SciFest

Inspiring and promoting excellence in STEM education

Programme

SciFest@SFI Discover

A Celebration of Excellence in STEM

SciFest 2015 was funded primarily by Science Foundation Ireland's Discover Programme, Intel Ireland and Boston Scientific. The events were hosted by the Institutes of Technology 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 Jan O'Sullivan, TD

Minister for Education and Skills

Welcome to the SciFest@SFI Discover 2015 National Final. I am heartened when I hear about science competitions like SciFest because it encourages students to learn about science, technology, engineering and maths (STEM) in a fun, creative and innovative way. An initiative like SciFest encourages students to challenge their thinking and apply their knowledge of STEM in a practical way. Events such as these are rooted in the natural curiosity and inquisitiveness of young people. SciFest@SFI allows them to demonstrate how that natural wonder has evolved through scientific experimentation and method. Through this process students take more control of their own learning and build skill sets necessary for the 21st century.

Research has shown that the quality of students' engagement – with the school, with teachers and with learning – is central to developing the skills and competencies that are necessary for students in today's world. SciFest allows students to engage with STEM from an early stage in their education thereby creating an interest from an early age. These young students are embarking on a voyage of personal and scientific discovery, the skills they learn through SciFest will stand to them in their future endeavours. Today, it is important that we recognise the achievements of all these students because they are the innovators, doctors, scientists and engineers of tomorrow.

More than 7200 students from more than 258 schools throughout the country participated in SciFest 2015. This is a tremendous achievement and I would like to take this opportunity to thank all of those who made this possible – the pupils, teachers, parents, Institutes of Technology and SciFest organisers.

The students exhibiting today represent the brightest young science minds in the country; they have excelled at their respective SciFest@College events and are already winners in their regions.

I wish all students the very best of luck and look forward to hearing about the winning project.

Jan O'Sullivan, TD

A Message from Professor Mark Ferguson

Welcome to the SciFest National Final 2015. This is the eighth year of the national SciFest event and I am delighted to see that year on year, participation in the programme continues to rise. Science Foundation Ireland (SFI), through our Discover Programme, is proud to have been able to support the SciFest project for the last number of years. The impact of science fairs like SciFest on encouraging students to become involved in science, technology, engineering and maths (STEM) is immense. Offering the opportunity to develop their ideas from conception to exhibition gives students the confidence and ambition to continue with the study of STEM at third level and to consider careers in related areas of the economy.

An educated workforce is paramount to supporting the development of Ireland as a global leader in science and technology. By encouraging our young students to participate in SciFest and similar fairs, we can afford them the opportunity to develop the skills – communication, problem-solving, critical thinking – required to prepare them: not just for employment but for a fulfilling life in a technological society. The rate of progress in this sector is staggering with new developments occurring daily; exposing young minds to this fast paced environment early provides them the greatest opportunity for success in the futu0re.

Over 7000 students from more than 250 schools throughout the country participated in SciFest 2015 at local and regional level. This is a remarkable achievement and I would like to thank all of those who made this possible – the students, teachers, parents, Institutes of Technology and SciFest organisers.

The students exhibiting today have already proven the quality of their work having achieved top marks at their respective SciFest@College events in their regions. I wish them all the very best of luck and look forward to hearing about the winning projects.

Professor Mark Ferguson
Director General of Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland

A message from

Leonard Hobbs, Public Affairs Director, Intel Ireland

Intel Ireland is delighted to be a sponsor of SciFest.

Intel is a Science, Technology and Engineering company with people at the core of what we do. Intel people use Science, Technology, Engineering and Maths (STEM) to research, design, innovate and manufacture computing and communication devices that connect and enhance the lives of every person on earth.

Science fairs are an important element in promoting a student-centred, inquiry-based approach to STEM 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 opportunities for students to work cooperatively with others on areas of local, national and/or global scientific and engineering interest. Through participation at SciFest events students develop skills sets that will inspire and shape the next generation of creative problem solvers and entrepreneurs. Such skills sets will be required to address future global concerns of food, water and energy security, create wealth to sustain growth and provide better health services and better infrastructure.

The SciFest National Final is the culmination of months of dedication, hard work and passion being demonstrated by students right across Ireland and the projects being shared today are a testament to the possibilities that are held by the country's next generation of innovators. We wish the best of luck to each of the participants and look forward to welcoming the winning project to participate at the Intel International Science and Engineering Fair being held next year in Arizona in the United States.

