

SCIFEST 2020

NATIONAL FINAL

Project Abstracts



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November 2020



SciFest@WIT 2020

STAND 1

Title of Project: An Image Analysis of Rehabilitating Patients' Exercises to Measure and Improve Recovery

Student: Caoimhín O'Leary

School: Ard Scoil na Mara, Tramore, Co. Waterford

Teacher Mentoring Project: Niamh Shannon

ABSTRACT



This project describes the development of an image analysis measurement system for rehabilitating patients on a prescribed exercise regime after joint injury or joint surgery. The work shows the relationship between rehabilitation exercises and common injuries, and identifies a sample set of exercises from the University of Idaho that represent typical exercises used in rehabilitation. The system in this project uses OpenPose software to measure joint and bone positions on any captured image of the exercise, with Python used to extract the co-ordinates for the joints. The joint angle of the measured joint is then calculated and superimposed on the image. The system was benchmarked against standard large (physical) triangles.

The system works well when tested on me performing a variety of exercises and could be used in remote rehabilitation monitoring and even to replace existing measurements, including mechanical measurements in rehabilitating patients. It is also very easy to transmit the images for remote analysis. Limitations of the system in terms of captured images, limitations of OpenPose, positioning of the photographer, orientation of the exercise and of the photograph are all presented, with photographs and analysis used to underline the limitations. A comparison with the other “healthy” joint drawn from rehabilitation of elite athletes, called the Limb Symmetry Index (LSI) is proposed, but not investigated further. As the world grapples with the COVID-19 pandemic, remote patient monitoring (RPM) systems such as this could be used to offer a safer rehabilitation to the patient than traditional healthcare models.

SciFest@TU Dublin City 2020

STAND 2

Title of Project: ARES: Using Artificial Intelligence to Detect Firearms

Students: Stephen Flynn, Oisín Brick

School: St Joseph's Secondary School, Convent Lane, Rush, Co. Dublin

Teacher Mentoring Project: Daryl Dunne

ABSTRACT

The Automated Risk Evaluation System, or ARES, is an artificial intelligence-based system that uses image detection to detect firearms in a live security feed. The objective of ARES was to deploy it in crowded areas such as schools to act as a deterrent to potential shooters. In the event a firearm is detected in a frame ARES will take a time-stamped screenshot of the feed and send it to a control room or the emergency services. ARES has the ability to perform this task in under one minute.

The data we received from our testing proves to us that ARES is faster than the average human at object detection and is also faster at responding. ARES is designed to assist the emergency services in their response to an active shooter and is able to make accurate predictions as to what an individual who is seen as a potential threat may be carrying. The main point of ARES is to stop a shooter before they have the opportunity to take a shot.



We trained ARES with the assistance of Google Cloud Services for faster reaction times and used the Raspberry Pi as our receiving board for local processing as well as a HD camera for the input of the stream. We then provided ARES with large amounts of training data with over 1000 images of firearms being used to train our model. This resulted in a fast and trustworthy model that we felt comfortable to deploy and work with from thereon.

SciFest@TU Dublin Blanchardstown

STAND 3

Title of Project: “PillPal”: An Application Supporting Patients Taking Medication

Student: Nicole Landers

School: Belmayne ETSS, Grange Abbey Road, Dublin 13

Teacher Mentoring Project: Emma Burrowes

ABSTRACT



I have created an app that notifies patients when it is time for them to take their medication, and also what medication is due and in what quantity. I also thought about who would be using this app, and how best it could be used to ensure the end user – mostly elderly people – could have an experience that made their lives a little easier.

An elderly person can be registered on the app by a family member, a doctor or a caregiver. Upon accessing the app the patient can view their medication. The details shown are the name of the medication and the quantity of the medication to be taken. The app also indicates the day and time the medication is to be taken. The patient will not have access to edit the medication prescribed for them. I realised some elderly patients might not be comfortable with downloading, registering and inputting days, times and type and quantity of medication to be taken. This is why I incorporated additional features and functionality for a family member, doctor or caregiver. These are the people who would essentially control the app for the elderly patient. The patient only sees a frontend screen which prompts them to take their medication, indicating what medication to take, in what quantities, and when to take it (day & time).

I am going to add in a further feature: when the elderly patient confirms the medication has been taken (by pressing a yes or no button on their screen) the information will be stored and the person who controls the app will then be able to see that the medication has been taken.

SciFest@LIT Moylish 2020

STAND 4

Title of Project: Making Electric Scooters Safer and Insurable Using AI

Student: Niall Meade

School: Ardscoil Rís, North Circular Rd, Limerick

Teacher Mentoring Project: Diane Condon

ABSTRACT

Electric scooters are becoming a popular mode of transport in Ireland, despite the fact that they are currently not regulated and are illegal. As a result of the lack of regulation, safety concerns and lack of user data, insurance companies are reluctant to insure these vehicles.

The insurance problem is a data problem, so I developed a system that could create a large database of scooter user data. I developed a user-friendly app, database and an interface for insurers to view data. The app collects scooter data via Bluetooth and continuously uploads it while driving. I used Firebase, which is a platform developed by Google, to store the scooter data. I created a webapp designed for insurers which shows data used for premiums.



Scooters are dangerous when used on rough terrain and without a helmet. I developed a terrain-classifier using neural-networks (AI) which, when implemented in the scooter, would limit the speed on dangerous terrain. I developed a helmet classifier which ensures the driver is wearing a helmet. It does this by searching for a face and then looking at the top portion of the head for a helmet. This would disable the throttle if a helmet was not being worn. Because of the Covid restrictions I was unable to get access to equipment to progress this side of my project.

I have taken the first step in developing a system to improve the safety and insurability of electric scooters using the technologies above. In the future I hope to implement the classifiers into the phone app and scooter.

SciFest@IT Sligo 2020

STAND 5

Title of Project: Electromechanical Convex Lens Integration for Photovoltaic System Efficiency (ECLIPSE)

Students: Niamh Carolan, LÍle Hensey, Ella Mc Daid

School: Ursuline College Sligo, Finisklin Rd, Sligo

Teacher Mentoring Project: Anthony Carolan

ABSTRACT

We propose the addition of a system of light refraction using magnifying lenses on standard photovoltaic cells to increase voltage output. Our initial prototype of this system consisted of a Fresnel lens angled by means of an electromechanical arm in relation to the angle at which the Sun's light strikes the given photovoltaic cell. We hypothesised that the refractive properties of an angled Fresnel lens would increase the voltage output of a given photovoltaic cell.



Over 175 individual comparative tests, with and without the addition of an angled lens, were conducted. Our data demonstrated that the integration of an external Fresnel lens could yield at least a 30% increase in voltage produced and, on average, a 78% increase in voltage efficiency. However, in testing outside our prototype yielded a maximum 12% increase in voltage output. However, any increase is a step in the direction of a more sustainable future.

