



The logo features a stylized '10' made of blue pixels, a white 'SciFest' text with an orange outline, and an orange orbital graphic with a central blue dot.

10 SciFest

CELEBRATING 10 YEARS
OF SCIENCE FOR ALL

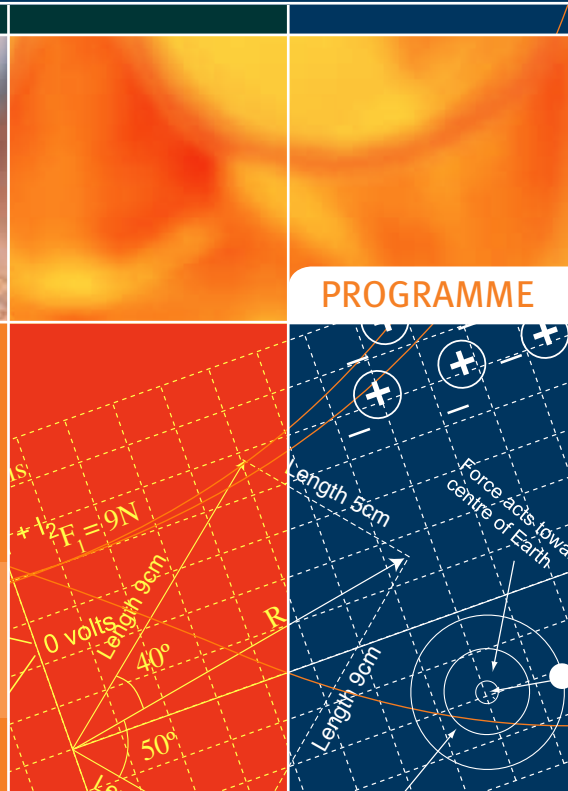
Inspiring and Promoting Excellence in STEM Education



PROGRAMME

SciFest 2017
National Final

A Celebration of
Excellence in STEM





SciFest National Final 2017

in Association with Science Foundation Ireland

SciFest 2017 was funded primarily by Science Foundation Ireland, Intel Ireland and Boston Scientific. The events were hosted locally in schools and regionally in the Institutes of Technology, DCU and St Mary's College, Derry and supported by a number of other partners. SciFest symbolises a highly successful collaboration between education, Government and enterprise and between the second and third level education sectors.



Foreword from Richard Bruton, TD

Minister for Education and Skills



It is always a great honour for me to welcome everyone to the SciFest National Final. 2017 marks the 10-year anniversary of this fantastic event, which is recognised across the education system as being a key driver and promoter of science, technology, engineering and maths among young people. STEM is of vital importance to our development as a society and as an economy, encouraging the growth of inquiry based learning and inventiveness that is necessary to achieve big breakthroughs for mankind. I am confident that the young people here today will be among the leaders in their fields in the years to come.

It is wonderful to see the levels of innovation, determination and dedication on display today. In my role as Minister for Education and Skills I have sought to put an emphasis on the learning of STEM at school. I will shortly be launching a comprehensive STEM plan which will outline how my Department plans to promote STEM education among students in all schools. STEM subjects help students to develop skills of creativity, adaptability, problem-solving and critical thinking which will serve them well into the future.

SciFest is a very important part of the work of developing STEM among our young people, and mirrors the work of my Department. Students are empowered to use what they learn in the classroom and apply it to real life situations, by answering their own questions in a rigorous and scientific manner. In effect, students develop the tools to help themselves, in an interesting and self-driven way. During the process, they develop as people too.

As this is the 10-year anniversary of SciFest, I wish to congratulate the organisers on bringing this transformative event to life. To date, over 50,000 students have participated, with 10,000 taking part this year alone, and this is a testament to the passion and drive of Sheila and George Porter. I also wish to congratulate all of the teachers who have given freely of their time to support students in their endeavours. Finally, I wish to thank all of the families and friends who have supported this year's participants in their work.

Ten years is an important milestone, and I have no doubt there will be many more milestones to come. I wish the very best of luck to everyone who is participating today. I hope everyone enjoys the day.

Welcome from Sheila Porter

SciFest Founder and CEO



On behalf of SciFest I would like to welcome you, students, teachers, parents, judges, and invited guests to the SciFest 2017 National Final. The year has been an exciting one for SciFest, celebrating not only its tenth anniversary but also the fact that it has grown to become Ireland's largest pre-college STEM competition. More than ten thousand students participated in SciFest 2017 bringing the total number of participants in the 10 years to over fifty thousand.

SciFest was set up to encourage a love of STEM through active, collaborative, inquiry-based learning and to give every young person, whatever their background or circumstances, the opportunity to achieve their potential in, and have an enjoyable experience of, STEM. Entry is free and open to all second-level students, thus promoting diversity and making participation highly inclusive and accessible.

As well as expanding each year SciFest continues to explore new avenues for development. Early in 2017 SciFest joined Gaisce - The President's Award as a Challenge Partner, providing further opportunities and recognition for SciFest participants. This year also saw the first SciFest STEM fair for students with intellectual disabilities in Trinity College Dublin.

The SciFest programme could not take place without the support of our partners, Science Foundation Ireland, Intel, Boston Scientific, the Institutes of Technology, DCU and St Mary's College, Derry. I would like to thank them, and all our sponsors, for their continued support. I would also like to thank the teachers and parents; their support and encouragement play a vital role in the success of the students.

Today, of course, is all about the students and a celebration of their achievements in the field of STEM. I would like to take this opportunity to give special praise and congratulations all these incredibly talented young people who've travelled here today from every corner of Ireland. The variety and quality of the projects on display testifies to the impressive spectrum of skills and creativity of the students involved. They represent the brightest young minds in the country, having already achieved success at a regional SciFest@College STEM fair.

I look forward to meeting the students and hearing about their projects. I hope that they enjoy the day and wish them every success now and in the future.

A Message from Dr Ruth Freeman

*Director of Strategy and Communications,
Science Foundation Ireland*



I am always delighted to attend the SciFest National Final, which year after year showcases the capacity of young people to engage with Science, Technology, Engineering and Maths (STEM) in a positive way and produce incredible pieces of work. This year is all the more notable as it is the tenth anniversary of SciFest. Over the past ten years, more than 50,000 students from all backgrounds across the island of Ireland have participated, demonstrating that SciFest is the most popular and inclusive event of its kind in Ireland.

Science Foundation Ireland is very proud to support SciFest. Our aim is to promote an awareness of STEM across the country and to also encourage people to engage with STEM in their everyday lives. We know that engaging young people at an early age is crucial. SciFest is an important grassroots event that promotes STEM among students, not just for one day, but throughout the year, at local and regional science fairs. Students in turn have the opportunity to make their interests a reality by developing projects that push the boundaries of science in new and exciting ways.

Attending the National Final every year is an excellent opportunity to see the projects that have been worked on for months and to meet the amazing students whose work and dedication have made them a reality. It is also a testament to the family and friends around each and every student, who support them in following their passions. I wish to congratulate everyone who has contributed to the projects on display today.

On the ten-year anniversary of SciFest I also wish to heartily congratulate Sheila and George Porter, whose dedication to promoting a love of STEM among young people has seen SciFest grow year after year and become such an important fixture on the educational calendar, recommended by teachers and principals across the country. The ten-year anniversary is a time to stand back and admire what has been achieved. It is also a time to look forward with confidence and anticipation to the many years that are to come.

I want to wish the very best of luck to everyone participating today. You are all great ambassadors for yourselves, your families, and your schools.

A Message from Sarah Sexton

*Communications Manager,
Intel Ireland*



Intel Ireland is proud to continue its sponsorship of the all island science competition SciFest. We are a science, technology and engineering company with people at the core of what we do. Every day we use science, technology, engineering and maths (STEM) to make amazing experiences possible for business and society, and for every person on Earth.