Leonard Hobbs

A Message from

Elaine Boyd, Director, Human Resources, Boston Scientific Galway

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

Boston Scientific is a medical devices company with a strong focus on research, development and innovation. As a company, we are committed to STEM education, to advancing healthcare and to the communities in which our employees live and work. Boston Scientific hires top talent in the fields of science, technology, engineering and bio-medicine, while supporting STEM education programs that inspire young people to pursue technical studies, expanding the diverse talent pipeline. Our efforts include a Corporate Social Responsibility team in Galway who are focussed on the promotion of education in our community. This team places a strong emphasis on motivating young people to pursue secondary education in STEM-related fields of study.

SciFest was a natural fit for Boston Scientific to partner with in this respect. 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. SciFest is an excellent opportunity for students to research, explore and develop their own ideas.

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

Elaine Boyd,

Director

Human Resources

Boston Scientific Galway

Boston Scientific
Advancing science for life™

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The SciFest 2015 Team

The SciFest Partners and National Sponsors

SciFest@SFI Discover

A Celebration of Excellence in STEM

6 November 2015

Programme

9.00	Arrival and set up of projects
10.00	Judging and viewing of projects (10.00 -11.00 – Judges only)
10.15	Mr Richard Bruton, TD, Minister for Jobs, Enterprise and Innovation will visit the exhibition and view the projects
11.00	Judging and viewing of projects (exhibition hall open to invited guests, parents and teachers)
12.45	Lunch
13.30	Awards Ceremony Introduction – Dr Arlene O'Neill
13.40	Dr Pádraig Kirk, Director, CPD for Junior Cycle and Director of SciFest Ltd
13.50	Professor Mark W.J. Ferguson, Director General of Science Foundation Ireland and Chief Scientific Adviser to the Government
14.00	Guest of Honour, Jennifer Cleary, Presenter of RTE's INSIDERS science programme
14.10	Presentation of Awards • Excellence in STEM Awards • Spirit of SciFest Award • ISTA Award • IOTI Award • Boston Scientific Medical Devices Award • SEAI INESPO Award • Berlin Long Night of Science Award
15.00	SciFest 2015 Grand Award Intel Teacher of Excellence Award
15.15	Photographs

SciFest@SFI Discover Judges 2015

SciFest Grand Award Judging Panel

Mr Gerard Hughes (Chair)	Project Manager, Sentinus
Prof. Martin Henry	Physical Sciences Department, Dublin City University
Dr Eamonn Cahill	Department of Jobs, Enterprise and Innovation
Dr Sheila Gilheany	The Institute of Physics in Ireland
Dr Ruth Richards	Inspector, Department of Education and Skills
Mr Tom Bolger	SFI
Dr Jennifer McKenna	Senior Dry Etch Plasma Engineer, Intel Ireland
Mr Jim Cooke	Teacher of Mathematics
Ms Michelle O'Flaherty	Technical Services Manager at Rottapharm
Dr Pádraig Ó Murchú	Former Education Manager, Intel Ireland
Dr Miriam Ryan	UCD Institute of Food and Health
Dr Deirdre Kilbane	Department of Physics, University of Kaiserslautern, Germany
Mr Aidan Fallon	Department of Perfusion, St James's Hospital
Mr Bernard Capraro	Silicon Technology Research Manager, Intel Ireland
Dr Gerry Mac Ruairc	School of Education, University College Dublin

SEAI INESPO Award Judging Panel

Ms Aoife Cannon (Chair)	SciFest
Mr Kevin O'Rourke	Former Head of Low Technologies, SEAI
Mr Declan Cahalane	Senior Inspector, Department of Education and Skills
Mr Richard Morton	Programme Executive, SEAI

Boston Medical Devices Award Judging Panel

Ms Anne Lynch (Chair)	SciFest
Mr Michael Walsh	Senior R&D Engineer, Boston Scientific
Mr Martin Fawdry	Principal R&D Engineer, Boston Scientific
Ms Noreen McMorrow	Inspector, Department of Education and Skills

The Awards

SciFest 2015 Grand 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 Phoenix, Arizona in May 2016. *Sponsored by SFI Discover 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 Phoenix, Arizona in May 2016 for the mentor of the Grand 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 mentor to attend the Long Night of Science in Berlin in May 2016. *Supported by the Department of Foreign Affairs and Trade*.