With the experience we had gained in solar technology we were able to design a more cost efficient, more elegant and, most importantly, more effective method of directing the Sun's incident light onto a photovoltaic cell. We are proposing the addition of an electromechanically controlled triangular prism suspended above either end of a photovoltaic cell. This prism is capable of rotation via a motor during the day for optimum efficiency.

Increasing the efficiency of existing solar technology with innovations such as ours would contribute to the transition away from dependency on fossil fuels.

SciFest@AIT 2020

STAND 6

Title of Project: Mathematically Predicting the National Transition to Electric Vehicles

Students: Rory Kilgarriff, Donagh Claffey, Dylan Corcoran

School: Marist College, Retreat Road, Athlone, Co. Westmeath

Teacher Mentoring Project: Martina Carey

ABSTRACT

The aim of our project was to mathematically predict the number of battery electric cars on the road by 2030 by building a prediction model for the probable rates of electric car sales over time and, from our research, make recommendations to Government to help them reach their target.

We based our prediction model on the **Product Adaption Curve** which models the predicted growth in sales of new products. The **Bass Diffusion Model** gives a mathematical formula for this curve. We created, with help, a prediction spreadsheet of electric car sales using current sale numbers and figures from the bass diffusion formula. We also created two surveys to assess the Irish public's attitudes regarding electric cars, one pre-COVID-19 and one post-lockdown. We received 1079 responses.

We developed an **interactive program**, coded in Java, which would help visualise how changing factors could impact sales.

Using our prediction spreadsheet we estimate that there will be 490,000 electric cars on the road by 2030. We also calculated figures for optimistic and pessimistic economic outlooks.

Key survey findings:

1. Insufficient knowledge of incentives and benefits for buying an electric car
2. Range Anxiety which is a fear that electric cars have insufficient charge to reach their destination
3. The gap between what many people paid for their current cars and a new electric car is too great
4. Concern regarding the number, availability and speed of charging stations

We made recommendations to Government based on our survey findings and research into other countries' strategies.



SciFest@LIT 2020

STAND 7

Title of Project: Sports Performance Grip

Student: Edel Daly

School: Presentation Secondary School Thurles, Thurles, Co. Tipperary

Teacher Mentoring Project: Serena Moloney

ABSTRACT

While watching the All-Ireland Senior Hurling Championship Final 2019 I observed that players were susceptible to dropping their hurls, possibly due to weather conditions, fatigue or because of a poor grip on the hurl. I related to this problem from playing camogie for both my local club and county as I would experience sharp pains in my shoulder from swinging the hurl because of a weak grip. I found that the pressure of the grip of a hurl can have an immense effect on performance in swing power, contact with the ball and simply the hold of the grip in use. From this observation I proposed my hypothesis of individualising the grip which would give a player a better grip and improve performance.



To develop the grip I experimented with many different materials, such as silicone and polyurethane rubber. During my experiment of trialling materials I found the silicone rubber to be one of the best materials to use as its pressure on the hurl could leave players with a lower chance of dropping the hurl and its softer ambience led to a stronger and more reliable grip. I have further developed the grip to incorporate technology to analyse data from a player. This data would be recorded and sent to a corresponding app. By recording components such as vibrations, hand grip strength and pressure, a player's performance could be regulated and improved as weaknesses are addressed.

SciFest@CIT 2020

STAND 8

Title of Project: A Statistical and Experimental Analysis of the Link Between Reading for Pleasure and Problem-Solving Skills

Students: Sarah Fitzgerald, Anna Peare

School: Kinsale Community School, Kinsale, Co. Cork

Teacher Mentoring Project: Shaun Holly

ABSTRACT



Our project looked at the link between reading for pleasure and problem-solving skills. We noticed a focus on problem solving in the Junior Cycle and know how important it is in STEM. We wanted to investigate if problem solving could be a benefit of reading as our background research showed that reading improves cognitive processes and maths. We found that no research had been done on our topic before.

We conducted a survey and abstract-reasoning test on 665 students in 11 diverse schools in Munster. We analysed our data and tested for statistical significance at a 95% confidence level. We discovered that reading does improve problem-solving ability. Those who read science-fiction scored the highest in the abstract-reasoning test. Frequent readers took longer to complete the test, we believe as a result of better concentration. Concerningly, 14-16 year-olds read the least out of all the age groups surveyed.

All of these results were statistically significant, meaning that if we were to take another sample, we are confident we would get the same result. We have proved our hypothesis that there is a link between reading for pleasure and problem-solving skills. We have many suggestions on how to encourage reading amongst adolescents, which we are currently working on.

We have conducted another survey to investigate whether school closures impacted reading habits. We found that adolescents read more over the period of school closures; the difference was statistically significant. We believe there is a link between school pressure and lack of reading.

SciFest@LyIT 2020

STAND 9

Title of Project: Beef or Leaf (An Rian Coise Charbóin a Bhaineann le hAistí Bhia Éagsúla)

Student: Eoghan Ó Fearáin

School: Coláiste Ailigh, Cnoc na Móna, Leitir Ceanainn, Co. Dhún na nGall

Teacher Mentoring Project: Siobhán Laighneach

ABSTRACT

Objective

The purpose of this project was to determine the carbon footprint associated with different diets. In particular, if “food miles” associated with the diets of omnivores (‘Beef’) and those of vegans (‘Leaf’) were significantly different.

Method

The steps involved in the project were:

Data collection:

- Design of survey questionnaires (omnivore and vegan) to determine typical diet; this was done on Google forms
- Distribution of questionnaires
- Collection and consolidation of responses



Data Analysis:

I used Microsoft Excel to do statistical analysis on the data. The analysis involved the translation of the responses into a format that allowed the different diet response to be compared. By converting the responses into “food miles” I was able to compare responses and use quantitative analysis methods. I used the website www.foodmiles.com to help calculate the food miles/km.

Conclusion

The data analysis showed that the vegan diet had a significantly higher (176% higher based on averages) “food miles” footprint compared with the omnivore diet.

Possible Practical Applications

The project conclusion can be used to educate people on which foods contribute most to carbon pollution associated with travel and encourage them to replace these with more environmentally friendly, locally grown, alternatives. This would be to the benefit, not only of the planet, but of the local economy also.

SciFest@IT Sligo 2020

STAND 10

Title of Project: The Lasting Effects of the Arigna Coal Mine on the Environment

Students: Hannah Stenson, Erica Mc Tiernan

School: Community School, Carrick-On-Shannon, Co. Leitrim

Teacher Mentoring Project: Louise Gallagher

ABSTRACT

The aim of this project was to investigate the lasting effects of the Arigna coal mine on the environment, particularly focusing on water pollution.