We believe that science fairs are an important element in promoting a student-centred, inquiry-based approach to skill development. Students are motivated to develop their own scientific investigations, develop models, collect, analyse and interpret data, draw inferences, display, communicate and defend their findings at a science fair and receive feedback on their investigation.

SciFest creates important opportunities for students to work on exciting and innovative projects and through participation at SciFest events students develop a wide range of valuable skills.

It is the bright, creative and curious minds of today's students that will be responsible for the innovations of tomorrow and the technologies and discoveries that we have yet to imagine.

Intel Ireland wishes all students the best of luck in today's competition.



A Message from Richie O'Sullivan

*Director, Research & Development,
Boston Scientific Galway*



Boston Scientific is delighted to partner with SciFest for the third year running.

On behalf of Boston Scientific we welcome everyone to the SciFest 2017 National Final. This is an event that we are passionate about supporting and so we are delighted to see the event continue to grow in content and excellence.

As a medical devices company with a strong focus on research, development and innovation, Boston Scientific is constantly looking for top talent in the fields of science, technology, engineering and bio-medicine. We are very aware that the promotion of STEM subjects, at second level in particular, is of vital importance. Our aim is to inspire students to develop a passion for these subjects, thereby ensuring we have a continuous uptake of the science and engineering disciplines at third level. As a result, we are helping to mould the scientists and engineers of the future.

We believe SciFest is an excellent opportunity for students to research, explore and develop their own ideas. It is through endeavours like this that students can nurture a passion for the STEM subjects and the positive impact they have on the world around us. Our commitment at Boston Scientific is to advance healthcare while giving back to the communities in which our employees live and work. We believe STEM education is a top priority for our business, for our patients and for our communities. We are delighted therefore to see such talented students taking part in events such as SciFest.

We wish all the students the very best of luck in their endeavours and we look forward to continuing our fruitful and exciting partnership with SciFest.

Table of Contents

Programme [page 11]

SciFest 2017 Judges [page 12]

Awards [page 13]

SCIFEST 2017 NATIONAL FINALISTS

PROJECT ABSTRACTS [pages 15-39]

[STAND 1] **TRACTOR SAFE LOCK**

SciFest@IT Tralee [page 16]

[STAND 2] **WHEN IN DOUBT SWING IT OUT!**

SciFest@LIT Thurles [page 17]

[STAND 3] **PROTECTING TURBOFANS FROM FOREIGN OBJECT DAMAGE**

SciFest@DIT [page 18]

[STAND 4] **WHAT ENVIRONMENT DO LICHENS PREFER?**

SciFest@DCU [page 19]

[STAND 5] **GLOGOS**

SciFest@ITC [page 20]

[STAND 6] **BIKE COLLISION PREVENTION SENSOR**

SciFest@ITS [page 21]

[STAND 7] **SOLAR SLEEVE**

SciFest@LIT Thurles [page 22]

[STAND 8] **PARK AND STRIDE – THE HIDDEN HAZARDS**

SciFest@DkIT [page 23]

[STAND 9] **FIRE ASHES – AN UNDERVALUED NUTRIENT**

SciFest@GMIT [page 24]

[STAND 10] **PREVENTION OF FURTHER CONCUSSIONS AND HEAD TRAUMA
IN RUGBY DUE TO EARLY DETECTION**

SciFest@WIT [page 25]

- [STAND 11] **THE TRUTH ABOUT CLEANING MAKEUP BRUSHES**
SciFest@DIT [page 26]
- [STAND 12] **MEASURING RADON AWARENESS**
SciFest@ITC [page 27]
- [STAND 13] **A NATURAL, ECONOMICAL AND ENVIRONMENTAL INSECT REPELLENT FOR USE IN THIRD WORLD COUNTRIES**
SciFest@ITB [page 28]
- [STAND 14] **TUTTIE FRUITY: WHAT'S IN YOUR SMOOTHIE?**
SciFest@ITT [page 29]
- [STAND 15] **CAN BEET BEAT OTHER CATTLE FEEDS?**
SciFest@AIT [page 30]
- [STAND 16] **AN INVESTIGATION INTO A SAFE PESTICIDE TO CONTROL VARROA MITES IN IRISH BEEHIVES**
SciFest@CIT [page 31]
- [STAND 17] **BIOASSAY TO INVESTIGATE THE EFFECT OF BOTH ORGANIC AND NON-ORGANIC FERTILISER RUNOFF ON DAPHNIA POPULATIONS**
SciFest@LIT [page 32]
- [STAND 18] **A STATISTICAL ANALYSIS OF THE SHORT-TERM SIDE EFFECTS ON THE HPV VACCINATION**
SciFest@DCU [page 33]
- [STAND 19] **“WHICH IS THE BETTER GROWING MEDIUM FOR POTATOES?”: A COMPARATIVE STUDY INTO THE EFFECT OF SEAWEED AND HOMEMADE COMPOST ON POTATO GROWTH**
SciFest@LyIT [page 34]
- [STAND 20] **SCOBY, SCOBY, DO**
SciFest@NorthWest(NI) [page 35]
- [STAND 21] **ENABLEARM: THE SHAVING DEVICE FOR PEOPLE WITH LIMITED HAND DEXTERITY**
SciFest@ITS [page 36]
- [STAND 22] **HEIGHT ADJUSTABLE CRUTCH**
SciFest@LIT [page 37]

[STAND 23] **AN AUTONOMOUS DEVICE THAT ASSISTS CAREGIVERS IN THEIR CARE OF PATIENTS SUFFERING FROM DEMENTIA**

SciFest@CIT [page 38]

[STAND 24] **STOPPING THE SHAKE**

SciFest@ITB [page 39]

SCIFEST 2017 BOSTON SCIENTIFIC MEDICAL DEVICES FINALISTS

[pages 41-46]

[STAND 21] **ENABLEARM: THE SHAVING DEVICE FOR PEOPLE WITH LIMITED HAND DEXTERITY**

SciFest@ITS [page 42]

[STAND 22] **HEIGHT ADJUSTABLE CRUTCH**

SciFest@LIT [page 42]

[STAND 23] **AN AUTONOMOUS DEVICE THAT ASSISTS CAREGIVERS IN THEIR CARE OF PATIENTS SUFFERING FROM DEMENTIA**

SciFest@CIT [page 43]

[STAND 24] **STOPPING THE SHAKE**

SciFest@ITB [page 43]

[STAND 25] **HEART VALVE DESIGN AND PROTOTYPE DEVELOPMENT**

SciFest@GMIT [page 44]

[STAND 26] **THE EFFECT OF MUSIC ON BLOOD PRESSURE**

SciFest@ITC [page 45]

[STAND 27] **ULTRA VISION**

SciFest@IT Tralee [page 46]

SCIFEST 2016 NATIONAL FINAL AWARD WINNERS

[pages 47-49]

[STAND 28] SCIFEST 2016 SFI INTEL ISEF AWARD WINNER

Caolann Brady, St Wolstan's Community School,
Celbridge, Co. Kildare

[STAND 29] SCIFEST 2016 SEAI INESPO AWARD WINNERS

Ciara MacCarthy, Claire Lemass, Our Lady's Bower,
Athlone, Co. Westmeath

[STAND 30] SCIFEST 2016 BERLIN LONG NIGHT OF SCIENCE AWARD WINNERS

Heather Murphy, Naoise Tobin, Sutton Park School,
Sutton, Dublin 13

The SciFest 2017 Team [page 50]

The SciFest Partners and National Sponsors [page 51]

