive app could aid paediatric speech and language development, helping children on waiting lists make progress and prevent the social and developmental setbacks linked to untreated speech-language difficulties.

In response, we designed and developed TalkTime, a mobile app utilising gamification to engage children in evidence-based activities used in traditional speech-language therapy. TalkTime provides a modern, accessible alternative that empowers families and brings therapy strategies into the home, utilising advanced machine learning models built with Python and Tensorflow to provide custom feedback.

We built our initial prototype using MIT App Inventor, before migrating to React Native to allow for further technological development. Our product is currently at a viable stage, allowing for extensive user testing to ensure its effectiveness for children aged 3-5. We collected and analysed post-usage data from a sample group of 25 children and their families; this data has supported our approach, and our hypothesis.

SciFest@TU Dublin Tallaght 2025

[STAND 11] Title of Project	ADVANCING POST-QUANTUM LATTICE-BASED CRYPTOGRAPHY BY DEVELOPING EFFICIENT SHORTEST VECTOR PROBLEM APPROACHES
Student	Addison Carey
School	Celbridge Community School, Celbridge, Co. Kildare
Teacher Mentoring Project	Zita Murphy

Abstract

The purpose of this project was to create and evaluate a heuristic algorithm for the Shortest Vector Problem (SVP), a fundamental challenge in lattice-based cryptography. The engineering goal was to integrate an algorithm with a refined selection method that could find short vectors in lattices more effectively than basic methods. It was expected that this algorithm would give results similar to traditional brute-force search in small lattices, but with potential to scale better as dimensions increase.

The algorithm was written in Python and tested on randomly generated lattices between three and six dimensions. Before execution, the lattice bases were conditioned to improve their structure. The refined algorithm was then compared with a brute-force solver by examining the length of the vector it produces, its runtime, and how well it handled complex lattice conditions. Randomness was assessed for using multiple trials.

The refined algorithm reliably found short vectors of similar quality to brute force, and in some challenging cases it out-performed brute-force algorithms. Although this method experienced higher runtime in lower dimensions, it displayed statistically significant improvements in reliability when the lattices were harder to solve. Results varied between executions due to its randomised design, but overall patterns remained consistent.

The project successfully met its goal of developing a new heuristic solver for SVP. The results suggest this could become a useful approach for higher-dimensional lattices, where traditional methods are infeasible. This work provides a foundation for future research in post-quantum cryptography where efficient solvers are critical.

SciFest@TUS Moylish 2025

[STAND 12] Title of Project	THE ARCHIVE – USING VR TO ASSIST IN JUNIOR CYCLE STUDY
Students	Luke O’Loughlin Byrne, Zack Bannon Griffin
School	Ardscoil Rís, North Circular Road, Limerick
Teacher Mentoring Project	Aisling Mullen

Abstract

“The Archive” is an application designed to bring aspects of Junior Cycle (JC) subjects to life using virtual reality. The aim of our app was to place the student in an immersive virtual world, allowing them to learn in a more engaging and active way. We have created scenes that students interact with, assisting their study and allowing them to assess their learning through quiz-style questions.

We have created two different scenes to assist the student with JC History and Science. The student is placed in a virtual reality in either the trenches of World War 1 or a science laboratory. Our goal was to make a proof of concept that can assist with the study of our chosen JC subjects and we feel by creating this app, we have achieved this. We believe that this is an effective method as it is based on the process of ‘learning by doing’.

We created our application using an app called Godot. Godot is a new game engine with many tools for creating VR apps, so it was suitable for our project. We created the models for our scenes using an app called Blender which has all the tools necessary to create an immersive and interactive world. In our newest iteration of the project, we completely rewrote the code from the ground up and switched to a new, simpler art style, cutting down on development time and making the app run smoother on VR devices, along with the addition of the science scene.

SciFest@TU Dublin Grangegorman 2025

[STAND 13] Title of Project	MOULD METRO: REDESIGNING IRELAND'S RAIL NETWORK USING SLIME MOULD
Student	Keelin O'Donovan
School	The Institute of Education, 85 Leeson Street Lower, Dublin 2
Teacher Mentoring Project	Wesley Hammond

Abstract

Ireland's rail network struggles with connectivity and efficiency. It does not serve rural areas well, and lines between major cities are unreliable. This project aims to explore the potential of using *Physarum polycephalum* or slime mould, to redesign the network using its natural pathfinding abilities.

My goal was to simulate Ireland's rail network using a virtual simulation inspired by slime mould to propose a more efficient model that balances accessibility, cost and speed. I was inspired by previous similar studies done in places like Tokyo and Canada.

I used C#, a programming language, and Unity, as my development tool. Major cities and towns were represented as nutrients and thousands of individual agents represented the mould cells. The agents' movements were then compared to Ireland's current rail network.

The slime mould grew networks that were like current routes, but different in some areas, particularly around the north of Ireland. The mould also grew new paths to more rural areas, which would improve overall availability.

I used graph theory metrics like efficiency, speed and vulnerability to show that my proposed model is more efficient than the current model.

This project shows that biological systems such as *Physarum polycephalum* can offer valuable insight into infrastructure design decisions providing a fresh outlook for optimizing transport networks.

SciFest@MTU Cork 2025

(STAND 14) Title of Project	TINTEÁN: A TECHNOLOGICAL INTERVENTION IN HOMELESSNESS MITIGATION
Students	Isabel Connolly, Laoise Kimber O'Shea, Hai Ka Sung
School	Scoil Mhuire, 2 Sidney Place, Wellington Road, Cork
Teacher Mentoring Project	Rachel Currivan

Abstract

Purpose of the Project: The purpose of Tinteán is to address the growing issue of homelessness in Europe by using technology to provide accessible, practical and compassionate support to those facing homelessness. The project aims to empower individuals experiencing homelessness, assist volunteers, and strengthen organisations that provide aid. Tinteán's mission is to act as a bridge to hope, safety and opportunity through a user-centred mobile application.

Description of the Project: Tinteán is a social enterprise mobile app designed to deliver essential information and real-time resources to people experiencing homelessness. Key features include offline maps of over 300 shelters and food services across Europe, real-time bed availability, an AI chatbot called "TinTin", a resource directory, volunteer tools, and upskilling opportunities. The app's offline functionality ensures accessibility without an internet connection, making it inclusive for vulnerable users.

Data: The development was guided by extensive research and user engagement. Over 300 survey responses and multiple interviews with shelter volunteers and workers (Focus Ireland) informed the design. Testing phases (A/B, Alpha, and Beta) refined usability, accessibility and feature placement. Data revealed that 95.4% of respondents would download the app and 93.7% found real-time bed availability extremely useful. Competitor analysis identified critical gaps in existing European solutions, validating Tinteán's unique offering.

Conclusion: Tinteán demonstrates that technology, guided by empathy and evidence-based design, can drive meaningful social change. By integrating accessibility, inclusivity and collaboration, the project provides a model for how innovation can reduce inequality and improve lives.

SciFest@ATU Donegal 2025

[STAND 15] Title of Project	CAS - A WEARABLE CAPSIZE ALERT SYSTEM
Student	Harry Davies
School	Abbey Vocational School, Donegal Town, Co. Donegal
Teacher Mentoring Project	Donna Furey

Abstract

In 2024 I brought a water detection sensor design to SciFest at ATU Donegal. To test if the detector worked, I individually tested each component first to check for any faults and then I attached them all to the Arduino board for an overall test of the system in and out of water. In this prototype, the detector worked without any problems but the current was too high for an LED so I added a resistor.