To obtain results we tested the pH and conductivity of the water samples we collected. We also used the benthic macroinvertebrates as bioindicators of the water quality. We took samples above the mine (upstream) and below the mine (downstream) to compare them and see any changes regarding pollution.

The different species of macroinvertebrate found gave us an idea of the quality of the water, using the biotic indices and macroinvertebrate methodology. The biotic indices told us that the upstream water samples were slightly polluted while the downstream water was moderately polluted.

Upstream was very diverse with many species such as mayflies, freshwater shrimps, caddis fly, etc. There was also plenty of plant litter upstream but much less downstream. Our downstream sample was not diverse as we only had bloodworms which are tolerant to pollution.

The upstream samples were slightly acidic with an average pH of 6.2; the conductivity was within the range expected for freshwater at 54.5 μS . The corresponding figures for downstream were a pH of 7.1 and an average conductivity of 472.4 μS ; this indicates that there was a large amount of impurities in the water.

The difference in our upstream and downstream samples is concerning and shows that mines may have long term effects on the environment, although other factors may also contribute to the difference.



SciFest@TU Dublin City 2020

STAND 11

Title of Project: Toxicological Investigation of Pesticides Using Paramecium as a Model

Organism

Student: Giulia Baratta

School: St Andrew's College, Booterstown Ave, Blackrock, Co. Dublin

Teacher Mentoring Project: Hilary Rimbi

ABSTRACT



My project investigates the effects of two widely-used pesticides on the survival and growth of the single-celled paramecium, a freshwater protist. My interest in this developed during my studies of geography and biology, and my growing awareness of the use of chemicals in farming and gardening.

I found that glyphosate herbicides and trifloxystrobin/tebuconazole-based fungicides are used extensively in Ireland and had measurable effects on wet environments. I then decided to observe the changes in the number of paramecia, their speed and size, on three different timeframes (0-24-48 hours) and at five different pesticide concentrations (0.00, 0.01, 0.02, 0.03 and 0.04 g dm⁻³). I used a microscope with X10 objective lens, haemocytometer and a camera to record live paramecia and subsequently count them, measure their speed and their length.

Through my investigation I observed that the paramecia number after 24 h and 48 h had dropped significantly. The speed of paramecia, after 48 h in the higher concentration solution, decreased by 15.99%, with a p-value of 0.013078, less than 0.05, therefore significant. The paramecia number at the concentrations of trifloxystrobin/tebuconazole had dropped to levels up to 31.07% lower than the expected (the control environment, without pesticide). The speed of paramecia after 48 h had a decrease of up to 15.06%, with a p-value of 0.058415.

In conclusion, I found that both the pesticides based on glyphosate and trifloxystrobin/tebuconazole are extremely toxic for the paramecium, an essential micro-organism which has an important role in the water ecosystem.

SciFest@TU Dublin Tallaght 2020

STAND 12

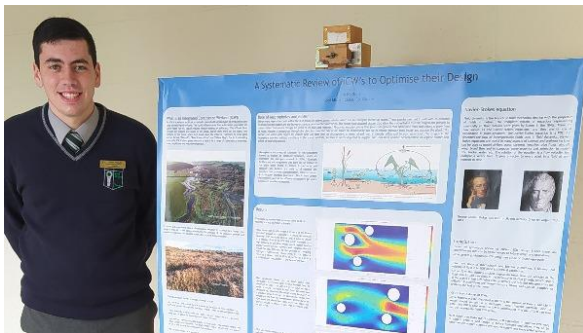
Title of Project: A Systematic Review of Constructed Wetlands to Optimise their Design

Student: Adam McNulty

School: Scoil Mhuire Community School, Clane, Naas, Co. Kildare

Teacher Mentoring Project: Aoife Jenkins

ABSTRACT



For my project entitled “A Systematic Review of Constructed Wetlands to Optimise Their Design” I examined the current design methods in Integrated Constructed Wetlands (ICWs) used in Ireland. An ICW is an artificial wetland used to treat wastewater and greywater found in sewage, surface runoff and industrial effluent from factories and small domestic areas. The treatment process mimics processes that would occur in natural wetlands.

From my systematic review of current ICW design I feel there are improvements that can be implemented in future design and utilisation through the use of Computational Fluid Dynamics (CFD). The use of CFD allows for the calculation of the Residence Time Distribution (RTD), thereby determining the amount of time a particle of water should remain in a treatment pond.

From my study of macrophytes and biofilm production, I believe that velocity of fluid in an ICW pond is a critical parameter. In an ICW, the densely packed vegetation helps slow the velocity of the fluid. This in turn can allow an increase in biofilm growth, which results in the plants in the ICW being able to extract the nutrient nitrogen from the effluent. Furthermore, the slower velocity allows particles of phosphorous to settle to the bed of the ponds.

ICW design can make use of complex CFD simulation to improve efficiency of current systems and design of future systems and allow ICWs to be implemented in more complex effluent treatment and flood relief systems.

SciFest@LIT Moylish 2020

STAND 13

Title of Project: The Effect of Greywater on Soil Nutrients and Earthworm Population

Students: Alice Davoren, Emily Cullinan

School: Mary Immaculate Secondary School, Lisdoonvarna, Co. Clare

Teacher Mentoring Project: John Sims

ABSTRACT



In summer 2018 there was a hosepipe ban in Ireland. People were advised of methods to keep their plants alive. One of the methods was to use greywater to water the plants. Because a lot of greywater contains cleaning chemicals, we wondered if it had an effect on the soil, the plants growing in it and the earthworm population in the soil.

We carried out our research in two parts. Firstly, we did research in a field near Gort. Secondly, we carried out research using barley seedlings in the school lab. We did not find that greywater affected the nitrate, phosphate and potash levels of the soil much in the field trials. However, there were some changes in pH in these trials. With regard to our laboratory trials, we found significant changes to pH, nitrate and potassium levels. There were no changes in phosphates levels.

With regard to earthworms in our field trials, we found that every quadrat that was not treated with the greywater contained earthworms. Only two of the treated quadrats contained earthworms. We noted that these earthworms were a greenish colour unlike the ones in the untreated quadrats. We also noticed that the texture of the treated soil was different to that of the untreated areas, both in the field and in our lab trial.

Our investigation of the effects of the greywater on the growth rate of barley seedlings was inconclusive as only a small number of our seedlings germinated.

SciFest@LyIT 2020

STAND 14

Title of Project: Is Exercise Recovery Time in Teenagers Dependent on the Type of Sport they Participate In?