SciFest 2017 National Final

in Association with Science Foundation Ireland

A CELEBRATION OF EXCELLENCE IN STEM

PROGRAMME 10 November 2017

9.00	Arrival and set up of projects
10.00	Judging and viewing of projects (10.00 - 11.00 – Judges only)
11.00	Judging and viewing of projects (exhibition hall open to invited guests, parents and teachers)
12.00	Mr Richard Bruton, TD, Minister for Education and Skills will visit the exhibition and view the projects
12.45	Lunch
13.30	Awards Ceremony Introduction – Stephen Davitt, Science Communicator, DCU
13.40	Prof. Brian MacCraith, President of DCU and Chair of the Board of SciFest Ltd
13.50	Dr Ruth Freeman, Director of Strategy and Communications, Science Foundation Ireland
14.00	Guest of Honour, Dr Jennifer Cleary, Presenter of RTE's INSIDERS science programme
14.10	Presentation of Awards <ul style="list-style-type: none">» Excellence in STEM Awards» SciFest 10th Anniversary Award» ISTA Award» THEA Award» Abbott Ireland Award» Boston Scientific Medical Devices Grand Award» Berlin Long Night of Science Award
15.00	SciFest 2017 SFI Intel ISEF Award Intel Teacher of Excellence Award
15.15	Photographs

SciFest 2017 Judges

National Finalists Judging Panel

Mr Gerard Hughes (Chair)	<i>Project Manager, Sentinus</i>
Dr Pádraig Ó Murchú	<i>Former Education Manager, Intel Ireland</i>
Dr Deirdre Kilbane	<i>School of Physics, UCD</i>
Mr Jim Cooke	<i>Teacher of Mathematics</i>
Dr Sheila Gilheany	<i>The Institute of Physics in Ireland</i>
Dr Jennifer McKenna	<i>European Programme Manager, Intel Research and Development Ireland</i>
Ms Michelle O'Flaherty	<i>Quality/Validation Consultant, Consultancy, Griffith College, Ireland</i>
Mr Simon Bluett	<i>Intel ISEF 2013, Electronic Engineering, TCD (Alumnus)</i>
Mr Paul Sheehy	<i>Intel Ireland</i>
Ms Rachel Linney	<i>Education Officer, NCCA</i>
Mr Bernard Capraro	<i>Silicon Technology Research Manager, Intel Ireland</i>
Mr Christopher Carragher	<i>Intel ISEF 2015, Mechatronic Engineering, DCU (Alumnus)</i>
Dr Joe MacDonagh	<i>Lecturer, ITT and Research Ethics board at St James's Hospital and Tallaght Hospital</i>
Mr Paul Hennessy	<i>Customer Experience Director, Abbott Diagnostics</i>
Dr Ruth Richards	<i>Inspector, Department of Education and Skills</i>
Dr Katie Corbett	<i>Teacher, Skerries Community College</i>
Mr Donal O'Shea	<i>Asset Manager/Project Manager, Avolon</i>
Dr Paul Lavin	<i>Genetic Technologist, Our Lady's Children's Hospital, Crumlin</i>
Ms Sonya Aherne	<i>AVP Technical, Powerplant, Avolon</i>
Dr Fergus McAuliffe	<i>Education and Public Engagement Manager at iCRAG</i>

Boston Medical Devices Judging Panel

Ms Anne Lynch (Chair)	<i>SciFest</i>
Dr Eithne Lynch	<i>Process Development Manager, Boston Scientific, Clonmel</i>
Ms Hannah Humphreys	<i>Research & Development Engineer, Boston Scientific, Galway</i>
Mr Kevin McClean	<i>Senior Inspector, Department of Education and Skills</i>

The Awards

SCIFEST 2017 SFI INTEL ISEF AWARD

Trophy and an all-expenses-paid trip for the student(s) to represent Ireland at the Intel International Science and Engineering Fair (ISEF) in Pittsburgh, Pennsylvania in May 2018. *Sponsored by Science Foundation Ireland and Intel Ireland.*

INTEL TEACHER OF EXCELLENCE AWARD

Trophy and an all-expenses-paid trip to the Intel International Science and Engineering Fair (ISEF) in Pittsburgh, Pennsylvania in May 2018 for the teacher of the SFI Intel ISEF Award winner(s). *Sponsored by Intel Ireland.*

BERLIN LONG NIGHT OF SCIENCE AWARD

Trophy and an all-expenses-paid trip for the student(s) and their teacher to attend the Long Night of Science in Berlin in June 2018. *Supported by the Department of Foreign Affairs and Trade.*

BOSTON SCIENTIFIC MEDICAL DEVICES GRAND AWARD

Engraved trophy and €500. *Sponsored by Boston Scientific.*

THE ABBOTT IRELAND LIFE SCIENCES AWARD

Engraved trophy and €150. *Sponsored by Abbott Ireland.*

THEA AWARD

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

ISTA AWARD

Engraved trophy. *Sponsored by the Irish Science Teachers' Association.*

SCIFEST 10TH ANNIVERSARY AWARD

Engraved trophy. *Presented by SciFest Limited.*

EXCELLENCE IN STEM AWARDS

Engraved plaques. *Sponsored by Science Foundation Ireland, Boston Scientific.*



SCIFEST 2017

NATIONAL FINALISTS

PROJECT ABSTRACTS



SciFest@IT Tralee 2017

[STAND 1] Title of Project	TRACTOR SAFE LOCK
Student	Jack Nagle
School	Killorglin Community College, Langford Street, Killorglin, Co. Kerry
Teacher Mentoring Project	Donal O'Reilly

ABSTRACT

My inspiration for this project came from witnessing my Grandad trapped under his tractor. When he got off his tractor rushing to put an implement on the back, he forgot to pull the handbrake. The tractor then rolled back crushing him under the tractor. Luckily his call was heard and he was rescued from underneath the tractor.

I started researching from that point and found out most farmers do not pull the handbrake when leaving their tractors. I was shocked to find that there is no device on the market that can be fitted to tractors to help stop the accidents that are occurring each and every day and, most importantly, reduce the number of deaths on farms.

The device I have created operates when the vehicle is in neutral. It sends a power signal to the first circuit and when there is no weight present on the seat sensor it sends a power signal to the second circuit/relay. When the first circuit receives power it then sends a power signal to the second circuit/relay which then sends a power signal to the control valve.

The control valve then operates the direction of the actuator which engages the handbrake. When the driver sits back into the seat, the actuator releases. The operator then has to release the handbrake manually.

SciFest@LIT Thurles 2017

[STAND 2] Title of Project	WHEN IN DOUBT SWING IT OUT!
Students	Christine Delaney, Seamus Ryan, Kate Madden
School	St. Joseph's College, Pallas, Borrisoleigh, Co. Tipperary
Teacher Mentoring Project	Mary Gorey

ABSTRACT

Our hypothesis was that we could develop a device that when used would develop muscle memory in the user to help golfers' backswing and putting.

We needed to obtain the optimal angle for a backswing in golf to give our device its target.

To improve our initial accuracy and reliability in calculating the optimal swing angle, which we had obtained from photos of famous golfers, we used Organic Motion sensors in the sports lab in LIT Thurles. This allowed us to calculate angles from a 3D simulation which gave us the ideal length of a golf backswing for configuration.

In swing mode, we developed three tilt switches and a buzzer that are positioned and programmed in such a way that you know how far back you are in your backswing. The three tilt switches constantly tell the microcontroller if they are "HIGH" or "LOW" alerting the user.

Putt mode uses an accelerometer as well as the buzzer; only one axis is used on the accelerometer, the x axis.

We trialled our device on a sample size of 174 people. Our results showed that for the backswing 100% of participants got within the optimum angle range (120° - 124°) upon retesting. For putting mode there was a mean improvement of 17.5%.

A development to our device would be to use the accelerometer in both swing and putt mode. To use it in swing mode we would use all three of its axes and have the microcontroller constantly monitoring their values.

SciFest@DIT 2017

[STAND 3] Title of Project	PROTECTING TURBOFANS FROM FOREIGN OBJECT DAMAGE
Student	Omar Salem
School	Sutton Park School, St Fintan's Road, Sutton, Dublin 13
Teacher Mentoring Project	Catherine Tattersall

ABSTRACT

At any given moment there are over 1 million people in the sky travelling across the planet. Air travel has become so vital for today's logistics and economy. However, one accident can cost millions in damage, cause airline stocks to plummet, ground entire fleets and ultimately result in the loss of life.