SEAI INESPO Award. Trophy and an all-expenses-paid trip for the student(s) and their mentor to represent Ireland at the International Environment and Sustainability Project Olympiad (INESPO) in the Netherlands in May/June 2016. *Sponsored by the Sustainable Energy Authority of Ireland (SEAI).*

Boston Scientific Medical Devices Award. Engraved trophy and €500. *Sponsored by Boston Scientific.*

IOTI Award. Engraved trophy and €75. *Sponsored by Institutes of Technology Ireland.*

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

Spirit of SciFest Award. Engraved trophy. *Presented by SciFest Limited.*

Excellence in STEM Awards. Engraved plaques. *Sponsored by SFI Discover.*

GRAND AWARD PROJECT ABSTRACTS

SciFest@CIT 2015

STAND 1

Title of Project: Maths Behind Music

Student: Sarah Kate Sweeney

School: Scoil Mhuire Gan Smál, Blarney, Co. Cork

Teacher Mentoring Project: Sean Foley

Project Category: Physical Sciences

ABSTRACT

This project combines my interests in music and technology. It is an investigation into the simulation of musical instrument timbres using Discrete Fourier Analysis. The original objective was to understand why different musical instruments sound different even when playing the same note. I wanted to develop a technique to allow multi-instrument musical scores to be synthesised from small amounts of reference data. This technique could be used in the gaming industry among others.

I recorded several notes on multiple instruments and analysed them using the Short Time Discrete Fourier Transform. I extracted the amplitude of the fundamental and up to sixteen harmonics from each window in each note. However, these are complex numbers. Phase shift is inaudible to the human ear, so I found the absolute value of the complex amplitudes. Using those absolute values, I re-synthesised the musical notes using a series of sine waves whose amplitude coefficients were the absolute values calculated earlier. I used interpolation to make the transitions between the windows smooth. I then synthesised a tune to demonstrate the viability of the technique as a way of generating commercial music. All of my software was written in Python and I used many standard libraries such as numpy and matplotlib.

The synthesised notes were a very good approximation to the original reference notes and it was easy to distinguish between the timbres of the different musical instruments. The tune was also a success and demonstrated how synthesised music could be used in gaming and other applications requiring musical scores.

SciFest@AIT 2015

STAND 2

Title of Project: **The Price of a Profit - A Statistical Analysis of the Effects of the GMS Charge**

Student: Mark Lyons

School: Lanesborough Community College, Lanesborough, Co. Longford

Teacher Mentoring Project: Michael Lyons

Project Category: Life Sciences

ABSTRACT

The aim of my project was to determine whether the GMS charge caused medical card patients to stop taking prescribed medications, thus negatively impacting on patient health. The charge is €2.50/item. National and international reports on the issue, along with observations from working in my local pharmacy, indicated that the charge was causing patients to refuse to take prescribed medications.

Using the software program Gretl I analysed GMS data from my test pharmacy from 2009 onward. By running a linear regression model I found that for every €1 increase in the charge 6 fewer items were being dispensed daily. On examining the scripts in greater detail I found that when the charge was increased to €2.50/item a number of patients asked the pharmacist not to dispense medications prescribed by their doctor. When I compared the 3 months after the charge was raised to the same three months the previous year I found that there was a 644% increase in patients refusing prescribed medications.

I cross-referenced these "refused" items with a list of "essential medications" and found that over 15% of refused medications fell into this category. The majority of these were preventative inhalers.

I then contacted a number of hospitals who confirmed that, since the charge rose to €2.50/item, they've noticed an increased number of patients in hospital with poorly controlled asthma.

In conclusion, my project has shown that, at its current level, the GMS charge is causing patients to stop taking essential medications, and is thus impacting on patient health.

SciFest@NorthWest 2015

STAND 3

Title of Project: **Investigating the Ability of Egg Membrane to Absorb Carbon Dioxide and the Development of a Fan/Filter that Can Remove Carbon Dioxide from the Air**

Students: Laura McLaughlin, Aine Gillespie

School: St Mary's College, 35 Northland Road, L'Derry, Northern Ireland, BT48 0AN

Teacher Mentoring Project: Ann Blanking

Project Category: Physical Sciences

ABSTRACT

The aim of the project was to test the ability of egg membrane to absorb carbon dioxide.

Egg membrane was exposed to carbon dioxide generated from the reaction of controlled amounts of hydrochloric acid and calcium carbonate which was dried by passing over anhydrous calcium chloride before reaching the egg membrane.

The egg membrane was weighed before and after exposure to the carbon dioxide.

The hypothesis was that if the egg membrane had gained in mass after exposure then it had absorbed carbon dioxide.

Results showed that egg membrane does absorb carbon dioxide irrespective of whether the membrane came from raw or boiled eggs. The membrane was shown to absorb 83% of the carbon dioxide it was exposed to.

The ability of egg membrane to absorb carbon dioxide was put to use in a fan/filter which can draw air through the egg membrane and remove the carbon dioxide. It is solar powered and can accept sachets of egg membrane which can be replaced after being used up.

The sachet of egg membrane has an indicator on it which shows when it needs changing and a control is incorporated that allows the speed of the fan to be regulated and control the flow of air through the egg membrane.