Student: Jennifer Doherty

School: Scoil Mhuire Secondary School, St Oran's Road, Buncrana, Co. Donegal

Teacher Mentoring Project: Laura Corbett

ABSTRACT

The aim of my investigation was to find out if the time taken, by teenagers, to recover from exercise (and therefore their aerobic fitness) depends on the type of sport they participate in. Ten participants, aged between 13 and 18 years, who played only one of five sports (Gaelic football, soccer, athletics, boxing and golf) completed an adaptation of the Chester Step Test. Heart rate was measured before exercise and at two-minute intervals during the test. The time taken for heart rate to return to its resting value was recorded as a measure of recovery time.



SPSS Statistical software was used to run a One-Way (Welch) ANOVA on the data which showed that the mean recovery time for each sport was significantly different. Games-Howell post-hoc analysis showed that teenagers who participate in boxing had the shortest recovery time indicating that they have the highest level of aerobic fitness. Teenagers involved in athletics had the second shortest recovery time and second highest aerobic fitness level. The difference in mean recovery time between Gaelic football and soccer was not statistically significant but the recovery time for Gaelic football was significantly lower than that for golf. The difference in recovery time between soccer and golf was not found to be significant.

From my investigation I conclude that exercise recovery time and aerobic fitness in teenagers is dependent on the type of sport they participate in.

SciFest@DCU 2020

STAND 15

Title of Project: The Effect of Exercise on Short-term Memory

Students: Ciara Heaney, Holly Bond, Jinlong Situ

School: Wesley College, Ballinteer, Dublin 16

Teacher Mentoring Project: Jilly Fleming

ABSTRACT

The aim of our project was to investigate the effect of exercise on short term memory. We think this project is very relevant to the real world and everyday life. There are continuous experiments being conducted all around the world on our brain and how it works. During our initial research, we found many studies which support the idea that physical exercise is beneficial to the body and the mind. Our experiment aims to further research this.

We conducted a series of tests among 1st and 4th year students to see if test results were improved by Physical Exercise (PE). We split each year into two groups. Each group had two test days, one with PE and one control with the same time interval but no PE. For each test they were given a list of 20 randomly generated words. After the set amount of time they had to individually recall as many words as they could.



We recorded these results in Excel. After statistically analysing the gathered data, we concluded that exercise marginally affects test results. However, to fully prove our hypothesis, that exercise does have a positive effect, we would need to conduct more tests.

SciFest@DkIT 2020

STAND 16

Title of Project: An Analysis of Physiological and Running Metrics in 3 km Cross Country Running in Comparison to Track and Treadmill

Students: Erinn Leavy, Sophie McCardle

School: St Vincent's Secondary School, Seatown Place, Dundalk, Co. Louth

Teacher Mentoring Project: John White

ABSTRACT

The purpose of this project was to analyse physiological and running metrics in 3K cross country (“XC”) running in comparison to track and treadmill and to find out if there is a difference in stride length, cadence and power over the three types of running surface.

Our hypothesis is that cross country running is better preparation for marathons due to training at a higher and more variable load on the body which is better preparation for any long distance runner because it adds variation to cadence, stride length and power. Heart rate should show more variation and be perhaps higher than the other two running surfaces as runners will be running up and down hills whereas training on a track or treadmill (no incline setting on a treadmill) is flat with no elevation.



We collected, logged and analysed physiological metrics (heart rate) and running metrics (cadence, running power and stride length) using cutting edge technological devices. The devices we used were the ‘Stryd’ running footpod (which estimates cadence, running power and stride length), a Garmin ‘VivoActive 3’ watch with Global Positioning System (GPS) (which estimates average heartrate). An advanced statistical analysis was carried out using the ‘SPSS’ statistical package.

We found that there is a complex relationship between the metrics measured. The XC metrics fell between track and treadmill, with the exception of heart rate. This is not what we originally hypothesised would happen and warrants further investigation.

SciFest@IT Carlow 2020

STAND 17

Title of Project: The Relationship Between Trees and Different Raised Bog Habitats

Student: Orla McCorry

School: Heywood Community School, Ballinakill, Portlaoise, Co. Laois

Teacher Mentoring Project: Aodhagán Ó Súilleabháin

ABSTRACT

Hypothesis: Better quality peatland habitats should not have lots of trees.

My objective was to investigate the relationship between trees and the quality of different bog habitats at Abbeyleix bog. The condition of the bog in relation to its vegetation and trees can tell us if the bog is probably storing carbon or emitting it.

During my investigation I worked in three main habitats:

- Cutover bog
- Bog margin
- The central area



I surveyed five quadrats in each habitat. I studied the number and sizes of all the trees in each quadrat. I also carried out a vegetation survey and did some environmental analysis and measured pH and bog water conductivity.

My results show that the cutover bog was dry, had low *Sphagnum* moss cover, and had large pine and birch trees. The central part of the raised bog was wetter, *Sphagnum* moss cover was higher. Trees were less frequent and much smaller. The driest parts of the bog had the most trees.

My results are typical of raised bogs around Ireland. While trees are good for carbon storage, they are not welcome on raised bog habitats. Trees can indicate the bog is dry. When peat is dry it oxidises and emits carbon. It is preferable to have wet peat and high *Sphagnum* cover so that the bog makes peat and stores carbon.

SciFest@WIT 2020

STAND 18

Title of Project: Are You Poisoning Your Children?: The Dangers of Car Exhaust Fumes and How to Avoid Them

Students: Cian Farrell, Enda McCabe, Ben Kinsella

School: Meánscoil na mBráithre Críostaí, Sráid Shéamais, Cill Channaigh

Teacher Mentoring Project: Emma Kavanagh

ABSTRACT



The idea came from our observations that children were being exposed to car fumes while retrieving baggage/instruments/gear from car boots before school. Although some parents turn off their ignitions, many children immediately jump out and walk directly into visible plumes of fumes. We examined the possible benefits of turning off the car and waiting for a short while, allowing the harmful car fumes to dissipate, before allowing children to retrieve items from the boot. In order to find a recommended wait time we measured children's exposure when the ignition was on/off for intervals between 5-120 seconds.

We decided to measure the exposure when the children exit from the passenger seats and don't access the boot at all, both when the car is running and turned off for between 5-120 seconds. We researched the dangerous substances that are present in car fumes and the levels at which these substances are harmful.

In conducting experiments, we used particle monitors to measure fume levels at various heights and at the boot/side, e.g. we tested for particulate matter 2.5/10. Overall, our aim was to inform adults about the dangers of car exhaust fumes and how to avoid them. Based on our experiments we recommend turning off the car engine and that children exit straight from the car door, i.e. do not go to the boot to retrieve bags, etc. Children should exit as fast as possible as inhaling any amount of car fumes is dangerous.