One of the primary contributors to air traffic incidents is foreign object debris. Foreign object damage occurs when any alien entities such as birds, rocks, screws and other debris enter the engine of an aircraft. The most common time for this to happen is during or shortly after take-off. Highly publicised incidents caused by FOD include Air France Flight 4590 Concorde crash in 2000 and US Airways Flight 1549 which landed in the Hudson River in 2009.

Various economic studies on the effects of FOD reveal that it costs airlines over 13 billion USD in repairs, new parts, cancelled flights, delays, maintenance and labour. This could also be viewed as 26 USD per flight. A solution that reduces or eliminates this danger and expenditure is highly needed in the aviation industry for it to continue to grow and remain safe.

I have developed an autonomous system that can be easily retrofitted to any modern jet engine on any modern subsonic aircraft. The system identifies foreign object debris about to enter the engine and prevents it from doing so with speed and precision. The most important design consideration, which has been implemented, is that it does this without compromising the high fuel-efficiency of modern aircraft.

Using DCU's new computational design and simulation studio, I have designed the system and tested it to see how it behaves aerodynamically and mechanically. I have constructed the prototype using a micro controller and a high-end 3D printer.

SciFest@DCU 2017

[STAND 4] Title of Project	WHAT ENVIRONMENT DO LICHENS PREFER?
Students	Ella Kavanagh, Niamh Scanlon
School	Dominican College, Griffith Avenue, Dublin 9
Teacher Mentoring Project	Catherine Corry

ABSTRACT

We measured lichen growth on 61 trees and surveyed the location and circumference of each tree, the smoothness of its bark, the presence of moss and lichen and the traffic levels in the area.

We found a wide range of average lichen growth on trees, from approximately 7% along Griffith Avenue to approximately 81% on Bantry Road in Drumcondra. Some lichens are sensitive to air pollution, so we were not surprised to see low lichen growth on Griffith Avenue as it is a busy road, and high lichen growth on Bantry Road as it is quiet. But by analysing our data we came to the conclusion that traffic is not always a deciding factor in the environment that determines whether lichens 'like' to grow there. In particular we found that lichen growth was high in trees on a busy road next to the Grand Canal in Dublin 2.

Overall, we think that several factors may contribute to lichen growth on the trees we surveyed, including light and moisture, and we suggest future research that could answer these questions and help us to plan future improvements for environments to support lichen growth on city trees.

SciFest@ITC 2017

[STAND 5] Title of Project	GLOGOS
Student	Seán Byrne
School	Avondale Community College, Avondale, Co. Wicklow
Teacher Mentoring Project	Aoife Sullivan

ABSTRACT

My project investigated different methods of making safety clothing 'glow', or emit its own light, to improve safety by making the wearer more visible.

The main aim of my project was:

- » To investigate alternative methods of making hi-vis clothing 'glow' to improve wearer safety

The methods used included:

- » To investigate whether hi-vis jackets can be seen in low-light conditions
- » To design a circuit to make hi-vis clothing emit its own light
- » To compare the effectiveness of different light emitting materials, such as electroluminescence (EL), fibre optic fabric, and photoluminescent phosphors

My main findings are as follows:

- » Hi-vis jackets are only visible when light is shining directly on them
- » By incorporating self-illuminating materials into the hi-vis jackets visibility is significantly improved
- » Electroluminescent tape is more visible than fibre optic fabric
- » The phosphorescent material (phosphor), strontium aluminate is a cheap, effective method to make hi-vis clothing glow to improve the wearer's safety

My key recommendations are:

- » Road safety for pedestrians and cyclists can be significantly improved by incorporating self-illuminating materials into clothing
- » Self-illuminating materials should also be used to improve the effectiveness of hi-vis clothing used in industry, and to improve workplace safety
- » A range of self-illuminating Glogos products can be developed to provide personal safety solutions for road users and for workers in industry

Future work includes:

- » Develop a range of safety products, e.g. Glo-Shoes
- » Develop products aimed at fashion industry, e.g. t-shirts with brand logos/slogans that glow
- » Bring products to market

SciFest@ITS 2017

[STAND 6] Title of Project	BIKE COLLISION PREVENTION SENSOR
Student	Ben Maloney
School	St. Muredach's College, Sligo Road, Ballina, Co. Mayo
Teacher Mentoring Project	Anne-Marie Whelan

ABSTRACT

Focusing on bicycle safety, I have designed a device that will alert the cyclist of any approaching vehicles within a 40-metre range whilst also alerting the driver of the cyclist's presence.

I have achieved this by using a LIDAR sensor (The Lidar Lite v3) to detect the vehicle; bright 10 millimetre LED lights (fixed beneath the saddle) that flash at the motorist to alert them of the cyclist's presence; and another LED (on the handlebars) that also flashes to alert the cyclist of the approaching vehicle, giving them ample time to react, if necessary.

Unlike the standard flashing red lights used on the back of many bicycles, I decided to incorporate a sensor so that the motorist will see a constant white flashing light that will increase in frequency as their vehicle approaches the cyclist. However, the light on the handlebars to alert the cyclist will only flash when the vehicle has entered into the 40-metre range of the sensor.

The main reason that I have selected this project is because The Road Safety Authority (RSA) statistics have shown a sharp increase in accidents for cyclists on Ireland's roads in the last number of years.

This device will leave cyclists in a much safer position as they will now be aware of any approaching vehicles before the vehicle has had a chance to enter into a dangerous range of the cyclist.

SciFest@LIT Thurles 2017

[STAND 7] Title of Project	SOLAR SLEEVE
Student	Joseph O'Donoghue
School	St. Joseph's College, Borrisoleigh, Co. Tipperary
Teacher Mentoring Project	Mary Gorey

ABSTRACT

I came up with my idea, Solar Sleeve, whilst listening to my dad complaining about the lack of wind one day which would mean our two wind turbines would not be generating much power.

Currently it takes a long time to get a grid connection. In our case, we waited nearly 9 years. It is a very slow process in Ireland. Most grid connections are only at 30% capacity of what they could add to the national grid. I investigated if I could add extra power to these grid connections, quickly and with a relatively low cost. I decided that solar energy would be a good area to investigate.

Adding photovoltaic cells to towers of turbines would be an example of sustainable development using pre-existing infrastructure.

In Ireland alone 228 farms, with each containing many turbines, could benefit from adding solar panels to the turbines according to my results.

140 m² of photovoltaic cells (without installation) in Ireland would cost approximately €380 from initial research based on a low-quality cell. Top of the range cells cost €16,000 for the area needed per turbine and would give a much larger power output.

The 'Solar Sleeve' has the potential to produce €51,000 a year minimum, per turbine, based on my readings, using low efficient PV cells, with average results from readings in both the winter and summer.

One turbine, working for 1608 hours a year would produce 1,050 MWh. That is enough to power 318 homes.

SciFest@DKIT 2017

[STAND 8] Title of Project	PARK AND STRIDE – THE HIDDEN HAZARDS
Students	Dearbhla McCourt, Ruth Clarke
School	St. Vincent's Secondary School, Seatown Place, Dundalk , Co. Louth
Teacher Mentoring Project	John White

ABSTRACT

Introduction

According to the Global Burden of Disease Study, air pollution causes more deaths than malnutrition, obesity, alcohol, drug abuse, and unsafe sex. We both attend school in Dundalk, a busy town, and were keen to investigate the levels of emissions from cars in this area.

Method

We detected elevated emissions (particulate matter, NOx gases and CO) using sensors we built and coded, outside primary schools located in Dundalk at peak traffic times (i.e. when parents are dropping their children to school and picking them up again). Pupils' height and number of passing cars were variables investigated in relation to increased levels of gas exposure.