The fan was tested in the same way as before by finding the mass of membrane before and after exposure to dry air. Results show it absorbed carbon dioxide from the air.

This has commercial viability and concerns a real pollution problem.

SciFest@DIT 2015

STAND 4

Title of Project: **Cost Effective Sound Localisation Sensor Arrays for Autonomous Mobile Platforms**

Student: Oran Ó Donnabháin

School: Scoil Chaitríona, Mobhi Road, Glasnevin, Dublin 9

Teacher Mentoring Project: Brian Ó Gallachóir

Project Category: Technology

ABSTRACT

Due to the growing influence of robotics in society it will become common that autonomous mobile platforms will be seen in a domestic environment. This will happen due to the development of social autonomous platforms that are intended for care purposes to help the elderly and disabled. If they are to be accepted into the homes of those in need these robots need to be able to replicate human behaviour and sensing abilities. My project aims to create an economically viable sound localisation sensor array for these autonomous mobile platforms, allowing such robots to gauge the direction of a sound and to turn in the direction of the sound source, allowing for the user to comfortably verbally communicate with their autonomous companion.

My device consists of a shell with sound sensors located around the perimeter. These sensors record sound and send the recorded information to a microcontroller located within the shell which is programmed to decipher the direction of the sound source based on the different amplitudes it receives. The shell has a cylindrical shape and is lined with sound insulating material to prevent noise from being recorded by sensors on the opposite side of the device. The microcontroller uses the sound data recorded by the sensors to calculate the angle from which the sound is coming. This information is then sent to a servomotor situated on top of the device which actuates a robotic 'head' and turns it to face the sound source.

SciFest@ITB 2015

STAND 5

Title of Project: The Use of Halophytes on Marginal Coastal Land as Carbon Sinks

Students: Sophie Sheahan, Adam McGrane

School: Skerries Community College, Skerries, Co. Dublin

Teacher Mentoring Project: Katie Corbett

Project Category: Life Sciences

ABSTRACT

Last year we studied the seashore as part of an environmental awareness project photographing the plants in the splash zone. We found that salt-tolerant plants (halophytes) were being studied for use as biofuels. In our project we looked at their possible use in capturing carbon dioxide instead of releasing it back into the atmosphere.

We assessed soil fertility using a dye binding method with a standard curve measuring the resultant absorbance to determine the cation exchange capacity (a measure of fertility). We measured CO_2 and O_2 over 24 hours with *Beta vulgaris* (our chosen plant species) growing in different soil types. We also tested the rate of photosynthesis at different salinities. We measured the rate of composting of the plants. We tested the starch and sugar content of the plants over time as they rotted. We estimated the potential absorption of CO_2 by halophytes around the Irish and English coasts.

We found that the marginal soils in the splash zone are less fertile than those 100 m inland. CO2 flux is therefore lower as there is less CO_2 leaching from the soil. It is possible that there may be a net loss of CO_2 from the air in this case.

SciFest@DkIT 2015

STAND 6

Title of Project: Bringing Genetics to the Masses: The Next Step in Genetic Research

Student: Louis Madden

School: Largy College, Analore Road, Clones, Co. Monaghan

Teacher Mentoring Project: Sharon Magennis

Project Category: Life Sciences

ABSTRACT

Purpose

In the twenty years since the first organism genome was mapped 4126 organisms have had their complete genome mapped: Archaea (181), Bacteria (3762) and Eukaryotes (183). The latter, Eukaryotes, have an estimated global species diversity estimated at 8.77 million species. Bacterial species are estimated to number 10 quintillion, that's 19 zeros after the 1. Although such research has benefited society by increasing our understanding of living organisms I believe we haven't used the incredible potential we have for genetic research since DNA was first sequenced in 1977. I believe the reason why is mainly due to the cost of equipment. This has limited research, particularly in developing countries where there is a critical need to carry out such research locally to address disease and food production issues. On this basis my hypothesis is: **"Genetic testing and DNA research can be carried out simply, cheaply and efficiently"**.

Description

Using cheap and recycled materials which in total cost me just under €150.00 I built the following laboratory equipment: vortex, centrifuge, PCR, transilluminator, gel box with power supply and gel camera. Using my equipment, I isolated and amplified chloroplast DNA using a proprietary DNA extraction kit. I had the product of my experiment sequenced.

Data

Using that sequence, I conducted comparative analysis as against known database sequences of the same organism to assess the efficacy of my equipment.

Conclusion

My results have proven my hypothesis, that it is possible to conduct genetic tests simply, cheaply and efficiently.