I developed this project further for SciFest@College in ATU Donegal in 2025 and had a prototype that detected water and location. This consisted of a microcontroller connected to all components: a battery, a water sensor that collected the water data, a transceiver to send a message home if water was detected, an LED to confirm activation for the casualty, and a GPS module to receive the casualty's coordinates. I also replaced the radio-based communication system with a more reliable LoRa system to give me a fully working sensor.

Since then, I have added a rotational sensor and have 3D printed wearable housing. I also tested my device in laboratory conditions using both saltwater and freshwater samples to troubleshoot any errors or delays in triggering the alarm. I conducted extensive in-field testing with the device hundreds of times before finally testing it on volunteers over a six-week period.

SciFest@ATU Galway 2025

[STAND 16] Title of Project	WASTE NOT, WANT NOT: AN INVESTIGATION INTO THE USABILITY OF STERILE MEDICAL SUPPLIES POST-EXPIRY
Student	Mary Lilibeth Curry Glynn
School	Mount St Michael Secondary School, Claremorris, Co. Mayo
Teacher Mentoring Project	Stephanie Hogan

Abstract

We live in a world where patients go without critical medical supplies, while elsewhere, unopened, usable items are discarded simply due to overstock or exceeding expiration dates. Too much and too little exist in tandem, creating a deeply inefficient and morally challenging imbalance. This isn't just wasteful; it is a missed opportunity to save lives.

This project explores sustainability in healthcare environments, focusing on the redundancy of expiration dates on sterile medical supplies. It investigates whether some expiration dates can be safely extended and how better waste management could be implemented. I hypothesise that assessing the usability of medical supplies post-expiry, combined with improved waste management strategies facilitated through a mobile application like HealthLoop, can reduce environmental and economic impacts in healthcare settings while maintaining patient safety.

This project consists of four components: Review, Survey, Testing and Development. A literature review established current protocols for expiration and disposal. Surveys and interviews with healthcare professionals gathered data on waste management practices and attitudes towards expiration dating. Laboratory experiments tested expired and in-date medical supplies for sterility, packaging integrity, and usability. These results showed that expired supplies remained sterile and functional beyond their printed expiry dates. These findings indicated potential for safe expiration extension and inspired the development of HealthLoop. HealthLoop enables healthcare facilities to track, manage and redistribute medical supplies, promoting circular living and sustainability.

The project concludes that reassessing expiration policies and using technology like HealthLoop can support a more efficient healthcare system that balances safety, sustainability and economic viability.

SciFest@ATU Donegal 2025

[STAND 17] Title of Project	CROSHA (CARDIAC RESUSCITATION, OXYGENATION AND SMART HEALTH ASSISTANT)
Students	Anish Nayak, Andrei Crosnoi
School	St Eunan's College, Letterkenny, Co. Donegal
Teacher Mentoring Project	Jane Gill

Abstract

Every second counts in cardiac arrest, and this project set out to create a device that could act in those critical moments. The purpose was to develop an intelligent system capable of detecting and responding to cardiac arrest in real time. The hypothesis was that combining continuous ECG monitoring with artificial intelligence would allow earlier detection and faster intervention than current approaches, increasing survival rates.

CROSHA was designed as a wearable vest that continuously recorded ECG signals and analysed them using CardioNet-1D, a custom-built convolutional neural network. This model was trained and validated on labelled ECG datasets to recognise patterns linked to cardiac arrest. When abnormal rhythms were detected, the device was programmed to deliver an immediate corrective shock while simultaneously sending emergency alerts to family members through the companion CROSHA app.

Data testing was carried out using open-source ECG datasets to evaluate accuracy and reliability. Results showed that CardioNet-1D achieved high levels of precision in identifying life-threatening rhythms, confirming the potential of this approach for real-world application.

In conclusion, this project demonstrated the feasibility of integrating artificial intelligence, continuous monitoring and automated intervention into a single life-saving system. CROSHA provides rapid detection, immediate treatment and instant communication, addressing the critical time window in cardiac arrest cases. By reducing delays between collapse and defibrillation, the system has the potential to save lives and provide reassurance for patients and families. A patent application has been submitted, and the system is currently patent pending.

SciFest@MTU Cork 2025

[STAND 18] Title of Project	WHICH TYPE OF ROTOR IS BEST FOR WIND GENERATION?
Student	Cianan Gill-Emerson
School	St Brogan's College, Kilbrogan, Bandon, Co. Cork
Teacher Mentoring Project	Michael Connern

Abstract

I chose this project on the topic of rotor design for wind turbines because of my interest in renewable energy and because I've always wanted to make a positive impact on the environment. I believe that wind power is an answer to our energy crisis, and we can be energy self-sufficient due to our geographical position on the Atlantic coast.

My hypothesis was if the design of a traditional wind turbine is changed then they perform better at electricity generation.

I 3D-printed several wind turbine designs, tested them in a wind tunnel, and measured the current and voltage each one produced. I kept the wind speed constant throughout to ensure it was a fair comparison. The turbines were designed on TinkerCAD or adapted from other designs found on Thingiverse. The turbines were attached to a small motor and this was connected to a Pasco voltmeter and ammeter to take my measurements.

After compiling my results in Excel and drawing graphs that best represented my data, the Archimedes Spiral proved to perform the best.

Cost analysis also showed the Archimedes Spiral to be the superior design but the cost to make a new mould for a spiral is prohibitively expensive, the repair costs also are a barrier because you would have to replace the entire turbine instead of repair and finally there is too little data on noise pollution and any detrimental impact on migratory birds and insects for companies to see it as a viable solution.

SciFest@ATU Galway 2025

[STAND 19] Title of Project	MEDSYNC+: IDENTIFYING PATTERNS IN PATIENT DATA TO SUPPORT EVIDENCE-BASED CARE
Students	Simona Gaubyte, Ema Sasnauskaite
School	Mount St Michael Secondary School, Claremorris, Co. Mayo
Teacher Mentoring Project	Stephanie Hogan

Abstract

Healthcare systems face increasing pressure as patient demand rises, and incomplete records contribute to delays and repeated tests. The purpose of this project was to investigate how a structured, technology-driven platform could improve proactive personal health management, support patient and clinician communication, and improve consultation efficiency, without providing medical diagnoses.

MedSync+ integrated symptom tracking via a 3D interactive body interface, medication tracking with reminders and an allergy log area, family history, condition images with local storage allowing the system to improve over time based on user input, and curated health references into a single, cohesive framework. Users could also upload blood test results, which were analysed using OCR-based AI models to extract values, detect patterns and generate simplified, actionable insights.

Methods included a literature review on current AI in healthcare, regulatory research on GDPR and EU AI Act compliance, interface usability testing with volunteers across diverse age groups, and validation of AI models using synthetic datasets, accuracy metrics and confusion matrices. Pre- and post-surveys guided iterative improvements to ensure accessibility and clarity, while clinical feedback informed design and ethical compliance.

Results demonstrated that structured health data combined with AI-driven pattern recognition simplified health tracking, highlighted patterns, and supported user-controlled information sharing with clinicians. These findings show that the project is feasible and effective in simulated and controlled scenarios, supporting the potential for real-world application. By centralising data, providing simplified insights, and enabling secure communication, MedSync+ demonstrates how research-driven digital tools can empower patients and reduce systemic pressures on healthcare systems.