We looked at 3rd – 6th class pupils as our target group and adjusted our sensors which were attached to an Arduino Uno board to the mean of their average height (nose position) (122.5 cm). We also used a separate identical sensor at the mean of the average height of an adult man and woman as a comparison (172 cm). We used these sensors to simultaneously record the elevated emissions from car exhausts that children are exposed to compared to adults along 'Park and Stride' routes.

Conclusions

Our investigative studies to date show that on average children are exposed to greater emission levels than adults. This is worrying for the health of children and warrants further investigation internationally because of the height (they are closer to ground level ozone and other toxic car exhaust emissions) and physiology of children (developing lungs). The EPA and WHO should take into account that lower dosages can have greater health implications on children and the under-12 population.

SciFest@GMIT 2017

[STAND 9] Title of Project	FIRE ASHES – AN UNDERVALUED NUTRIENT
Students	Shannon McHugh, Ciara Keaveney
School	Glenamaddy Community School, Glenamaddy, Co. Galway
Teacher Mentoring Project	Deirdre Hardiman

ABSTRACT

Aim

We aimed to show how turf and wood ashes have a lot of benefits by our research and our experiments. Our tests used comparisons of ashes versus artificial fertiliser. We aimed to educate people on the beneficial uses of wood and peat ashes.

Our tests

- » We examined the difference in the growth in grass – between the different types of ashes (wood, peat and a combination of both) – and comparing these with expensive and cheap artificial fertilisers.
- » We investigated the different nutrients in ashes and their purposes.
- » We grew ridges of onions with ashes mixed throughout the soil and ridges without.
- » We grew cabbage and used ashes around a ridge instead of slug pellets to investigate if ashes can be used as a slug repellent.
- » We investigated if the pH of soils could be raised by using ashes as a substitute for lime.
- » We carried out a taste testing of onions grown with and without ashes.
- » We contacted bin companies and horticulture centres to get their ideas and opinions.

Results and Conclusions

Through our experiments we showed how grass and crops grow better with ashes and how this product, which has lots of nutrients with valuable applications, is being wasted in Ireland.

We discovered that there is a difference in taste in onions grown with and without ashes.

We also found that slugs cannot pass through the ashes, so ashes can be used as a slug repellent.

We would like to see these ashes being dropped off at collection points, from where farmers and horticulture centres could collect and reuse them in an environmentally friendly way.

SciFest@WIT 2017

[STAND 10] Title of Project	PREVENTION OF FURTHER CONCUSSIONS AND HEAD TRAUMA IN RUGBY DUE TO EARLY DETECTION
Students	Eimear Power, Holly Meaney
School	Our Lady of Mercy Secondary School, Ozanam Street, Waterford City
Teacher Mentoring Project	Rosario Burke

ABSTRACT

Our aim was to provide a piece of equipment that can limit the number of head injuries a rugby player sustains in a game. We connected a webserver to an Arduino Uno Wifi and Arduino Nine Axes Motion Shield (micro-controller, accelerometer and gyroscope). The webserver is programmed to read all the data off the Arduino so coaches and medical staff can read the information from the webserver and detect whether the player has received a serious head injury.

The coaches and medical staff can then make a quick decision to remove the player from the field based on the figures displayed on the webserver. We carried out a number of experiments to test the reliability and accuracy of each attribute of our project. Each experiment we carried out was tailored specifically to testing each element of our project.

We also investigated the ongoing problem that is concussion. We compared rugby statistics from games just after rugby turned professional in 1995 to the modern game. We believe that our project can be used in a wide variety of contact sports not just rugby. We believe this project can contribute to science and hopefully make a difference!

SciFest@DIT 2017

[STAND 11] Title of Project	THE TRUTH ABOUT CLEANING MAKEUP BRUSHES
Student	Isobel Moloney
School	St. Andrew's College, Booterstown Avenue, Blackrock, Co. Dublin
Teacher Mentoring Project	Laura Brogan

ABSTRACT

My project is to see the effectiveness of different commercial cleansers versus the effectiveness of my own natural antibacterial cleanser on the removal of bacteria and cleansing of makeup brushes. I tested different commercial cleansers and then created my own cleansers based on the data I gathered from the results.

I created five different formulations of this cleanser using the same base soap but varying the amount of the natural antibacterial. The antibacterial chosen was tea tree oil. I then tested my cleansers to see the difference between mine and the commercial ones. I used different identification methods to help me identify different bacteria. I used Gram staining, KOH string test, Catalase test and colony counting to get my results.

The results I got from commercial cleansers was very unsatisfactory but I was extremely pleased with the results of my own natural antibacterial cleanser.

SciFest@ITC 2017

[STAND 12] Title of Project	MEASURING RADON AWARENESS
Students	Kate Kirwan, Ciara Carroll, Niamh O'Dowd
School	FCJ Secondary School, Bunclody, Co. Wexford
Teacher Mentoring Project	Catherine Doyle

ABSTRACT

Our school, FCJ Bunclody, is located in a high-risk radon area.

Radon is a naturally occurring radioactive gas that accounts for 56% of the total radiation dose received by the Irish population.

Aim

1. To measure and compare radon awareness in a high-risk and low-risk radon areas.
2. To determine the factors which influence the level of awareness.

Hypothesis

1. The level of awareness will be greater in high-risk radon area than low-risk radon area.
2. All houses built after 1997 would have a radon barrier (due to building regulations).
3. Residents in high-risk areas would be more likely to take action after learning about radon.

Experimental Work

1. Selecting a sample of households in both a high-risk and a low-risk radon area for comparison.
2. Designing, validating, distribution and completion of surveys among the sample householders.
3. Collating and analysing the results using Microsoft Excel Statistics Tool.
4. Presenting data using Tableau.
5. Carrying out site visits to validate findings.

Our Findings

1. One-third of people in high-risk radon areas are aware of radon compared to one-fifth in the low-risk radon area.
2. The awareness levels found in this survey were much lower than those of a similar awareness survey carried out in 2005 but we believe this is due to differing definitions of awareness.
3. 90% of people supported the idea of a legally required Radon Clear Certificate for new builds.

Recommendations

1. To standardise the definition of radon awareness.
2. Radon Clear Certificate for new builds a legal requirement.

SciFest@ITB 2017

[STAND 13] Title of Project	A NATURAL, ECONOMICAL AND ENVIRONMENTAL INSECT REPELLENT FOR USE IN THIRD WORLD COUNTRIES
Student	Molly Measey
School	Pobalscoil Iosolde, Kennelsfort Road Upper, Palmerstown, Dublin 20
Teacher Mentoring Project	Lynda Jordan

ABSTRACT

How can we deter locusts from crop fields, minimising the damage caused to farms in developing countries? While watching a documentary on Capuchin monkeys I noticed that the monkeys began to rub skins of multiple fruits on their body, including dragon fruit. Could dragon fruit be used as a companion crop to deter locusts?

I used lettuce leaves, locusts and a specially designed testing box to investigate my theory. The experimental method involved placing lettuce leaves in the testing box. Some leaves were “protected” by the presence of dragon fruit skins and some were not. Locusts were placed into the box for a period of time. The amount of lettuce consumed was measured by weight difference. Various techniques were tried but the most successful involved surrounding the leaves with dragon fruit skins. Behavioural issues with the locusts were encountered. For example, the locusts did not like walking on the cold tiles of the test box! It was necessary as a result to warm the tiles before I began each test run.

My results showed that locusts ate an average of almost 33% less of the leaf which was surrounded by dragon fruit skins than the leaf which was left “unprotected”. These results are supported by research I found that phenylacetone nitrile (known repellent) is released from cacti. African farmers could use this low-maintenance crop as a companion crop to repel locusts, as a lucrative crop to sell and export and even eat this nutritious crop.