SciFest@LIT 2015

STAND 7

Title of Project: The Handy Guide to Sign Language

Students: Eoin Hayes, Adam Burke

School: Coláiste Chiaráin, Croom, Co. Limerick

Teacher Mentoring Project: Edel Farrell

Project Category: Technology

ABSTRACT

Our project aimed to create a device which would aid in the learning of Irish Sign Language (ISL). We created a glove which makes use of an Arduino Nano to allow users to learn ISL from home using a computer.

Our device works by displaying videos on a computer programme to the user. The user will then mimic the gesture shown on the screen. Using flex sensors and an accelerometer, the glove will read the hand position and then send the information to the computer via a Bluetooth module on the glove. If the user correctly imitates the gesture, the program moves to the next letter. If not, they are encouraged to try again.

A flex sensor is attached to each finger of the glove. The flex sensors are then connected to a printed circuit board with the Arduino Nano microcontroller, accelerometer and Bluetooth module embedded onto it. The glove is coded using Arduino C Code, which is designed to work with the Arduino components used on the glove.

We have calibrated the device with the help of members of our local Deaf Community Centre. A number of people signed each letter. We collected a set of resistance and acceleration values for each letter. These values provided the parameters for the finger positioning of each sign.

Our project will hopefully increase the numbers of ISL signers throughout Ireland by allowing them to learn it at their own pace in the comfort of their own home.

SciFest@GMIT 2015

STAND 8

Title of Project: Complexity in Chaos

Student: Conall Vincent McCabe

School: Yeats College, College Road, Galway

Teacher Mentoring Project: Corinna Mahoney

Project Category: Physical Sciences

ABSTRACT

Introduction: Chaos theory is a mathematical field of study which states that non-linear dynamical systems that are seemingly random are actually deterministic from much simpler equations. Acknowledging that chaos theory is found in many spheres of life yet known to very few people inspired me to research and prepare this report.

Aims/Background: To provide a quantitative analysis of the aspects of chaos theory and to investigate the existence of chaotic motion in three mechanical systems: (i) The Double Pendulum (ii) Swinging Atwood's Machine (iii) Ball Dynamics.

Method: Langrangian-Hamiltonian and Newtonian mechanics were used in conjunction to derive the equations of motion of the systems. In some cases other mathematical tools such as Taylor Series expansions were utilised to fully explore the motion. Computational simulation software was used to carry out these investigations to a higher degree of accuracy.

Results:

- Double Pendulum: Chaotic motion is widely present in this system
- Swinging Atwood's Machine: This particular system exhibits little chaotic motion although its sensitive nature would have initially said otherwise
- Ball Dynamics: Although chaotic nature was found to be less existent in this system than in the double pendulum, the motion shows more chaotic motion than in the swinging Atwood's machine

Conclusions: This investigation shows that the nature of chaos is deep-rooted in a variety of seemingly linear systems that appear to be non-chaotic. This report also shows the importance of understanding a relatively unknown theory and how its implementation into other disciplines has great potential.

SciFest@WIT 2015

STAND 9

Title of Project: Functional Movement Training in Young GAA Players

Students: Conor Flynn, Conor Cantwell

School: CBS Secondary School Kilkenny, James Street, Kilkenny

Teacher Mentoring Project: Lisa Cosgrove

Project Category: Life Sciences

ABSTRACT

Our project investigated functional movement training in young GAA players. Our aims were to assess how at risk young GAA players were to injury, to assess the knowledge of functional movement among young players and coaches and to investigate if a ten-week functional movement programme could improve players' functional movement.

We screened our school's junior hurling team using the functional movement screen. We discovered 54% of the team were at risk of injury. We decided to create a ten-week functional movement training programme.

We completed the programme with five of the junior hurling team. At the beginning of the programme 60% of the players were at risk of injury. After ten weeks none of the players were at risk of injury. This proves that functional movement can be improved by using a functional movement training programme.

We created questionnaires to assess the knowledge of functional movement among both players and coaches. The questionnaires showed an overall lack of understanding and knowledge of functional movement. The responses showed players had used functional movement training before but never in a structured manner and also that coaches had a knowledge of functional movement but weren't informing their players about it.

We addressed the lack of understanding of functional movement by creating an educational booklet and a simple functional movement test to educate players and coaches on how to improve functional movement through corrective exercises ,warm ups and cool downs.

SciFest@ITC 2015

STAND 10

Title of Project: Voice Controlled Home Automation with Raspberry Pi Technology

Student: Eve McGlinchey

School: St Leo's College, Dublin Road, Carlow

Teacher Mentoring Project: Julie Egan

Project Category: Technology

ABSTRACT

Installation costs of typical home-automation systems range from €5,000 - €15,000. This project presents a wirelessly-networked home-automation system using Raspberry Pi technology for considerably less (≈€350).