SCIFEST 2025

NATIONAL FINALISTS / BOSTON SCIENTIFIC MEDICAL DEVICES FINALISTS

PROJECT ABSTRACTS



SciFest@TUS Athlone 2025

[STAND 20] Title of Project	CAPILL: COMPLIANCE AID PROMOTING INDEPENDENT LIVING LONG-TERM
Student	Ronan Lyons
School	Lanesboro Community College, Lanesborough, Co. Longford
Teacher Mentoring Project	Mary O'Brien

Abstract

The aim of my project, CAPILL, is to develop a medicine dispenser that makes taking medications easier and safer for the estimated 460,000 people in Ireland with conditions such as arthritis, rheumatism and Parkinson's disease.

My design process was guided by 5 key pillars:

- » Safety
- » Medication compliance
- » Ease of use and access
- » Promoting Independent living
- » Adaptable to meet the changing medicinal needs of the patient

Using an iterative approach, I have developed an adaptable design that can hold a week's worth of medications. These medications can be dispensed up to four times a day.

CAPILL consists of up to four levels. In each level, a stepper motor rotates a paddle that pushes the medication through a slot. This drops the medication into an ergonomic cup in the base of the device. When the medication is due to be taken, audio and visual prompts alert the patient. The patient scans their fingerprint, and a servo motor presents the cup from the base.

To ensure patient safety is met and to improve medications compliance, the device works with an app. The app ensures that a patient will not skip a dose or take a double dose by alerting family members or carers when a dose is not taken at the correct time, allowing them to intervene.

To assess how well CAPILL meets the five key goals, I ran a trial with a random sample of patients from the population of intended end-users.

CAPILL improves medication compliance, patient safety, and promotes independent living long-term.

SciFest@Dundalk IT 2025

[STAND 21] Title of Project	EEG & BCI: A CHEAPER HARDWARE CONTROL
Student	Athish Anandan Srinivasan
School	St Oliver's Community College, Drogheda, Co. Louth
Teacher Mentoring Project	Sinéad Kelly

Abstract

My initial proof-of-concept prototype was successfully constructed for approximately €200, leveraging components such as the ECG AD8232 to acquire brainwave EEG signals. While this low-cost assembly was immediately functional and successfully demonstrated the potential for democratising biosignal technology, the prototype revealed a critical engineering paradox: my budget design introduced significant signal noise and unreliability. This instability, a direct result of using temporary connections and unshielded components, highlighted a key reason why professional systems are so expensive: they must engineer out these complexities. This struggle was an important practical lesson.

The limitations of Prototype 1 have led to a concrete and ambitious plan for Prototype 2, currently under development. This next phase focuses entirely on transforming the initial proof-of-concept into a robust, reliable, and portable system. Key hardware steps include designing a PCB to ensure solid, soldered connections, implementing Faraday cage shielding to eliminate external electromagnetic interference, and researching improved electrodes to stabilise contact. Beyond hardware, I am committed to developing a user-friendly system, including a GUI for real time data visualisation. This journey confirms that while cheap technology can be democratised, achieving professional reliability and usability requires an investment of time and expertise in mitigating noise and engineering challenges, reinforcing the value of every setback encountered. This is not a medical device as it is not regulated.

SciFest@MTU Cork 2025

[STAND 22] Title of Project	DEMENTIA SHIELD - THE FUTURE OF AR AND AI IN MEDICINE
Student	William Brosnan
School	Scoil Mhuire Kanturk, Kanturk, Co. Cork
Teacher Mentoring Project	Siobhan O'Riordan

Abstract

The purpose of my project was to find out how Artificial-Intelligence (AI) and Augmented reality (AR) can slow down the onset of dementia, improve life quality for dementia patients and reduce dementia carers' workload. My hypothesis was that a wearable AI device could improve medical adherence, reduce stress and slow down cognitive decline whilst still allowing patients to have independence.

I designed and created an application with the aim to reduce stress for both Frame AR smart glasses and mobile devices. This app uses AI to recognise faces, answer questions in a calm, familiar voice, provide reminders for medication and daily tasks, and dial emergency contacts in urgent situations while sharing the user's location. I am working on parts of the app that will provide reading exercises and puzzles to help with cognitive stimulation. I built this app using the Frame-AR smart glasses software-development-kit.

My results, gained from testing my prototype, interviewing and consulting professionals, and analysing data from past research and experiments, indicate that a technology like this can slow cognitive decline by up to 40% by reducing stress and engaging cognitive functions such as problem-solving. I also found out that a technology like this on average improves medication adherence by 30% and on average improves adherence to other daily tasks like hydration by 35%.

In conclusion, my project, Dementia Shield demonstrates that Artificial-Intelligence and Augmented-Reality can improve life quality for people with dementia and can slow down the onset of cognitive decline in dementia.

SciFest@SETU Waterford 2025

[STAND 23] Title of Project	WRIST WELLNESS: PRESSURE ALERT SYSTEM
Student	Kirsty Weldon
School	St Mary's College Arklow, Arklow, Co. Wicklow
Teacher Mentoring Project	Joanne English

Abstract

My project focuses on developing a wrist and hand-worn device that helps in injury rehabilitation. It features a traffic light system to alert users if they are exerting too much pressure on the area. I came up with the idea for this device since I have had issues with wrist pain for the last three years. This device helps prevent further strain or injury by providing a simple visual cue: green for safe pressure, orange for caution, and red for excessive pressure.

I explored various options for building this device and discussed my idea with Neil Weldon, who has a background in Computer Science, to refine my idea. I sourced components which included various pressure sensors and LED lights, which form the traffic light system and a programmable microcontroller. Through experimentation, I evaluated the effectiveness of each pressure sensor to determine the best one and how to integrate them. I did extensive research on the anatomy of the arm, wrist and hand, along with different conditions and injuries. I interviewed several professionals in their field (biomedical engineer and physiotherapist). I calibrated the device to multiple people to gain data on how the device will work for different people depending on age and gender. I conducted a survey to gauge public interest. I asked participants about their injury history and whether they would use the device during rehabilitation. I analysed this data through SPSS software.

In conclusion through experimentation and evaluation, I found that my device could have a benefit.

SciFest@DCU 2025

[STAND 24] Title of Project	FEEL THE WAY
Students	Caroline Asiruvatham, Niamh Bonallie
School	St Joseph's Mercy Secondary School, Navan, Co. Meath
Teacher Mentoring Project	Bronagh Farrell

Abstract

The idea for our project started when we saw how many cars and other obstacles were left precariously on the footpath and how dangerous it could possibly be for people who have a visual disability. Creating a device that detects objects and informs users would improve navigation in their daily lives.

The purpose of our project is to create a device that makes walking through our streets less hazardous for visually impaired people.

We investigated this problem and found that approximately 297,000 people in Ireland are blind or have some form of visual impairment. According to a survey by the NCBI, "Almost 50 per cent of blind or visually impaired people have been injured as a result of unexpected obstacles or hazards on footpaths" (Irish Times, 2023). Parking cars on the footpath is illegal, but people still choose to do it. This makes the lives of visually impaired people exceedingly difficult.

We programmed an Arduino board and used ultrasonic sensors to detect obstacles which make the stick vibrate through the use of mini vibration motors. Our aim is to combine advanced technology and the stick to aid visually impaired people navigate the world around them.

Through trial and error, we discovered certain limitations to the device, such as it being unable to detect soft structures and being unable to detect objects from above like tree branches.