SciFest@NorthWest 2020

STAND 19

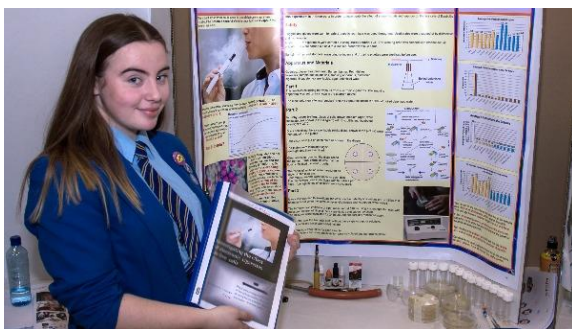
Title of Project: Investigating the Effect of E.Vape Liquids and their Components on Live Cells

Student: Hollie Harkin

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

Teacher Mentoring Project: Ann Blanking MBE

ABSTRACT



With doubt about the safety of e.vaping and reported deaths attributed to e.vaping, this project tested a range of unflavoured e.vape liquids, their vapours, constituent parts and cigarette smoke (for comparison) for any antibacterial activity against the gram positive bacterium, *B.subtillis*. Vapours were collected by using a smoking apparatus and bubbling the vapours into boiled deionised water. The Kirby-Bauer zone of inhibition test and a turbidity test using a spectrophotometer at 696 nm

were used to determine the effect of the e.vape liquids, their vapours, constituent parts and cigarette smoke on *B.subtillis*. Aseptic technique was used throughout.

Results suggest that all of the e.vape liquids and most of their vapours promote the growth of *B.subtillis*. Vegetable glycerine and propylene glycol also promoted the growth of bacteria. Original and Eelite vapours showed some antibacterial activity. This could be due to the formation of aldehydes formed during the vaping process.

Tobacco smoke promoted antibacterial activity. Background research showed there was evidence that cigarette smoke did have antibacterial properties against a range of gram positive and gram negative bacteria. These results would appear to suggest that vaping promotes the growth of bacteria in the respiratory system and could contribute to respiratory diseases such as 'Popcorn lung' which are being seen in people who vape.

SciFest@AIT 2020

STAND 20

Title of Project: Dispel the Smell of Goats' Milk

Students: Emily Ray, Sharon Seery

School: Moate Community School, Church Street, Moate, Co. Westmeath

Teacher Mentoring Project: Mairead Cusack

ABSTRACT

The health benefits of goats' milk are well known; the reason for the lack of consumption is the milk's unpalatable nature. The aim of our project was to use a multi-faceted approach to improve the taste and smell of goats' milk and make it more palatable.



We decided to focus on the breed of goat, the goats' diet, cooling method and effect of additives. We first looked at breed and tested the milk of five breeds (Saanen, British Alpine, Toggenburg and Boer) on its chemical and physical properties. We concluded that Toggenburg milk is the most palatable.

We then looked at diet (grass and hay vs silage) and found that grass and hay are best. Cooling method was focused on next, which led us to finding that lipase is the enzyme which breaks the long chain fatty acids into short chain causing the smell and the unpalatable taste of the milk. We figured out cooling the milk as quickly as possible denatures the enzyme lipase and stops it breaking long chain fatty acids in the milk to short chain.

We then pooled all our results together and decided to make yoghurt using different additives (lecithin, skimmed milk powder and whey protein). We concluded that whey protein and skimmed milk powder both reduced the smell of goats' milk. We then tested our samples using gas chromatography mass spectrometry in Athlone Institute of Technology which confirmed our results

SciFest@TU Dublin Tallaght

STAND 21

Title of Project: Investigating the Antimicrobial Effects of Herbal Plants and Vegetables against a Plant Pathogen

Student: June Polgolla

School: Our Lady's School, Templeogue Road, Terenure, Dublin 6W

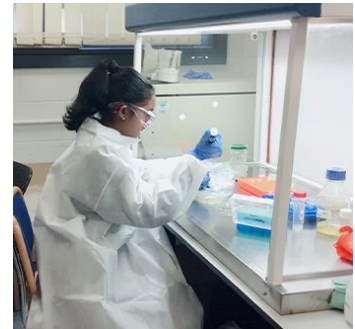
Teacher Mentoring Project: Lynsey Stuart

ABSTRACT

Plants being infected with pathogenic bacteria is a global problem. Globally, around 30-40% of food production is lost due to pathogens and many plant pathogens have expanded their range because of climate change. 'Pseudomonas Syringae Pathovar Tomato DC 3000' causes bacterial speck disease in tomato plants.

Currently, when plants are infected with bacteria farmers use pesticides which are expensive and unsustainable based on current EU and Irish regulations. Therefore, an alternative natural, sustainable and economically viable method is needed.

My hypothesis was that if I tested a range of herbal plant and vegetable extracts against plant pathogens in this case, 'Pseudomonas Syringae Pathovar Tomato DC 3000', using the agar disk diffusion method over a series of trials, then I could identify which had the strongest antimicrobial effect.



Extracts of the herbal plants were created and used to impregnate filter discs. The discs were added to agar plates, lawned with the P. Syringae pv Tomato DC 3000 and the zones of inhibition were measured after three days of incubation.

Based on my three trials, betel leaves had the biggest area of clearing (0.5 cm), followed by cinnamon (0.4 cm).

In conclusion, betel leaves and cinnamon contain antimicrobial properties against the bacterium P. Syringae pv Tomato DC3000. My hypothesis is therefore supported. The antimicrobial component within the herbal plant extracts could be isolated and used instead of traditional pesticides. These herbal plant extracts would also have the further benefit of providing additional nutrients to the plants.

SciFest@AIT 2020

STAND 22

Title of Project: Fighting for Breath: Is the School Drop-off Harmful to Students' Health?

Students: Tiarnan Clarke MacMahon, Owen Bagnall, Luke Seery

School: Meán Scoil an Chlochair, Kilbeggan, Mullingar, Co. Westmeath

Teacher Mentoring Project: Niamh Daly

ABSTRACT

When we noticed that an asthmatic member of our team regularly coughed as he entered the school grounds each morning we considered that there may be a correlation between his coughing and the volume of cars at the school drop-off point.



We randomly selected half of the national schools in Westmeath and investigated whether their drop off sites produced significant levels of increased air pollutants. We sought guidance from the Alpha Centre in DCU Science Department, who lent us air quality sensors to record the type and levels of airborne contaminants present during school drop-off periods.

We measured six independent variables (carbon dioxide, odour, temperature, small particles, large particles and humidity) at each participating national school, at two time points: one in the empty car park 30 minutes prior to drop-off, and the second during the peak drop-off period, when the school car parking/drop off area was full.

The findings demonstrated that there was an increase over time in levels of carbon dioxide and both large and small particles. Paired T tests indicated statistically significant changes in the mean scores over time for all participating schools. Individual analysis of each school's readings for small particles indicated that 3 schools entered the "warning" range at Time 2, and 1 school entered the "alert" range at Time 2.