In contrast to the many available systems, this home-automation network uses voice recognition to activate devices. Specifically, this project showcases a client-server networked system operated through Python programming using voice commands from a wireless headset. A Raspberry Pi radio and a security system with camera and door-locking mechanism are included.

The control Raspberry Pi regulates four Pi-Mote sockets which have been coded to receive vocalised instructions using Voice Command. A second Raspberry Pi allows clients to select music from a playlist and hear their chosen track played on radios within the broadcast range by simply voicing their intention. A camera module connected to the third Raspberry Pi uploads video feed to a specified webpage viewed on a monitor associated with the control Raspberry Pi.

The system has been calibrated to account for different voices and to assign interpreted words to specified commands. The range of the headset was tested (>10 m) and the broadcast range of the Pi radio was extended using an aerial and verified (>27 m). Results indicate that the headset can be used between rooms and the broadcast range extends to a car radio outside the home.

This customisable system can be installed in any home and tailored to address the needs of individuals experiencing mobility challenges. Others may simply enjoy the opportunity to be Tony Stark with their very own JARVIS for a day!

SciFest@ITT Dublin 2015

STAND 11

Title of Project: **Correlation or Coincidence? Solar Flares, Lunar Phases and Stock Market Activity**

Student: Claire Nichols

School: Sutton Park School, St Fintan's Road, Sutton, Dublin 13

Teacher Mentoring Project: Catherine Tattersall

Project Category: Physical Sciences

ABSTRACT

Large bursts of energy from the sun have a dramatic effect on the earth, causing geomagnetic storms. This can have an effect on people's moods, causing depression, anxiety, and bad judgment.

The purpose of this project was to determine whether geomagnetic storms have an influence on people's decisions regarding the stock market. The stock market is made up of millions of individuals who make decisions in the moment based on their view of the future. A negative mood can cause people to sell stocks, driving prices lower. My strategy to avoid the market during geomagnetic storms, and the 7-day recovery period, was more profitable than remaining in the market over the same amount of time.

I analysed data on every solar storm over the last 13 years that reached a level of 6 on the planetary K-Index, which measures the actual disturbances in the earth's magnetic field. For the stock market, daily data on the S&P 500 Index was used over the same time period. Testing showed that selling the S&P 500 Index after a K-6 geomagnetic storm, and remaining out of the market for 7 days following the storm, had a hypothetical return of 210.63% between Jan 1, 2002 and December 26, 2014, compared to a hypothetical return of 81.63% for the S&P 500 Index over the same period. This strategy out-performed the buy-and-hold strategy for 10 out of the 13 years tested, in both up years and down years for the overall stock market.

I am currently testing the effect of lunar phases on market volatility, using a similar process. So far, my data suggests that the full moon causes a change in sentiment (mood swings from high to low or low to high) among the human population of traders as it is happening.

SciFest@LIT Thurles 2015

STAND 12

Title of Project: **A Statistical Analysis and Investigation of Electromagnetic Radiation Emitted by Models of Mobile Communication Devices**

Students: Ciara Burke, Isabel Dwyer, Clodagh Howe

School: Scoil Chríost Rí, Borris Rd, Portlaoise, Co. Laois

Teacher Mentoring Project: Breege Masterson

Project Category: Physical Sciences

ABSTRACT

We felt obliged to pay heed to not only the risks involved but also possible solutions to avoiding these risks. Our inspiration stemmed from the simple fact that our mobile phones have become almost like an extra limb, constantly by our side, and to be so dependent on a device that may have negative lasting effects we believed it was crucial to further investigate.

Using a calibrated TES 593 Electrosmog Meter to measure the electromagnetic radiation emitted in mW/m^2 we have reached our goal of testing 200 phones. Our testing involves measuring the emissions while the phone is in an idle state, while receiving a text and while receiving a three second phone call. Our control was exhibited when the phone was turned off and no electromagnetic radiation was identified on the device. We repeated this test first right beside the device and second further away in order to investigate whether distance plays a part in the volume of radiation identified by the device/absorbed by the body. Following experimentation we used a statistical analysis package "SAS University Edition" to analyse the results and to form a conclusion. We also used the package to analyse the data of gliomas (associated with electromagnetic radiation) to the phone subscriptions in Ireland that date back to 1994.

We concluded that distance affects the results significantly and in turn developed a solution in the form of a 3D printed phone case prototype using CAD software alongside the engineering department in DIT.

SciFest@LyIT 2015

STAND 13

Title of Project: Classroom or Class Doom? An In-Depth Analysis into the Effects of Using Google Classroom

Students: Hannah Dominguez Mc Laughlin, Conor Gildea, Claire Barron

School: Crana College, Crana Road, Buncrana, Co. Donegal

Teacher Mentoring Project: Philip McGuinness

Project Category: Life Sciences

ABSTRACT

Our project "Classroom or Class Doom?" aims to investigate the impact of Google Classroom on student/teacher attitudes and academic success. Our research was completed through various mediums. We began by contacting the Central Statistics Office for advice on how to best conduct a survey.