Overall, we came away from this with a positive experience and outcome to our device.

SciFest@ATU Galway 2025

[STAND 25] Title of Project	NEUROSYNC: AI POWERED SUPPORT FOR COGNITIVE AND NEUROLOGICAL CARE
Student	Muhammad Ashir Anwar
School	Coláiste Muire Máthair, St Mary's Road, Galway
Teacher Mentoring Project	Anthony Carey

Abstract

NeuroSync is a prototype wearable device that integrates biomedical sensors and neurostimulation technology to detect and support treatment of neurological conditions such as dementia, ADHD, strokes and seizures. Currently, limited tools exist for early detection of these conditions outside hospital settings, leading to delayed responses and higher mortality rates.

The device continuously monitors neurological activity, detects early warning signs, and connects to a mobile app that automatically alerts emergency contacts. NeuroSync combines hardware, AI models and companion apps into one cohesive system. The device delivers targeted neurostimulation and records responses, while AI models analyse brain signals and generate adaptive feedback to ensure safety and effectiveness. Data flows in a continuous loop collected by the device, interpreted by AI and visualised in the app, allowing real-time monitoring and control.

To validate performance, I developed an AI-based simulator that mimics human neurological conditions and ran 15 test simulations using a sampling and averaging method to reduce bias. From May to November, I researched detection methods and neurostimulation technologies, guiding both hardware and software design. The prototype integrates ECG, EEG, blood pressure sensors, ESP32, Raspberry Pi Zero, haptic modules and bone conduction speakers.

The project budget increased from €340 to €600 due to component costs. Future development could expand NeuroSync into specialised devices tailored to specific conditions. With a target market valued at €1.69 billion, NeuroSync has the potential to revolutionise neurological care especially for elderly patients in care homes by offering early detection, continuous support and new hope for families worldwide.

SciFest@TUS Moylish 2025

[STAND 26] Title of Project	CHILL 'N' HEAL BANDAGE
Students	Kinga Tobianska, Paulina Varuyeva
School	Desmond College, Newcastle West, Co. Limerick
Teacher Mentoring Project	Donal Enright

Abstract

Our project "Chill 'N' Heal Bandage" aligns with the scientific principles of chemistry and biochemistry to create an improved, beneficial product - a hydrogel healing bandage. The project deals with the creation, formulation and testing of a prototype that would have measurable performance in terms of absorption, strength and antimicrobial properties.

Bandages have been around for years but their use has been limited to the most basic protection. Thus, our objective was to make a new, healing-promoting alternative. We started by looking for substances that could help heal wounds and came across hydrogel technology as the most probable solution. The hydrogel was made out of glycerol, corn-starch, gelatine, cutaneous powder and water. The ingredients were then heated, and stirring was done until a thick, soft, gel-like consistency was achieved. The hydrogel was finally poured onto sterile plates, where it was allowed to solidify into samples. We performed a number of tests to check the absorption capacity, the mechanical strength and the antimicrobial properties of our hydrogel.

The findings showed that the Chill 'N' Heal hydrogel, though comparable to standard bandages in its physical and absorptive characteristics, was still very much active in terms of antimicrobial activity, hence the ability to reduce infection and assist in healing faster. Although we could not test directly on human wounds due to ethical considerations, we managed to create a simulated wound model by mixing gelatine, glycerine and red food dye to replicate the characteristics of human tissue for further evaluation.

SciFest@ATU Donegal 2025

[STAND 27] Title of Project	SMART WOUND DRESSING AND CONTROLLED DRUG RELEASE
Student	Cian Gallagher
School	St Eunan's College, Letterkenny, Co. Donegal
Teacher Mentoring Project	Jane Gill

Abstract

The purpose of my project was to determine whether it was possible to integrate sensors into a wound dressing, enabling them to monitor data and model whether a wound is infected. When triggered by the model, treatment would be administered by the system. This provides many benefits such as reducing limb fatality rates, reducing healing times, lowering healthcare costs and wait times, and improving quality of life. This project isn't only designed to be used in professional medical settings either; it can be used at home, particularly for elderly people who want to avoid unnecessary journeys to the hospital that could put them at risk of further complications. It could also be used in sport settings, as it can act like a bandage, but also provides better conditions for healing and monitoring.

The project monitors key wound biomarkers such as pH, temperature and moisture, which are associated with infections. The project uses a Raspberry Pi to simulate data and send it to an app built on Flutter. This uses Google's Firebase for data logging. The data was processed against clinically-defined thresholds that could be changed remotely by a medical professional only.

Tests successfully demonstrated the system's ability to assess simulated infections.

The remote configuration and app, along with the conceptualised simulation of drug release, have also been proven to work.

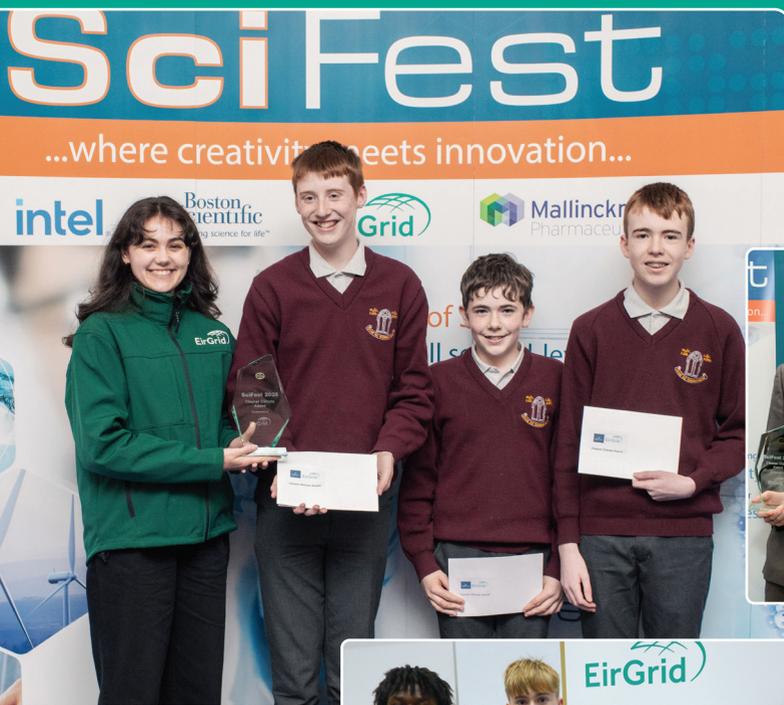
This project validated a viable and scalable software framework that now requires a prototype to test on, a step that promises to advance chronic wound care through data monitoring.



SCIFEST 2025

NATIONAL FINALISTS / EIRGRID CLEANER CLIMATE FINALISTS

PROJECT ABSTRACTS



SciFest@NorthWest 2025

[STAND 28] Title of Project	MICROBIAL FUEL CELLS (MFCs)
Students	Fatima Memon, Aleena Muddassir
School	Loreto Secondary School, Letterkenny, Co. Donegal
Teacher Mentoring Project	Margaret O'Reilly

Abstract

The project Microbial Fuel Cells (MFCs) aims to generate renewable electricity using bacteria. Our hypothesis was that bacteria in the soil produces electrical energy while breaking down the organic matter or waste.