SciFest@ITT 2017

[STAND 14] Title of Project	TUTTIE FRUITY: WHAT'S IN YOUR SMOOTHIE?
Students	Ciara McSweeney, Lucy McMahan
School	St Wolstan's Community School, Ballymakealy, Clane Road, Celbridge, Co. Kildare
Teacher Mentoring Project	Paula Kirrane

ABSTRACT

Our project, *Tutti fruity: What's in your Smoothie?*, investigates and measures the concentration of three different sugars found in common fruit and liquid ingredients used in homemade smoothie ingredients by investigating how sucrose and lactose are converted into glucose using digestive enzymes lactase and invertase in our bodies.

The project was inspired by our group's love for smoothies. The popularity of Nutri-bullets has caused a trend in the making of homemade smoothies to increase. The sweet taste that you taste from smoothies is undeniably addictive. We wanted to investigate how much sugar our bodies are really consuming from our everyday smoothie recipes. We decided to look for the glucose content instead of the sugar quantity as the glucose content is what our body actually consumes.

HYPOTHESIS: Smoothies contain sugar but homemade smoothies have better nutritional values than various store-bought smoothies.

We carried out a series of experiments in order to establish our results and conclusions. The glucose control test tested the ability of our urinalysis test strips. This acted as a control as it gave us clear expected results.

The average time was then found for the enzymes lactase and invertase to change the sugars and lactose into glucose. We carried this out three times and took an average time. We then tested numerous series of fruits and liquids for a) glucose content after invertase and b) glucose content after lactose. This was also repeated for the various smoothies we compiled.

As an extension, we also decided to compare the glucose quantities from homemade smoothie recipes to a sample of shop-produced recipes. We repeated step three on these various samples from commercial and store-branded smoothies.

SciFest@AIT 2017

[STAND 15] Title of Project	CAN BEET BEAT OTHER CATTLE FEEDS?
Student	Adam Kelly
School	Moate Community School, Moate, Co. Westmeath
Teachers Mentoring Project	Margaret Mandal, Mairead Cusack

ABSTRACT

My project aims to study the nutritional benefits of beet compared to other cattle feeds by monitoring the impact of diet on the daily live weight gain of weanlings and on rumen fermentation rates.

In January 2017 eight heifer weanlings of similar age were selected on my family farm. Over an eight-week period the weight gain of weanlings fed on a diet of silage and 5 kg of either beet or cereal ration was measured. My preliminary results showed that regardless of breed, weanlings fed on beet displayed greater increases in weight than those fed on cereals. After further research I found that beet is deficient in phosphorus. Therefore I repeated these experiments using a phosphorus additive to supplement the beet test which allowed me to compare two nutritionally balanced diets: beet and commercial cereal grain.

Both feed samples have been tested for organic matter, water and sugar content in the school lab. Fixed masses of faeces have been taken from both groups of weanlings and examined to determine the DMD (Dry Matter Digestibility) for each feed type.

In order to identify the effect of feed type on rumen fermentation rates I collected fresh rumen contents containing live microflora cultures. I monitored changes in the pH, temperature, carbon dioxide, methane and oxygen content of rumen samples over an eight-hour period using probes. The tests were repeated when fixed masses of fresh beet, year old beet, fermented beet and cereal ration had been added.

Using the results collected I hope to identify the true reason behind the success of beet in supporting weight gain and prove that it is a cost-effective feed for the Irish beef herd.

SciFest@CIT 2017

[STAND 16] Title of Project	AN INVESTIGATION INTO A SAFE PESTICIDE TO CONTROL VARROA MITES IN IRISH BEEHIVES
Students	Rachel Hodnett, Maeve O Regan, Aoife Minihan
School	Sacred Heart Secondary School, Convent Road, Clonakilty, Co. Cork
Teacher Mentoring Project	Claire Holland

ABSTRACT

Our project is an investigation into the deadly Varroa mites in Irish beehives and the damage they cause. Varroa mites are external parasites that suck the blood from both the adults and developing brood. They can cause abnormalities such as deformed wing virus which disables them from flying out of the hive and ultimately kills them as they cannot leave the hive without falling to the floor.

If a hive is left untreated it can collapse and an entire colony can be eradicated. Mites spread from colony to colony by drifting workers and drones. As a result of this Varroa mites are now epidemic in every hive in Ireland.

For our project we wanted to compare and observe the differences and similarities between chemical and natural known treatments for hives suffering with Varroa infestation. We began our project in November of last year. We used five hives, two with natural treatments (thyme oil and formic acid), two with chemical treatments (Bayverol and Apiguard) and finally our control with no treatment.

The results from our investigation showed us that thyme oil had the best outcome when based on different aspects of prosperity. We concluded from this that thyme oil was the best treatment to use while keeping the hives strong and healthy, while also killing a sufficient number of mites. This led us to continue our investigation using only thyme oil as our treatment on three hives with different application methods (vaporizing and filter paper) and one as our control.

SciFest@LIT 2017

[STAND 17] Title of Project	BIOASSAY TO INVESTIGATE THE EFFECT OF BOTH ORGANIC AND NON-ORGANIC FERTILISER RUNOFF ON DAPHNIA POPULATIONS
Student	Ruth Daly
School	Coláiste Chiaráin, Croom, Co. Limerick
Teacher Mentoring Project	Niamh Naughton

ABSTRACT

The main aim of my project is to investigate the effect of organic and non-organic fertiliser runoff on Daphnia.

Daphnia are aquatic crustaceans which normally inhabit fresh habitats. They are primary consumers as they feed on algae and are a main food source for many fish such as trout and salmon.

Fertiliser runoff contributes to increased algae growth in lakes and ponds. If fertiliser runoff also has a negative impact on Daphnia then this could speed up the process of eutrophication.

Daphnia have a number of natural responses to environmental stress – population decreases, heart rate changes and the egg type produced changes. Under stressful conditions female Daphnia reproduce sexually, where they develop eggs called ephippia.

I have applied the fertilisers to soil samples and filtered to obtain the “runoff.” Daphnia were placed into containers with equal amounts of runoff from different fertilisers. A control container was used to compare results. Daphnia were monitored daily for a period of ten days. I have recorded population changes, average heart rate, egg numbers and egg type.

Results were tabulated and graphed and clearly show that certain fertilisers have a dramatic toxic effect on Daphnia when compared to the control. The organic fertiliser had the least impact on Daphnia populations and responses.

My conclusion suggests that fertilisers with high concentrations of nitrates, sulfates and potassium had the most toxic effect on the Daphnia. Organic chicken manure had the lowest nitrate concentration and did not have the same negative impact.

SciFest@DCU 2017

[STAND 18] Title of Project	A STATISTICAL ANALYSIS OF THE SHORT-TERM SIDE EFFECTS ON THE HPV VACCINATION
Students	Savannah-Rose McAuley, Kelsey Wilson, Anna Sowray
School	Loreto Secondary School, Balbriggan, Co. Dublin
Teacher Mentoring Project	Dr Niamh McNally

ABSTRACT

Our hypothesis is that teenage girls in secondary schools who receive the HPV vaccination suffer from minor short-term side effects following the HPV vaccination.

HPV is a small spherical, double stranded DNA type virus, of which there are 200 strains. HPV is contagious and is spread by physical contact, infecting the mucous membrane. It is the world's most common STI. Annually 300 women are diagnosed with HPV in Ireland and 100 deaths are caused. We selected this topic due to major controversy regarding the vaccine in the media and in schools, and because the uptake of the vaccine has diminished in recent years.

Our investigations included determining the:

1. Vaccine uptake in our school
2. Immediate effects and the effects five hours later of the HPV vaccination on the first-year students
3. Short-term side effects on 600 students in our school and any school absences resulting from the HPV vaccine
4. Reasons parents forbade their daughters to receive the HPV vaccination
5. Difference in opinions of the vaccine between ethnical groups

We believe the negative media controversy surrounding the vaccine had a strong influence on parents. We discovered that 81% of the 1st year students who were surveyed experienced some form of a negative side effect directly after the vaccination such as nausea, vomiting, fainting, etc. Once surveyed again five hours later following the vaccination the short-term effects either remained the same or developed further. We have also investigated the impact of this year's push by the HSE to increase the uptake and will analyse the effect of this on the 2017 statistics.