We conducted qualitative and quantitative surveys on a sample population of the senior student body. We interviewed a random selection from this population to gain further insight into the impact Google Classroom has had on them. Along with this we examined and compared grade averages before and after the introduction of Google Classroom in our school.

We constructed various graphs and charts to visually illustrate our findings. We found a 7% increase in grade averages since the introduction of Google Classroom. We are currently investigating if this trend continues. Some of our main findings were:

- 90.6% of students felt it had a positive impact on their learning
- 9.4% of students felt it had no impact on their learning
- 96.9% of students believed it made them feel more prepared for exams
- 3.1% of students believed it did not make them feel prepared for exams

We are currently expanding our research to examine the effect Google Classroom has on teachers' attitudes and workload. As well as this we hope to further investigate students' opinions in relation to workload and general usage of Google Classroom.

We plan to present our findings to Google and our school once our research is completed.

SciFest@IT Sligo 2015

STAND 14

Title of Project: Decibels of D.V.S.

Students: Anna Corcoran, Aine Kelly, Niamh McNamara

School: Drumshanbo Vocational School, Drumshanbo, Co. Leitrim

Teacher Mentoring Project: Pauline McBarron

Project Category: Physical Sciences

ABSTRACT

Aim

The aim of our project is to see if the sound levels in our school are within the safe limit recommended by the World Health Organisation. This limit is 80 decibels. We aim to raise awareness among the students in our school about the damage to hearing caused by listening to music at high levels on phones or iPods.

Our investigations

We have downloaded an app 'sound meter' to measure the sound levels in decibels. We used a sound level meter to make sure that the readings on the app were accurate. Our school is divided up into 3 buildings. We decided to take our measurements for one week in three different buildings at 5 different times of the day. We wanted to get a good range of readings. We have measured the sound levels in practical classes, Woodwork, Metalwork, Home Economics and Science and compared them to classes such as English and Irish.

To raise awareness about the dangers of listening to high volumes for a long period of time we have put up informational posters. We have prepared a survey to ask the students of our school about their music listening habits. We hope to find out if the pupils in our school are aware of the dangers of listening to unsafe levels of sound for too long.

We have also researched about headphones and earphones, which is safer to use while listening to music on your phones.

SciFest@IT Tralee 2015

STAND 15

Title of Project: **A Statistical Analysis of Whether Segregating Males and Females for PE Will Increase Participation and Physical Activity Levels**

Student: Liam Passmore

School: John the Baptist Community School, Hospital, Co. Limerick

Teacher Mentoring Project: Michelle Buckley

Project Category: Life Sciences

ABSTRACT

Physical activity is important to reduce the risk of heart disease, diabetes and other conditions. According to previous studies there is a decrease in participation in PE by females starting at age fifteen. The aim of this study was to ascertain if PE classes in co-educational schools were undertaken as single-sex classes would participation increase. Also, I investigated if the sexes enjoyed participating more. Online surveys were used to investigate this in secondary school students of all ages and both sexes. I studied attitudes towards the subject of PE, single-sex or co-ed, and which areas of PE were favoured together or apart. I studied many journals using Google Scholar. I distributed the link of the survey to students from schools locally and I got approximately 325 students to respond. I ensured that there was an equal spread of males and female students from all years and ages. I concluded from analysing my data that females were more likely to avoid participation in PE than males. This is due to perception by both sexes of physical capabilities. I also found that students would rather play contact sports separately but would rather play non-contact sports mixed as they would find it more enjoyable. It has been proposed by the Irish government in recent times that PE should become an exam subject. I agree with this initiative but I believe my findings are significant to develop the criteria for the students participating in this exam and to outline an effective curriculum.

SciFest 2015 SEAI INESPO Award Finalists

SciFest@IT Tralee 2015

STAND 16

Title of Project: **Fuinnimh Tonnta Gan Creimniú Cósta (Reducing Costal Erosion While Generating Electricity from Wave Energy)**

Students: Janine Ní Chonchúir, Ursula Ní Mhochóir, Lorraine De Nais

School: Gaelcholáiste Chiarraí, Tobar Mhaigh Dor, Trá Lí, Co. Chiarraí

Teacher Mentoring Project: Elaine Ní Dheargáin

SciFest@ITB 2015

STAND 17

Title of Project: The Automation of Light Intensity for Energy Conservation

Students: Aisling Paterson, Niamh Wilson

School: Dominican College, 204 Griffith Avenue, Dublin 9

Teacher Mentoring Project: Mick Moriarty

SciFest@LIT 2015

STAND 18

Title of Project: **An Investigation into the Use of *Fucus serratus* and *Fucus vesiculosis* as a Raw Material for Thermal Energy Production**

Students: Aoibhe Cronin, Ciara McInerney

School: Scoil Mhuire, Ennistymon, Co. Clare

Teacher Mentoring Project: Sue-Ann Sheridan

SciFest@LIT Thurles 2015

STAND 19

Title of Project: It's an Ill Wind that Blows No Good!