We used two chambers and connected them with a salt bridge made of agar powder and salt solution. Graphite electrodes were inserted into each chamber and the voltage output was measured. Additionally, to increase voltage production, we used a boost converter, the MT3608. We also created an AI-integrated app that monitored the system and adjusted temperature, voltage production and moisture. Our research and collected references allowed us to interpret the total voltage that could be produced in one year.

We have also constructed a prototype to demonstrate our project on a larger scale. The lecturers from the Engineering department in ATU Donegal have also helped us develop our project through their survey feedback and overall assistance in enhancing our prototype. Moreover, to raise awareness, we carried out workshops and surveys with the Transition Year (TY) students. Overall, our project shows how renewable energy can be produced through simple, natural bacteria and how it can help to reduce the impacts of global warming.

SciFest@MTU Kerry 2025

[STAND 29] Title of Project	SEA SAVERS: ENGINEERING SUSTAINABLE ARTIFICIAL CORAL REEFS
Students	Moira Butler, Aisling Dillon
School	Mercy Secondary School, Mounthawk, Tralee, Co. Kerry
Teacher Mentoring Project	Roisin Riordan

Abstract

The title of our project “Sea Savers: Engineering Sustainable Coral Reefs” led us to question if we could create a sustainable coral reef structure to help provide habitat for marine life affected by coral loss and if it could be implemented in offshore wind farm construction.

We first began this project in March of 2025 and ran our first round of experiments in April 2025. We failed to obtain conclusive results from our experiments, so we reran them in the summer of 2025. During our first trial, we tested three materials to investigate their suitability to be used in coral reef construction (recycled concrete, clay with glass shards and clay). We ran into issues such as poor aeration, material sturdiness, unsuitable water conditions, and salinity, which caused our marine organisms to fail to respond to our models. From this we were able to observe that we needed to create a more realistic marine environment.

In our second trial, we used real seawater to tackle the unsuitable salinity and water conditions, proper aeration and more robust materials (recycled concrete, porous limestone and PVC as a stand-in for fibre glass wind turbine blades). We measured the abundance of marine organisms on each model over the course of one week. From our results we were able to conclude that recycled concrete and porous limestone were the most successful models. These results highlight the potential of using sustainable materials to construct artificial coral reefs in offshore wind farms to provide habitats for marine species.

SciFest@ATU Sligo 2025

[STAND 30] Title of Project	ENERGY CRISIS - LET ME KELP YOU!
Student	Amber Mc Donald
School	Ursuline College, Finisklin Road, Sligo
Teacher Mentoring Project	Anthony Carolan

Abstract

This study proposes the development of a dual-purpose desalination and seaweed processing plant powered by solar energy to produce nutrient-rich seaweed liquid fertiliser (SLF) and biochar soil conditioner. This sustainable system simultaneously extracts nutrients from seaweed and desalinated water while creating a carbon-enriched soil amendment, enhancing energy efficiency and environmental sustainability.

A multi-stage approach was employed to evaluate the system's effectiveness. First, solar energy facilitated simultaneous saltwater evaporation and nutrient extraction from seaweed. The resulting SLF was tested on salt-tolerant crops, including tomatoes, using varying concentrations to monitor germination rates, growth and biomass yield. Biochar was produced from the seaweed residue, applied to impoverished soils, and its impact on crop productivity was compared against control groups. Careful consideration was given to seaweed selection, prioritizing species abundant in Irish waters: *Ascophyllum nodosum*, *Saccorhiza polyschides* and *Sargassum*. Each was chosen for its unique characteristics, including biomass availability and potential use in agriculture.

Preliminary findings demonstrate the viability of the proposed system in producing enriched SLF and biochar, improving plant growth and soil fertility. The dual-purpose plant offers a promising approach to sustainable agriculture, leveraging renewable energy to reduce reliance on fossil fuels. Its scalable design makes it adaptable for global use, particularly in regions with poor soil quality and water scarcity, potentially supporting local economies and mitigating global warming.

SciFest@ATU Galway 2025

[STAND 31] Title of Project	BIOVOLT: THE MOSS POWER REVOLUTION - HARNESSING NATURE'S SOFT POWER FOR A SUSTAINABLE FUTURE
Students	Liya Walsh, Crystal Quinn
School	Coláiste Muire Máthair, Galway City, Co. Galway
Teacher Mentoring Project	Sinéad Phillips

Abstract

This project explored whether moss could make electricity through a process called biophotovoltaics (BPV), where plants use sunlight to produce small electrical currents. We wanted to see if different moss types and water sources would change how much electricity was made. Four kinds of moss were used: Delicate Fern Moss, Red-Stemmed Feather Moss, Mountain Fern Moss and Pincushion Moss. To collect electricity, copper and zinc electrodes were put into the moss and connected to a multimeter to measure voltage. We also tested four water sources—tap water, river water, rainwater and sea water—to see how they affected the results.

Our tests showed that all moss types made small voltages between 0.2 and 0.4 volts, but the current was too weak to light an LED. River water gave the best results, likely because it has natural minerals that help moss grow and carry electricity better. Tap water didn't work as well, probably because of chemicals like chlorine, while rainwater had too few dissolved ions. Sea water gave unstable readings because its high salt and impurities can interfere with the reactions inside the system.

We found that while moss can make electricity, the power levels are too low for practical use right now. However, if multiple moss "cells" were connected together, it could make more voltage. This experiment shows that moss has potential as a clean, sustainable energy source and could play a role in greener technology in the future.

SciFest@TUS Thurles 2025

[STAND 32] Title of Project	ENGINEERING A NEW VERTICAL AXIS WIND TURBINE DESIGN FOR USE IN URBAN AREAS TO PROMOTE SUSTAINABLE ENERGY PRODUCTION
Student	Jack McCormack
School	St Joseph's College, Borisoleigh, Co. Tipperary
Teacher Mentoring Project	Mary Gorey

Abstract

If you look around the towns and cities of Ireland, renewability and climate consciousness don't spring to mind. My project aims to change that by introducing renewable energy capture into urban areas using our most bountiful natural energy source, wind.

When you think of wind turbines, you picture huge, incredible machines off the coast or over rolling hills, but they don't have to be. My design for a wind turbine promotes efficiency at a small scale and in the ever-changing wind environments of urban areas. The shape of my wind turbine is known as a H-Darries vertical axis wind turbine, and while it looks very different to the wind turbines you know, it functions in much the same way by capturing wind power using its blades and transforming it to electrical power. These VAWTs have several benefits over other designs as they are more efficient at lower wind speeds, can take wind from all directions and are both quieter and produce less vibrations. Along with these benefits, they also have two major weaknesses: vulnerability to storm damage, since they can't turn away from high winds, and poor self-starting ability, which often offsets their efficiency at low wind speeds. To solve these issues, I invented a new type of turbine with self-starting abilities, using a motor at the base and a folding mechanism to protect the turbine during storms. I went on to test these additions and found huge benefits in simulated urban and storm conditions.

SciFest@TU Dublin Grangegorman 2025

[STAND 33] Title of Project	DESIGN OF AN INTELLIGENT, RENEWABLE ENERGY-HARVESTING SYSTEM TO POWER THE VEHICLES OF THE FUTURE
Student	Elijah Preston
School	St Andrew's College, Booterstown, Blackrock, Co. Dublin
Teacher Mentoring Project	Laura Brogan

Abstract

This project aimed to tackle one of the main barriers to electric vehicle adoption “range anxiety,” the fear of running out of battery power before reaching a destination, by designing a solar-powered energy-harvesting system. I began by constructing simple model vehicles powered directly by solar panels and batteries, comparing their performance on different road surfaces and under various loads. The battery-powered models performed more efficiently, but the results confirmed that solar power could still drive motion under optimal sunlight.