SciFest@LyIT 2017

[STAND 19] Title of Project	“WHICH IS THE BETTER GROWING MEDIUM FOR POTATOES?”: A COMPARATIVE STUDY INTO THE EFFECT OF SEAWEED AND HOMEMADE COMPOST ON POTATO GROWTH
Students	Mark McAteer, Peter Curran
School	Mulroy College, Milford, Co. Donegal
Teacher Mentoring Project	Aisling McAteer

ABSTRACT

Our research has made us aware that seaweed is a natural food found all along our coast. It contains 60 essential nutrients that are vital for growth. As we are living along the coastline we have an abundance of seaweeds at our disposal. Plants grow at different rates. Choosing a plant that was slow growing was essential to the progress of the experiment, so as we could measure the growth rate.

Over a three-month period we planted potatoes in different mediums and watched the growth rate. The chosen potatoes were Rooster and Kerrs Pinks. This was carried out at the same time in various areas of locality using the same weather conditions. Although not in a controlled environment, all of the potatoes were exposed to the same conditions.

Our results showed that the compost and seaweed mixture was the best growing medium. The potatoes in seaweed did not survive at all. They did begin to grow but when the seaweed dried out the growth stopped and they died immediately. This was compounded with the fact that there was blight which killed the growth. The clay acted as an insulator as the other potatoes did not grow.

We are interested in going one step further and comparing the growth in ground seaweed and whole seaweed. It is necessary to do analysis of the nutrients present in the seaweed to make a comparison. Studies have shown that centuries ago seaweed was collected and composted in fields for potatoes to grow. If seaweed is an important growth medium it could be utilised more.

SciFest@NorthWest(NI) 2017

[STAND 20] Title of Project	SCOBY, SCOBY, DO
Student	Maeve Stillman
School	St Mary's College, 35 Northland Road, Derry, BT48 oAN
Teacher Mentoring Project	Ann Blanking MBE

ABSTRACT

This project arose from an article in the media concerning making cellulosic material as a by-product of brewing the probiotic drink Kombucha and using it to make clothes.

SCOBY (symbiotic culture of bacteria and yeast) has been found to have numerous uses. Doing some background research, I found that the material is very hydrophilic. I also found out about other uses for the material and decided to investigate two of them:

1. Growing a cellulosic material from the SCOBY and investigating ways of waterproofing it for use in clothing, using vegetable oil, flax seed oil, virgin olive oil, Briwax, beeswax, petroleum jelly and emulsion, with deionized water as a control. The treated SCOBY material is placed over the open end of a vertical tube containing water with a ruler behind and left for 10 minutes. The difference in water level is recorded. Hypothesis: The smaller the difference in water level the better the waterproofing ability of the material.
2. Investigating the material's possible use for removing metal ions from water using known concentrations of solutions of zinc, lead, iron III and lithium chlorides, and a conductivity meter to follow the concentration of dissolved solids (ions). Hypothesis: If the SCOBY removes ions then the conductivity should decrease.

Results show that beeswax was the most successful waterproofing material but did not give 100% waterproofing. It was decided to make and investigate emulsions as the hydrophilic end should attach to the SCOBY holding the waterproofing lipophilic end in position.

The results of the test for the ability of the SCOBY to remove metal ions was inconclusive. It appeared that ions were being added to the solution from the SCOBY as the conductivity increased. Further work would need to be done to identify the ions present.

SciFest@ITS 2017

[STAND 21] Title of Project	ENABLEARM: THE SHAVING DEVICE FOR PEOPLE WITH LIMITED HAND DEXTERITY
Student	Aaron Hannon
School	St. Muredach's College, Sligo Road, Ballina, Co. Mayo
Teacher Mentoring Project	Kevin Boyle

ABSTRACT

The project was inspired by my late grandfather Joe, who suffered from limited hand dexterity due to a stroke. This left him unable to shave independently – a source of frustration for him. After extensive desk research it was established that no product currently available would have served his needs or those of others. Thus, I hypothesised that there is a need for a device which helps people with limited hand dexterity to shave independently. This was verified through field research – meeting focus groups and distributing and analysing user surveys. Key performance indicators were identified at this stage after user consultation.

Technical research was carried out to assess potential designs. The Stanford University d-School “Design Thinking” approach was used as the design process guideline in this project. Through multiple iterations, repeated testing and a user-focused approach, design concepts were analysed and developed using sketches, CAD and FEA software and 3D printed prototypes to produce a high-quality physical design. Software and electronic design was approached similarly, using Arduino to code the device’s operations. Continual testing was carried out using a mannequin head to develop and refine the design. An Android app was designed and tested to allow greater ease of use, as demanded by users. The initial prototype was critiqued by users in the second user research phase, before more technical refinements were made.

In conclusion, a functional prototype was created that fits the needs of the user and is ready for further development to become a market ready product.

SciFest@LIT 2017

[STAND 22] Title of Project	HEIGHT ADJUSTABLE CRUTCH
Students	Thomas Curtin, Dylan Moloney
School	Desmond College, Gortboy, Newcastle West, Co. Limerick
Teacher Mentoring Project	Donal Enright

ABSTRACT

Our project is a customisable crutch that helps people with a lower body disability to stand up and sit down more easily. We came up with this idea when Dylan fractured his knee playing a soccer match and he had to get crutches. Dylan was at school one day trying to sit down on a chair, and with normal crutches you have to remove your hands and find your balance on your other leg. While he was trying to do this, he lost his balance and landed on his injured leg. Wishing that there was a device to help him with these challenges, we decided to come up with an idea of our own.

Our device will allow crutch users with varying BMIs to sit down or get to a standing position with ease while they are using our product. By customising the grips to the user we will reduce the usual cramps and pains associated with normal crutch handles.

We discovered the average body mass of a person varies between 18.5 BMI and 25.8 BMI. We also discovered the average weight of a person varies between 45.5 kg and 50 kg, depending on gender.

We had the opportunity to demonstrate our device to medical personnel including the Physiotherapy Department in the University Hospital Limerick, doctors, and end users. Our awareness and empathy for crutch users and their injuries as well as the issues they face while using crutches has spurred us to believe in our product and its ability to solve these issues.

SciFest@CIT 2017

[STAND 23] Title of Project	AN AUTONOMOUS DEVICE THAT ASSISTS CAREGIVERS IN THEIR CARE OF PATIENTS SUFFERING FROM DEMENTIA
Student	Danila Fedotov
School	North Monastery CBS, Our Lady's Mount, North Monastery Road, Cork
Teacher Mentoring Project	Frank Murphy

ABSTRACT

There are multiple reports published by The Irish Examiner, Trinity College Dublin and The Alzheimer's Society of Ireland stating that there are over 48,000 people with dementia living in Ireland and that this number is on the rise. It is expected to triple by the year 2040.

A device has been created to support family carers / caregivers by making it easier for them to monitor the patient. This device is a wrist-worn device, by the patient, which uses micro technology and many forms of communication to notify the caregiver of a possible fall using an Inertial Measurement Unit (IMU), the exact location of the patient inside their home using Radio Frequency Identification and the approximate location outside their home using GPS. The caregiver is notified via an Android app or a website which is hosted to display the identical information as on the app. This will make it easier for the caregiver and improve privacy for the patient as they are not required to be checked on as often.

This project was mainly targeted at the symptoms of dementia but is also freely usable with people who have different disabilities or are simply elderly. This project may prove useful in hospitals and elderly homes too. This project's purpose is to improve health care and privacy for the patients and make caregivers more efficient as they can then monitor more patients than normal by simply using an app.