In conclusion, the research indicated an increase in the presence of car emissions, in particular carbon dioxide and large and small PM at drop-off points in school grounds when cars are idling.

SciFest@GMIT 2020

STAND 23

Title of Project: An Investigation into the Tsiolkovsky Rocket Equation

Student: Lucy Garrett

School: Dominican College, Taylor's Hill, Galway

Teacher Mentoring Project: Laura Thornton

ABSTRACT

This project is an investigation into the practical applications of the Tsiolkovsky rocket equation – an equation that describes the motion of an object with similar properties to a rocket, i.e. it uses a “fuel” of some description to propel itself upwards. The focus of the project is to determine whether the motion of a water bottle rocket could be applied to this equation, and thus calculate its final height. This project has two distinct components: calculating the theoretical motion of the rocket, and finding out the rocket’s launch height experimentally.

To calculate the rocket’s theoretical height, I wrote an iterative Python program that calculates values for the rocket’s internal pressure, volume of air, exhaust velocity, mass, thrust, drag, acceleration, and velocity at a defined (small) timestep. These calculations are not possible solely using the Tsiolkovsky equation, because it only takes the rocket’s velocity, its exhaust velocity, and its change in mass into account. This means that factors such as gravity, drag and the bottle’s own weight, which limit the rocket’s potential height, are not considered. Therefore, we must use other principles in classical mechanics to derive useful formulae for simulating the rocket’s motion accurately.



The theoretical value for the rocket’s height was compared with the experimental data – rocket launch heights. The launch heights were measured using a clinometer, a known distance from the launch site, and some simple trigonometry.

SciFest@IT Tralee 2020

STAND 24

Title of Project: Using Machine Learning to Improve Numerical Weather Prediction

Student: Conor Casey

School: Pobalscoil Inbhear Scéine, Kenmare, Co. Kerry

Teacher Mentoring Project: Sarah Abbott

ABSTRACT

This report hypothesises that it's possible to train a RNN on data from the past 15 years, that such a network captures weather patterns, and that such a model will improve numerical weather prediction.

This project has been enhanced since it was submitted into SciFest@College. To understand the performance increase, a comparison between the performance of the current and previous model was done. Air temperature is the only parameter examined for this comparison. Concerning the two metrics, RMSE and MAE, there has been a dramatic performance improvement. There has been a mean decrease of 50.6% in the aforementioned metrics. The performance has not plateaued, which is promising.

It was expected that the development of a ML model would decrease the computational resources required. Once the model has trained, a performance increase of 3.59x was observed in comparison against a physical model of a similar resolution. It should be noted that the benchmark of the software was run on a consumer-grade laptop, while the benchmark of the IFS T42 model was performed on machine with 36 cores. Hence, a further increase can be expected.



The results are promising, the architecture's spatial awareness is lacking, as evident by the current ACC values. It outperforms persistence and climatology forecasts and performs better than a physical model after five forecast days; more work, potentially incorporating a CNN will improve the performance. The current model is 4x faster than a physical model of an equivalent resolution.

Hence, the proposed hypothesis has partially been proven.

SciFest@CIT 2020

STAND 25

Title of Project: An Investigation into Ideal Angles in Ballet

Student: Andrea Marshall

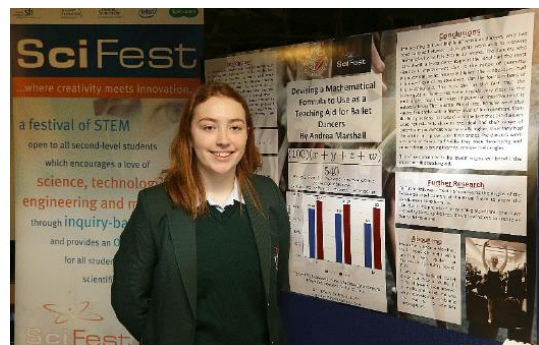
School: St Aloysius Girls Secondary School, Sharman Crawford Street, Cork

Teacher Mentoring Project: Katie O'Donovan

ABSTRACT

The aim of my experiment was to investigate the significance of angles in ballet. I did this by conducting an experiment to investigate this by devising a formula to define how close a dancer is to the ideal, investigating accuracy compared to professional success and trialling this model in a real-life application as a teaching aid.

I measured the angles created by the professional dancers and then compared their angle accuracy to their professional success. I devised a formula that allowed me to define how close a dancer is to the ideal angles. From the results of the significance test, I found that there is a clear and significant correlation between these two factors. From this, I have concluded that angle accuracy is a significant factor in professional success in ballet. Therefore dancers with a higher percentage of the ideal will have more successful professional careers compared to those with a lesser.



I also measured advanced dancers' angles, to trial this as a teaching aid over a six-week period. From the data I collected it was evident that this tool was highly effective, as dancers who had already been dancing for 12-15 years had increased their accuracy by 11.64-25.97% in just six weeks. I concluded that this mathematical model can be used as a teaching aid for dancers to improve their technique and that it will be most beneficial to dancers with angles further from the ideal as the range of potential improvement is the largest.

SciFest@IT Tralee 2020

STAND 26

Title of Project: Specs - An Adapted Spectacle System for Dementia Patients

Students: Dara Newsome, Conor Bradshaw, David Hughes

School: Mercy Secondary School Mounthawk, Mounthawk, Tralee, Co. Kerry

Teacher Mentoring Project: Eimear Nolan

ABSTRACT



Our project aimed to develop an intelligent spectacle system which helps reduce anxiety and paranoia in people suffering from dementia when faced with people and surroundings they do not recognise.

Our system, Specs (Specialised Personal External Care System), mounts onto the patient's glasses and employs computer vision and machine learning software to detect and identify faces. It then feeds this information

to an OLED display. This data is then projected onto a transparent screen in front of the patient's eye.

The system is not limited to faces and can also be extended to recognise everyday objects.

We also created an app to complement the Specs system. The app was developed to make the system as user friendly and intuitive as possible. It possesses many features such as remote power management, personal profile management, identifiable image uploads and, in the future, message relay between the patient and their caregiver/family.

A working prototype was successfully developed and tested against multiple samples. Each participant during the testing received a demonstration of the Specs system and was then surveyed on their experience. The survey results were then used to improve and develop the system further.

SciFest@GMIT 2020

STAND 27

Title of Project: Hospital Holly and Henry - A Mobile Trinal Interactive Solution to Eradicate Children's Fears of Medical Procedures

Student: Aoibheann Mangan

School: Mount St Michael Secondary School, Convent of Mercy, Claremorris, Co. Mayo

Teacher Mentoring Project: Paula Campbell

ABSTRACT



Many children are afraid of hospitals. Unfamiliar places and faces and invasive, painful procedures only heighten this anxiety causing huge stress and panic.