To improve the efficiency of this approach, I developed a second-generation 3D-printed model that could store solar energy in rechargeable lithium batteries. Over a two-week testing period, I observed how different weather conditions affected charging efficiency and motor runtime. Even on cloudy days, the solar system maintained a minimum 25% battery charge, suggesting that stored solar power could serve as a valuable emergency backup in this model system.

In the final project stage, I created an Arduino-based solar tracking mechanism using light-dependent resistors and servo motors. This system enabled the solar panel to follow sunlight throughout the day, increasing overall efficiency.

My findings demonstrate that intelligent, solar-powered systems could provide a sustainable solution to back-up energy limitations in electric vehicles. If implemented on a larger scale, such systems could reduce reliance on fossil fuels, alleviate range anxiety, and encourage broader adoption of clean transportation technologies.

SciFest@DCU 2025

[STAND 34] Title of Project	UV INDEX CALCULATION: INTEGRATING CLOUD CLASSIFICATION AND MACHINE LEARNING FOR PRECISION IN UV FORECASTING
Students	Eabha McBride, Layla Nolan, Leah Mullen
School	St Joseph's Secondary School, Rush, Co. Dublin
Teacher Mentoring Project	Daniel Murray

Abstract

In Ireland, 13,000+ skin cancer cases are diagnosed yearly, making it the country's most common cancer, with 90% caused by UV exposure. UV radiation leads to short and long-term effects such as sunburn, eye damage and cataracts. To help people protect themselves, the UV index measures the intensity of ultraviolet radiation from the sun at a specific time and place. We investigated whether this could be improved and found that the current formula only considers cloud cover percentage as a cloud factor. However, research shows that cloud types classified by height, shape and thickness affect the severity of UV radiation.

We hypothesised that incorporating cloud classification into the UV index would yield a more accurate measure of UV levels, providing better protection guidance for individuals than the legacy UVI model. To test our hypothesis, we created a cloud type classification model using photos we took from a Raspberry Pi on the ISS. We also created a ground-based camera model using Raspberry Pi HQ camera with a coral ML accelerator. Finally, we used multiple UV sensors on our ground-based raspberry pi to measure the real world UVI value.

Using a Python Flask Web App, we graphed the UVI sensor value, our satellite model value, ground-based model value and external UVI forecast from Meteo.com which uses the legacy UVI prediction. We found our cloud classification satellite model to be constantly closer to the UVI sensor value and thus a better model for predicting UV exposure.

SciFest@NorthWest 2025

[STAND 35] Title of Project	INVESTIGATING WAYS OF REMOVING MEDICATION FROM WATER SYSTEMS
Student	Grace Dornan
School	St Mary's College, Derry City
Teacher Mentoring Project	Ann Blanking

Abstract

I chose to do my project on this topic as water pollution is a significant issue. After humans use medication, residues are excreted and enter the wastewater system. Many studies have been conducted which show that pharmaceutical residues in our water systems can have a substantial impact on the environment and animals such as fish.

My project centres on discovering ways to remove medicines from different solutions I created. I used paracetamol and ibuprofen. I crushed 4 tablets of each medication using a pestle and mortar and dissolved the powder in 1 L of deionised water. I measured out 200 mL of a medicine solution into a beaker, recording its parts per million (ppm) using a handheld dissolved solids meter. I then added either 2 g of charcoal or 1.5 g of polystyrene to the solution and waited for 1 hour. This step was followed by the filtering of the solution using filtering paper. I then re-recorded the solution's parts per million (ppm), calculating the difference between the original reading and the reading after filtration, to determine whether any of the medication's particles were removed. I repeated this entire process three times.

My results showed that some particles were removed. For example, activated charcoal removed an average of 19 ppm from the solutions. And for polystyrene, there was an average of 23 ppm removed from the solutions. This has showed a small yet positive change, which has encouraged me to further develop my project.

SciFest@MTU Kerry 2025

[STAND 36] Title of Project	ARE VERTICAL AXIS WIND TURBINES A VIABLE SOLUTION FOR IRELAND'S WIND ENERGY NEEDS?
Student	Sri Raj Arush Satyavolu
School	C.B.S. Secondary School, Tralee, Co. Kerry
Teacher Mentoring Project	Cathal Halton

Abstract

Objective: My project investigates the potential of Vertical Axis Wind Turbines (VAWTs) for generating renewable energy in Ireland, particularly along highways influenced by traffic-induced wind. A Savonius VAWT made from recycled materials was tested under controlled conditions, and different rotor configurations were analysed using Irish wind data. Comparisons with Archimedes screw turbines suggest that VAWTs could serve as practical supplementary energy sources in locations where Horizontal Axis Wind Turbines (HAWTs) are less feasible.

Brief Outline of Steps: I researched various types of VAWTs, focusing on Savonius and Archimedes screw designs. I constructed three Savonius rotors from cardboard and mounted them on motors connected to a multimeter and LED. Using a hair dryer to provide a constant wind source, I measured the voltage output, repeated trials for consistency, compared results, and explored alternative turbine designs and motor options for future improvements.

Results: The three-bladed curved turbine generated significantly more energy than the two-bladed designs because it could capture more air, making it a more efficient option.

Conclusion: The experiment supports the hypothesis that VAWTs could be used to harness wind energy from highways in Ireland. The three-blade Savonius design demonstrated superior performance, and its drag-based mechanism is well suited to the turbulent winds created by passing vehicles. With further development and the use of more durable materials, VAWTs could provide a low-cost, sustainable energy solution for roadside applications. Although more complex calculations would be required for a fully accurate assessment, this project provides an initial overview of the potential benefits of installing VAWTs along Irish highways.

SCIFEST 2025

INTERNATIONAL FINALISTS

SRI LANKA SCIENCE AND ENGINEERING FAIR

SOUTH AFRICA ESKOM EXPO FOR YOUNG SCIENTISTS

PROJECT ABSTRACTS



Khushi Lall, Grade 9
Tyger Valley College



Sri Lanka 2025

[STAND 37] Title of Project	ENGLISH ASSESSING SYSTEM (EAS)
Student	Abeywickrama Pahuruthotage Thisath Damiru
Science Fair	Sri Lanka Science and Engineering Fair
Fair Director	Eng. Jayavilal Meegoda

Abstract

The English Assessing System (EAS) was created to tackle challenges faced by English learners in Sri Lanka and South Asia, where English proficiency is essential for employability and education. Many learners encounter difficulties due to outdated teaching methods and inadequate assessment tools. Insights from educational institutes and students highlight that existing software often lacks simplicity and fails to support lower-proficiency learners, particularly in rural areas.

Despite government efforts, English literacy among Sri Lankans over 15 years old remains at only 22%, with varying proficiency levels across South Asia. Current language-learning platforms do not meet the specific needs of this region and often lack personalized learning paths and effective assessment. In contrast, EAS leverages AI to provide adaptive testing, automated scoring, and real-time feedback, offering a tailored assessment experience. This system aims to bridge the English proficiency gap by being cost-effective and accessible to learners from diverse backgrounds, making it a transformative solution for enhancing language skills essential for academic and career success.