SciFest@ITB 2017

[STAND 24] Title of Project	STOPPING THE SHAKE
Students	Katie Rattigan, Hannah Nugent
School	Loreto Secondary School, St Michael's, Navan, Co. Meath
Teacher Mentoring Project	Dr Lisa Darley

ABSTRACT

Inspired by our grandfather who suffers from Parkinson's, we have designed and tested a device that when attached to any cup could counter movement in the cup caused by hand tremors experienced by people with conditions such as Parkinson's Disease. The aim of this device is to give sufferers of Parkinson's more independence and to improve their quality of life.

We have successfully designed, developed and tested a handle that will enable a person with a tremor to drink liquids comfortably without spillage. Our device, which can attach to any type of cup, utilises a levelling system based on a ball bearing to counter the sudden movement experienced during shaking and to re-level the cup.

Using deviation from an angle of 180 degrees as a quantitative measure of the suitability of our device we were able, over the course of nine prototypes, to reduce the mean angle from 35 degrees to 1 degree. Statistical analysis of multiple tests showed our results to be extremely statistically significant, proving our device does have an effect.



SCIFEST 2017 BOSTON SCIENTIFIC MEDICAL DEVICES

PROJECT ABSTRACTS



SciFest@ITS 2017

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Student	Aaron Hannon
School	St. Muredach's College, Sligo Road, Ballina, Co. Mayo
Teacher Mentoring Project	Kevin Boyle

This project is also a National Finalist – see page 36 for the project abstract.

SciFest@LIT 2017

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Students	Thomas Curtin, Dylan Moloney
School	Desmond College, Gortboy, Newcastle West, Co. Limerick
Teacher Mentoring Project	Donal Enright

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SciFest@CIT 2017

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SciFest@GMIT 2017

[STAND 25] Title of Project	HEART VALVE DESIGN AND PROTOTYPE DEVELOPMENT
Student	Thomas Hayes
School	Yeats College, College Road, Galway
Teacher Mentoring Project	Marian Lowry

ABSTRACT

Stenosis and leakage are serious heart diseases that affect 1.5 million people in the United States. There is a high mortality rate linked with these diseases. This project sought to design and develop prototype heart valves to treat these heart diseases.

First existing heart valves were researched and a design brief was prepared. Prototypes were developed using alternative designs and assembly methods compared to existing valve design in the market place. A basic bench test method was developed to compare early prototype designs. Later prototypes were tested using industry standard medical device test equipment. Test results were analysed, evaluated and compared to international standards for heart valves.

The final design achieved the design brief requirements. Readily available resources were used, acceptable haemodynamics were recorded and final designs met international standards for leakage and valve opening. Secondary design brief requirements were met; stainless steel, suture, and bovine tissue were used, which are all nonthrombogenic, inexpensive and accessible. As these materials are already used in existing heart valves they are unlikely to degenerate or damage blood constituents.

These valves prototypes, in particular double ring valves, have the potential to be used in surgical aortic valve replacement. They use available and inexpensive materials and they can be easily made to fit typical annulus size. Further development would be required in finalising this design.

The basic test method developed while somewhat crude allowed all prototypes to be compared to each other and to International standards. The Vitro pulse duplicator results demonstrated the limitations of the basic test method and ensured the final design achieved ISO standard for heart valves. The recommendation is that these prototype valves be wear and fatigue tested.

SciFest@ITC 2017

[STAND 26] Title of Project	THE EFFECT OF MUSIC ON BLOOD PRESSURE
Students	Fintan Smith, David Kemple
School	Coláiste Bhríde, Carnew, Co. Wicklow
Teacher Mentoring Project	Miriam Rickerby

ABSTRACT

When we commenced with our project we had a basic goal in mind – to identify and detect the effect of music on blood pressure in the classroom. We hypothesised that there would be a minor rise in blood pressure. However once results were gathered and through rigorous experimentation our project evolved.

Our initial experiment confirmed blood pressure as our dependent variable and music as our independent variable. Firstly, we acquired our blood pressure at rest. Then using a blood pressure monitor and six music tracks, which were split into two groups named ‘calm’ and ‘energetic’, we, while strapped to the monitor and listening to the tracks, established that candidates’ pulses significantly decreased when listening to ‘calm music’. Additionally, pulses increased dramatically when listening to ‘energetic music.’

Implementing the results, we used them in conjunction with a class test. This involved two quizzes, which were completed by the students while listening to the different types of music. The students listening to ‘calm music’ on average achieved a grade 15% higher.

Then, using a watch that recorded blood pressure, we looked at an average student’s week and how their blood pressure fluctuates throughout the day. We focused on how adding music could increase a student’s work ethic throughout the day. During lunch the students’ blood pressure rose, we suggest that they listen to ‘calming music’ here. During the middle and end of the day is when the students’ blood pressure is at its lowest. We recommend playing energetic music here.

Our findings, in conclusion, assist students by relaxing them in stressful situations.

SciFest@IT Tralee 2017

[STAND 27] Title of Project	ULTRA VISION
Student	Timothy McGrath
School	Killorglin Community College, Langford Street, Killorglin, Co. Kerry
Teacher Mentoring Project	Donal O'Reilly

ABSTRACT

Aim:

I am investigating/solving the problem that blind people have when they encounter out of the ordinary obstacles in walking the public domain. The categories that these obstacles go under are temporary obstacles or obstacles that are not connected to the ground. Obstacles such as scaffolding, ladders, signage boards and wing mirrors from large vehicles are all hazardous to the blind person. It's not just the natural obstacles, such as overhanging tree branches, rose bushes, etc. they worry about. Blind people have no way of knowing if they are approaching such obstacles. Having witnessed this in my home town on numerous occasions I began thinking and planning a way to solve this problem by using technology.

My project helps blind people to navigate around obstacles in their everyday life using my sensor glasses powered by Raspberry Pi. Over 39 million people worldwide will benefit from my project. The wearable technology, which is run by a small form factor operating system, is seamlessly integrated into a simple pair of glasses. The system will revolutionize how blind/visually impaired people detect and then avoid obstacles. It does this using an ultrasonic sensor which, using ultrasonic waves, detects obstacles and then gives a reading of how far away the obstacles are. This information is sent to the blind / visually impaired person in the form of audio through speakers.

Conclusion:

I believe I am closing the gap when it comes to using technology to its fullest potential in assisting blind people.

SCIFEST NATIONAL FINAL

2016

AWARD WINNERS



SciFest@ITT 2016

[STAND 28] Title of Project **HUM YOUR WAY TO BETTER HEALTH**

**SciFest 2016
SFI Intel ISEF
AWARD WINNER**

Student	Caolann Brady
School	St Wolstan's Community School, Ballymakealy, Clane Road, Celbridge, Co. Kildare
Teacher Mentoring Project	Karen O'Callaghan

AWARD AT INTEL ISEF 2017 IN LOS ANGELES

2ND Place in the Biomedical and Health Sciences Category

SciFest@AIT 2016

[STAND 29] Title of Project **CAONACH CLISTE**

**SciFest 2016
SEAI INESPO
AWARD WINNER**

Students	Ciara Mac Carthy, Claire Lemass
School	Our Lady's Bower, Retreat Rd., Athlone, Co. Westmeath
Teacher Mentoring Project	Ciaran Mac Carthy

AWARDS AT INESPO 2017 THE NETHERLANDS

1ST Place and Gold Medal

SciFest@DCU 2016

[STAND 30] Title of Project **SOUND ABSORBING PAINT**

**SciFest 2016
RUNNERS-UP**

Students	Heather Murphy, Naoise Tobin
School	Sutton Park School, St Fintan's Rd, Sutton, Dublin 13
Teacher Mentoring Project	Catherine Tattersall

BERLIN LONG NIGHT OF SCIENCE

Educational Visit

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10 November 2017