I researched different supports, educational, emotional, psychological and play therapy reports and I surveyed 500 children to find out the root causes of their anxieties so that I could predict what might help them be less afraid. Fear of the unknown was the biggest cause of fear in those surveyed. Survey results showed that education through animation and gamification using cartoon characters would help them be more confident.

My hypothesis is, that if children are familiar with hospital procedures, first aid and medical personnel, it can alleviate anxiety and increase confidence, allowing them to be more comfortable in medical settings whether pre-planned or in emergency situations.

My project is a trinal device to educate children on medical procedures through animations and gamification. It uses an interactive doll I created, an app and a website which can be used to show hospital procedures. I made several prototypes of interactive dolls featuring different devices. The app also has an emergency feature that allows children to summon help by calling 999 or texting/calling for help.

On completion of prototypes I worked with a focus group of children to gain feedback and make changes to each prototype in order to improve their functionality. The familiarity with procedures together with the ability to perform basic first aid and to summon help all empowered the children to feel like a hospital hero!

SciFest@TU Dublin Blanchardstown 2020

STAND 28

Title of Project: Lost

Students: Finn Nankivell, Cian Glynn

School: Stratford College, 1 Zion Road, Rathgar, Dublin 6

Teacher Mentoring Project: Helen O'Kelly

ABSTRACT



Lost is a grid-based, navigational puzzle game – but with a catch. The player’s monitor has been disabled, meaning that they must rely on audio cues alone to traverse increasingly difficult levels. The reason for this is that *Lost* is designed to be played by visually impaired players. However, it has also evolved into a unique experience for players who may be used to playing games relying on visual feedback.



SciFEST 2020
BOSTON SCIENTIFIC
MEDICAL DEVICES
AWARD FINALISTS

SciFest@IT Tralee 2020

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SciFest@GMIT 2020

STAND 27

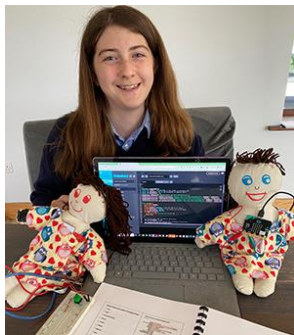
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SciFest@CIT 2020

STAND 29

Title of Project: S.I.D.S. Temperature Monitor

Student: Aishling Reeves, Nadia O'Sullivan

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

Teacher Mentoring Project: Marguerite O'Donoghue

ABSTRACT

Aishling had a cousin who died from cot death (or SIDS - sudden infant death syndrome) and we decided to do some research on this problem. We found that there are many risk factors that can lead to SIDS.

Some of these factors include the following:

- Smoking while pregnant
- Smoking near or around as a baby
- Placing the baby on its tummy while it's sleeping
- Baby's temperature getting too high

Parents have a lot of control over the first three factors and can make their own decisions but in the case of high temperature the parents may not be aware until it is too late.

So we decided to help with this and base our project on measuring the temperature of a baby in a pram or cot. We built a temperature monitor using an Arduino microcontroller on some basic electronic components with help from our parents and their friends. To keep a similar theme to our original idea, (which was to build a solar powered car), we decided to include solar charging of the batteries that power the system. The system can be used in a cot at nighttime or be portable and work outdoors in a pram or buggy. Prior to building our prototype we did a lot of research on SIDS mainly online but we also carried out a survey of parents and health professionals and analysed and charted their responses.



SciFest@IT Sligo 2020

STAND 30

Title of Project: 'Inside Out' – A Wearable Device that Externalises Internal Emotions

Student: Ellen Woodward

School: Ursuline College Sligo, Finisklin Rd, Sligo

Teacher Mentoring Project: Anthony Carolan

ABSTRACT

My project aimed to create a wearable device which reads and learns the physiological responses from the autonomic nervous system caused by various emotions, such as heart rate and skin temperature, and displays the emotion's associated colour on the device, worn on the wrist. This device will help those with autism to be alerted as to what emotion they are feeling. It would also alert their carers. This gadget can act as an emotional intelligence learning tool for those who struggle to understand their feelings.

I hypothesised that, 'If I read physiological responses with a variety of sensors, then I would be able to interpret these responses and identify their corresponding emotion, because emotions all have a specific pattern of responses of the autonomic nervous system.'

I built and soldered a Raspberry Pi Zero W, along with a variety of sensors and lights. I then coded the individual sensors with Python and began testing. I performed controlled experiments where I measured the response of the temperature of skin when under different emotions: fear and anger. I also created a truth table to determine the emotion of each combination of events. I then assigned a colour to each which corresponded to the emotions in the movie Inside Out.



There are many future applications for a device like this. A machine learning element would allow the device to be tailored to each individual and creating a smart-watch application would eliminate the need for production of an entirely new device.

SciFest@AIT 2020

STAND 31

Title of Project: Ultrasonic Assistant

Student: Marina Caballero

School: Our Lady's Bower, Retreat Rd, Athlone, Co. Westmeath

Teacher Mentoring Project: Julie-Anne Greaney

ABSTRACT

I have done this project because, in our daily life, we don't think about people with disabilities, particularly blind people. They are daily confronted with numerous problems while performing routine activities and moving through unfamiliar areas. They have lots of difficulties to face in leading a "normal" life, so I decided to create a device to help them.



I have created a device called Ultrasonic Assistant which consists of a headband which incorporates ultrasonic sensors. When detecting something at a medium height, it will emit a sound that informs the person that they are close to an obstacle and have to change direction.

The headband has ultrasonic sensors around its outer surface which send ultrasonic waves to the environment. If the sensors receive a response from an obstacle at a distance of less than 1.5 metres the device

will emit sounds through two speakers. This will alert the disabled person to avoid the obstacle. It would cost around €120.

I have tested the Ultrasonic Assistant prototype with blind and non-blind people in situations similar to the real ones; different trigger detection distances were tested to know the optimal distance.

I have compared my work with the existing devices and my prototype is cheaper and works reasonably well. It is also easy to wear. However, in the future I will have to improve the weight and softness of the device as it is a bit heavy and visually impaired people won't feel comfortable wearing it all day.



SCIFEST 2020

SPECSAVERS MAKING A DIFFERENCE GRAND AWARD

AWARD FINALISTS

SciFest@TU Dublin Blanchardstown 2020

STAND 28

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SciFest@AIT 2020

STAND 32

Title of Project: Our Farmers – ‘Deaf as Doornails?’ An Investigation into the Effect of Machine Noise on our Farmers’ Hearing

Students: Molly Cunnane, Katie Hannelly

School: Castlerea Community School, Castlerea, Co. Roscommon

Teacher Mentoring Project: Pauline Dervin

ABSTRACT



Our project is titled ‘Our Farmers - ‘Deaf as Doornails?’’. The idea for our project came about when one of the team members noticed that her grandad was becoming noticeably deaf. After brainstorming, we felt that his hearing loss could be associated with the non-use of hearing protection when using machinery.