Sri Lanka 2025

[STAND 38] Title of Project	MATTRESS VENTILATION SYSTEM
Student	Senanayaka Mudiyanseelage Chirath Adithya Bimsara Senanayaka
Science Fair	Sri Lanka Science and Engineering Fair
Fair Director	Eng. Jayavilal Meegoda

Abstract

Bed sores are a hidden, critical problem in society. Elderly, stroke, coma, spinal cord injury, and other immobile patients commonly face this issue. Dead cells formed due to continuous pressure, bed surface temperature and moisture (sweat or urine) are the main causes of these wounds. This project aims to prevent bed sores by controlling these factors, thereby reducing caregiver involvement and promoting faster patient recovery.

The designed bed cover minimizes continuous pressure on the skin and maintains the bed surface temperature below the recommended 33.4 °C. It is made for single beds and divided into six sections, each controlling temperature and pressure individually through an air-flowing mechanism. Thus, high-risk areas can be treated directly. High-temperature zones are identified and cooled automatically. Pre-set pressure-reducing air patterns help control both pressure and temperature, while also minimizing sweat formation.

The system can detect room temperature and connect with an external cooler to further reduce surface heat. It operates in two formats: a general mode, for single-bed use, and a networked mode, suitable for hospitals and multi-bed healthcare centres. In the interconnected setup, multiple bed covers are operated through a single air compressor.

This intelligent bed cover provides an efficient, automated and affordable solution to prevent bed sores, improving patient comfort and reducing caregiver workload.

South Africa 2025

[STAND 39] Title of Project	PASTURE-BASED SHEEP FARMING SYSTEM: BIOACCUMULATION OF HEAVY METALS AND THE IMPLICATIONS FOR LIVESTOCK, LAMBING RATES, GROWTH MARGINS AND HUMAN HEALTH
Student	Marlhuné Bezuidenhout
Science Fair	Eskom Expo for Young Scientists
Fair Director	Parthy Chetty

Abstract

This study investigated whether heavy metals present in pasture soils are absorbed by grazing ewes, transferred through their milk to lambs, and how this affects milk production and lamb growth performance. One hundred lactating ewes were divided into two groups of fifty and grazed on two pastures, Oulands (VPA1) and Kikuyu (VPK1), maintained under similar management and environmental conditions. Soil and leaf samples from both pastures were analysed to determine heavy metal concentrations, while lambs were weighed at birth and weaning to assess growth and productivity.

Results showed that the VPA1 pasture contained significantly higher levels of heavy metals than the VPK1. Ewes grazing on VPA1 exhibited reduced udder development, lower milk yields, and overall poorer health compared to those on VPK1. Consequently, lambs nursing from these ewes displayed slower growth rates and significantly lower weaning weights. In contrast, ewes grazing on the lower-contaminated VPK1 pasture maintained healthy milk production, resulting in better lamb performance.

The findings confirm that elevated heavy metal concentrations in grazing soils can be transferred through the food chain, affecting both ewe productivity and lamb development. Because sheep may ingest 10–30% of their daily dry matter intake from soil, their exposure risk is considerable. The study concludes that bioaccumulation of heavy metals adversely impacts livestock health and production efficiency. Therefore, effective soil management and monitoring of heavy metal contamination are essential to safeguard animal welfare, optimise growth performance, and ensure the safety of meat and dairy products for human consumption.

South Africa 2025

[STAND 40] Title of Project	GARLIC: NATURE'S SECRET TO FOOD PRESERVATION
Student	Khushi Lall
Science Fair	Eskom Expo for Young Scientists
Fair Director	Parthy Chetty

Abstract

Food spoilage caused by bacterial contamination remains a major global challenge, leading to significant food waste and foodborne illnesses. In response, there is growing interest in natural, plant-based preservatives as sustainable alternatives to synthetic chemicals. This study investigated the antibacterial properties of South Africa's indigenous wild garlic species, *Tulbaghia violacea* (TV) and its hybrid (*T. violacea* × *T. acutiloba*, TVH), and evaluated their potential for extending the shelf life of fresh produce.

Plants were cultivated in both soil and aeroponic systems, and extracts were prepared using dichloromethane and ethanol, followed by concentration with a rotary evaporator. Thin-layer chromatography (TLC) and minimum inhibitory concentration (MIC) assays were conducted to assess antibacterial activity against *Staphylococcus aureus*. Additionally, extracts were applied as coatings on cucumbers, strawberries, and grapes to evaluate their preservative effects.

Both TV and TVH extracts inhibited *Staphylococcus aureus*, with variations depending on cultivation method and plant part. Soil-grown extracts generally exhibited stronger antibacterial activity. In coating tests, treated fruits showed reduced bacterial growth and slower spoilage compared to uncoated controls. TLC and MIC results further confirmed antibacterial activity in the leaves and roots of TVH and the leaves of TV.

Overall, soil-grown, dichloromethane-extracted samples demonstrated the highest antibacterial potency. These findings highlight the potential of indigenous wild garlic as a natural, sustainable preservative - offering a promising strategy to reduce food spoilage, minimize waste, and promote local biodiversity.

South Africa 2025

[STAND 41] Title of Project	COMPARATIVE EVALUATION OF MORINGA OLEIFERA SEED FORMS FOR LOW-COST WATER TREATMENT
Student	Milani Mjiji
Science Fair	Eskom Expo for Young Scientists
Fair Director	Parthy Chetty

Abstract

This study focused on finding an affordable and effective method to produce clean drinking water for rural communities using *Moringa oleifera* seeds (MOS). The seeds are known for their natural purification properties and offer a safe, low-cost solution for improving water quality. Three different forms of MOS, whole, crushed and powdered, were tested to determine which was most effective in purifying water.