Students: Lorcan Tuohy, Elliot Huggins

School: Borrisokane Community College, Borrisokane, Co. Tipperary

Teacher Mentoring Project: Niamh O'Sullivan

SciFest@CIT 2015

STAND 20

Title of Project: An Investigation into the Effect of LEDs on Plant Growth

Students: Tom O' Donovan, Robbie Matthews, James Hayes

School: Clonakilty Community College, Clonakilty, Co. Cork

Teacher Mentoring Project: Patrick O'Keeffe

SciFest@DIT 2015

STAND 21

Title of Project: An Investigation of the Potential of Pine Needles as a New Alternative Biodiesel Source

Student: Luc de Barra

School: Coláiste Raithín, Bóthar Florence, Bré, Co. Chill Mhantáin

Teacher Mentoring Project: Lís Ní Chíobháin

SciFest 2015 Boston Scientific Medical Devices Award Finalists

SciFest@DIT 2015

STAND 22

Title of Project: A Medical Device to Assist Doctors Finding Veins

Student: Moritz Ziewer

School: Sutton Park School, St Fintan's Road, Sutton, Dublin 13

Teacher Mentoring Project: Catherine Tattersall

SciFest@CIT 2015

STAND 23

Title of Project: A Smoke Detector for the Deaf or Hard of Hearing

Students: Zainab Baker, Aoife O'Driscoll

School: Mount Mercy College, Model Farm Road, Cork

Teacher Mentoring Project: Aaron O'Sullivan

SciFest@DkIT 2015

STAND 24

Title of Project: **Harnessing Patient Information to Mitigate Risks Associated with Stroke Treatment**

Student: Cillian Gartlan

School: Patrician High School, Carrickmacross, Co. Monaghan

Teacher Mentoring Project: John O'Rourke

SciFest@ITB 2015

STAND 25

Title of Project: **Challenges for Blind People in Identifying Euro Notes: Exploring One Cost Effective Solution**

Student: Eleanor Murchan

School: Loreto Secondary School, St Michael's, Navan, Co. Meath

Teacher Mentoring Project: Helena Smyth

SciFest@IT Tralee 2015

STAND 26

Title of Project: **Virtual Visual - An App that Guides a Visually Impaired Person around an Unfamiliar Building**

Students: Timothy McGrath, Donal Brennan

School: Killorglin Community College, Langford Street, Killorglin, Co. Kerry

Teacher Mentoring Project: Donal O'Reilly

SciFest@ITT Dublin 2015

STAND 27

Title of Project: **A Medical Device to Treat Hand Burns**

Student: Cherie O'Keeffe, Jonathan Andrews, David Joyce

School: Sutton Park School, St Fintan's Road, Sutton, Dublin 13

Teacher Mentoring Project: Catherine Tattersall

SciFest@SFI Discover 2014 Winning Projects

SciFest@LyIT 2014

STAND 28 SciFest 2014 Grand Award Winner

Title of Project: An Integrated Electronic Medical Dispensing, Diary and Locator Device to Support Memory Impaired Independent

Student: Christopher Carragher

School: Our Lady's Secondary School, Castleblaney, Co. Monaghan

Teacher Mentoring Project: Kathryn Higgins

Award at Intel ISEF 2015

Category: Computational Biology *and* Bioinformatics – 2nd place

Other Awards:

BT Young Scientist & Technology Exhibition 2015. Category: Chemical, Physical and Mathematical Sciences – 1st place

Naughton Scholarship 2015

SciFest@CIT 2014

STAND 29 SciFest 2014 SEAI INESPO Award Winner

Title of Project: Non-integrated LED Bulb

Students: Ellen Fitzgerald, Aoife Dolan, Niamh Nyhan

School: Sacred Heart Secondary School, Clonakilty, Co. Cork

Teacher Mentoring Project: Claire Holland

Award at INESPO 2015

First Place and Gold Medal

The SciFest 2015 Team

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George Porter	**SciFest CFO**
Aoife Cannon	**SciFest OM**
Anne Lynch	**SciFest Support Executive**

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