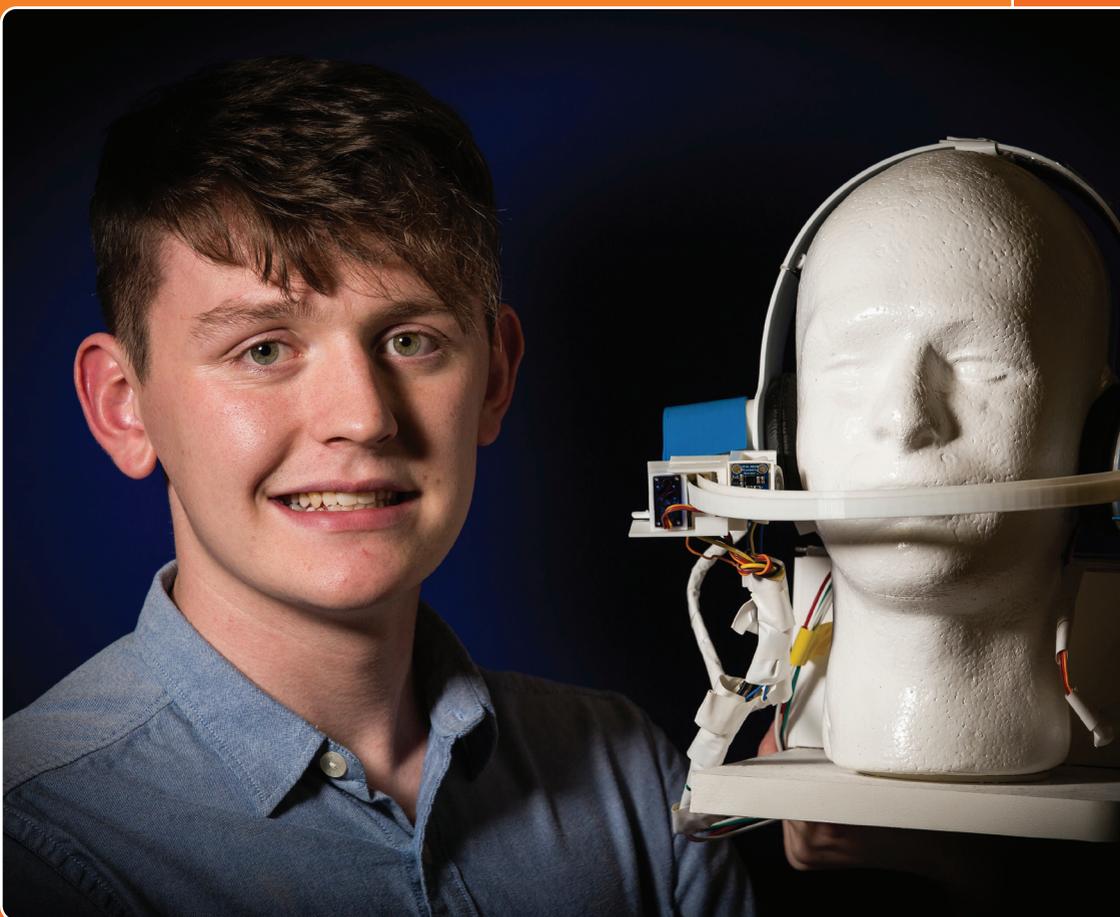
The initial experiments were carried out at home using 50 mg of MOS per litre of water to observe its settling ability. Further microbial tests were conducted at the Buffalo City Metropolitan (BCM) Water Services laboratory to evaluate MOS effectiveness in reducing total coliforms, particularly *E. coli*. A jar test was also performed at the Amatola Water Board to measure turbidity levels and determine whether the treated water met the South African National Standards (SANS 241) for potable water.

Results showed that the powdered form of MOS was the most effective, confirming the project's hypothesis. The optimum dosage was found to be 5 g/L, which successfully reduced turbidity to 4.3 NTU, meeting the SANS 241 requirement. It also significantly lowered *E. coli* counts, showing a marked improvement in water safety.

In conclusion, powdered MOS proved to be the best form for water purification due to its greater surface area and stronger coagulation effect. Although it effectively reduced turbidity and bacterial contamination, additional treatment such as boiling or disinfection with bleach is still recommended to ensure complete compliance with SANS 241 standards for safe drinking water.

PREVIOUS WINNERS

2011-2024

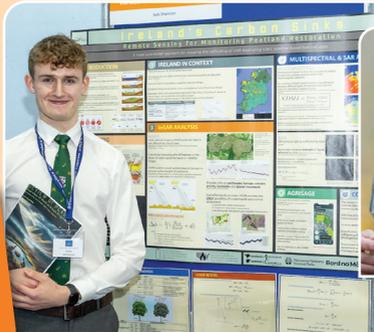


2024
SCIFEST STEM
CHAMPION



Maura Moore-McCune

2023
SCIFEST STEM
CHAMPION



Jack Shannon

2022
SCIFEST STEM
CHAMPIONS



Liam Waldron, Rachel Griffin,
Luke O'Sullivan

2021
SCIFEST STEM
CHAMPION



Clare Reidy

2020
SCIFEST STEM
CHAMPION



Caoimhin O'Leary

2019
SCIFEST SFI STEM
CHAMPION



Timothy McGrath

2018
SCIFEST SFI STEM
CHAMPION



Adam Kelly

2017
SFI Intel ISEF
AWARD WINNER



Aaron Hannon

2016
SFI Intel ISEF
AWARD WINNER



Caolann Brady

2015
SFI Intel ISEF
AWARD WINNER



Louis Madden

2014
SFI Intel ISEF
AWARD WINNER



Christopher Carragher

2013
SFI Intel ISEF
AWARD WINNER



Paul Clarke

2012
SFI Intel ISEF
AWARD WINNER



Simon Bluett

2011
SFI Intel ISEF
AWARD WINNERS



Eoghan Flynn,
Ruairi O'Neill



The SciFest 2025 Team

Sheila Porter	Founder and CEO
George Porter	Chief Financial Officer
Hugo Rowsome	Project Manager
Aoife Wadd	Programme Coordinator
Seán Foley	School Liaison Officer
Catherine Tattersall	School Liaison Officer
Alan Dunne	School Liaison Officer
Rory Geoghegan	School Liaison Officer
Damienne Letmon	School Liaison Officer

REGIONAL COORDINATORS

Dr Noreen Morris	Technological University of the Shannon Athlone
Ms Norma Welch	Munster Technological University Cork
Dr Eilish McLoughlin	Dublin City University
Dr Moira Maguire	Dundalk Institute of Technology
Dr Aisling Crowley	Atlantic Technological University Galway
Dr Adriana Cunha Neves	South East Technological University Carlow
Dr Tomi Zlatar	Atlantic Technological University Sligo
Ms Gráinne Maunsell	Munster Technological University Kerry
Dr Christopher McEleney	Atlantic Technological University Donegal
Dr Pauline Ryan	Technological University of the Shannon Limerick
Mr Martin McCormack	Technological University of the Shannon Thurles
Mr Mark Logue	St Mary's College, Derry
Dr Gemma Kinsella	TU Dublin Grangegorman
Dr Brian Murray	TU Dublin Tallaght
Dr Sheila Donegan / Mr Eoin Gill	South East Technological University Waterford



Partners, National Sponsors and Supporters

SCIFEST PARTNERS

INTEL
BOSTON SCIENTIFIC
EIRGRID
KEENOVA
DEPARTMENT OF EDUCATION AND YOUTH
RESEARCH IRELAND
THE TECHNOLOGICAL UNIVERSITIES
DUNDALK INSTITUTE OF TECHNOLOGY
DUBLIN CITY UNIVERSITY
ST MARY'S COLLEGE, DERRY
GAISCE - THE PRESIDENT'S AWARD

GOLD SPONSORS

THE BUSINESS EXCELLENCE INSTITUTE
REGENERON
DAWN MEATS
THE INSTITUTE OF PHYSICS
IRISH SCIENCE TEACHERS' ASSOCIATION

SILVER SPONSORS

DEPARTMENT OF FOREIGN AFFAIRS AND TRADE
EUROPEAN SPACE EDUCATION RESOURCE OFFICE IRELAND
(ESERO IRELAND)
BOTTLETOP MEDIA
TECHNOLOGICAL HIGHER EDUCATION ASSOCIATION

BRONZE SPONSOR

EXPLORIUM
HENKEL
ORACLE ACADEMY
TE CONNECTIVITY

SUPPORTERS

TECHCENTRAL.IE





SciFest

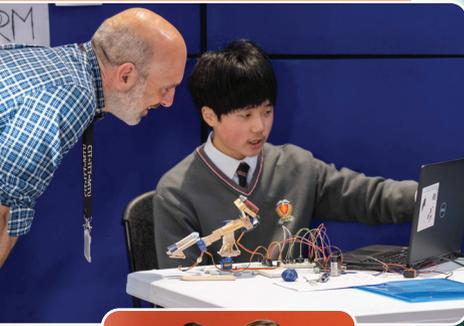
T: (+353) 1 298 8312

M: (+353) 86 379 6143

E: info@scifest.ie

W: www.scifest.ie





20-21 November 2025