Following research, we found that machinery over 85 decibels (dB) affects hearing. The aim of our project was to make farmers in our local community aware of the damage that the noise from farm machinery has on their hearing. To do this we tested different tractors to establish if the noise emitted from them was over 85 dB. We analysed our results and realised that the older the tractor the louder the noise emitted from the tractor. This result proved our hypothesis wrong. Our hypothesis was, ‘The higher the horsepower of the tractor the louder the noise emitted from the tractor’.

We then compiled a survey for our local farmers which we conducted in our local mart. The survey enabled us to assess the farmers’ knowledge, awareness and practices towards the use of farm machinery and ear protection. 79% of farmers surveyed said they thought the noise from farm machinery affects their hearing, while 21% did not think it affected their hearing. Surprisingly, only 22% of farmers said that they wore ear protection and 78% said they did not wear ear protection. We were alarmed that farmers knew the harm it was doing to them but were doing nothing about it.

SciFest@GMIT 2020

STAND 33

Title of Project: Exploring Schools App

Students: Elana Monaghan, Saibh Malcolm

School: Presentation College, Headford, Co. Galway

Teacher Mentoring Project: John Toner

ABSTRACT



Sixth class primary school pupils and their parents can find choosing the right post-primary school a daunting task. Our project looked at bridging the gap between post-primary schools and prospective students. To do this we created 'Exploring Schools,' an app and a website of the same name, which work collectively to give a much broader picture of what schools have to offer. Users are able to view subject choice and extracurricular activities to make a more informed decision. Our app provides

a platform for post-primary schools to showcase their offerings and provides parents with important information should they choose a place, e.g. fees, book rental schemes, a uniform description and much more. 'Exploring Schools App' deepens the engagement between schools and their prospective students so that everyone has a smoother transition into secondary school life.

We trialled our project in County Galway where we knew we had 46 post-primary schools. Using www.education.ie, www.irelandstats.ie and individual school websites we collected data (school details, subject choices, extra curriculums, fees, etc.) for each school. We created our website on Weebly and input the information on each individual school. We also created a subject list on our website which provides students and parents with an explanation of the subject. Finally, we coded our app and linked it up to our website.

SciFest@CIT 2020

STAND 34

Title of Project: To Research the Challenges of Transitioning from Primary to Secondary

School for Students with Autism

Students: Sean Moloney, Michael Ware

School: St Brogan's College, Kilbrogan, Bandon, Co. Cork

Teacher Mentoring Project: Norma Sheahan

ABSTRACT



Currently there is very little research on the challenges that students with ASD experience when transitioning from primary to post-primary school. Maras and Aveling (2006) propose that young people with ASD may find transitioning particularly difficult, since difficulty adapting to change, or unusual situations can be a particular feature of ASD. According to research by the National Autistic Society (2019), parents whose children were suffering high levels of

anxiety due to stress from meeting secondary school requirements felt that the support during the transitioning phase was inadequate. The aim of our research was to identify these challenges and develop an information booklet that can be used as a resource for sixth-class pupils. We both know first-hand how difficult the leap to post-primary school can be, having to cope with new and unfamiliar settings. As we are both on the autism spectrum, and part of the ASD base class in our school, we know and understand the value of a positive, well-co-ordinated transition plan.

We established a focus group of current sixth-class pupils from the local primary schools that have a diagnosis of autism. We used two methods to survey the pupils, a traditional questionnaire and 'impromptu drawings' of how they are feeling about the transition. We then analysed their responses to identify reoccurring features and trends. Using this data we created an information booklet to address the concerns identified and act as a resource for sixth-class pupils to help alleviate some of these challenges – 'Brogan's Bridge to Secondary School'.

SciFest@LIT Thurles

STAND 35

Title of Project: Vegan vs Omnivore: Can a Vegan Diet Benefit the Environment from an Irish Perspective?

Student: Kaitlyn Ryan

School: Coláiste Mhuire Co-Ed, Castlemeadows, Thurles, Co. Tipperary

Teacher Mentoring Project: Katie Carr

ABSTRACT

This study deals with the area of veganism and a diet which includes meat and dairy products and these diets' impact on the environment. The study investigates the meals that two people eat in a week – one person who is a vegan and another who is an omnivore and eats meats, dairy, fruit and vegetables. The students explained what they ate over a week and I then used this information to calculate the food miles associated with each food and the carbon footprint associated with each food. The food miles for the different foods were compared in order to identify the carbon footprint of each of the different diets.

It was clear from this research that a vegan diet is not better for the environment due to the wide variety of fruit and vegetables as well as nuts and legumes which are imported every day. It would not be possible to have a healthy vegan diet where the person achieves their recommended daily allowances in every nutrient without including a lot of foods which are imported. It is also clear that very few supermarkets are supporting Irish produce and so more should be done in order to ensure that fruit and vegetables are sold which are Irish produce, especially when these foods are in season in Ireland. People should also try to grow their own produce as it is very easy to do even if one lives in the smallest of places.



SciFest 2020 Award Winners

SciFest SFI STEM Champion 2020

Student	Caoimhín O'Leary
School	Ard Scoil na Mara, Tramore, Co. Waterford
Project	An Image Analysis of Rehabilitating Patients' Exercises to Measure and Improve Recovery
Teacher	Niamh Shannon

Teacher of Excellence 2020 Award

School	Ard Scoil na Mara, Tramore, Co. Waterford
Teacher	Niamh Shannon

SciFest SFI Runner-Up Award

Student	Conor Casey
School	Pobalscoil Inbhear Scéine, Kenmare, Co. Kerry
Project	AMSIMP: Using Machine Learning to Improve Numerical Weather Prediction
Teacher	Sarah Abbott

Berlin Long Night of Science Award

Students	Finn Nankivell, Cian Glynn
School	Stratford College, 1 Zion Road, Rathgar, Dublin 6
Project	Lost
Teacher	Helen O'Kelly

Boston Scientific Medical Devices Grand Award

Students	Dara Newsome, Conor Bradshaw, David Hughes
School	Mercy Secondary School Mounthawk, Mounthawk, Tralee, Co. Kerry
Project	Specs - An Adapted Spectacle System for Dementia Patients
Teacher	Eimear Nolan

Boston Scientific Medical Devices Runner-up Award

Student	Ellen Woodward
School	Ursuline College Sligo, Finisklin Rd, Sligo
Project	'Inside Out' – A Wearable Device that Externalises Internal Emotions
Teacher	Anthony Carolan



Specsavers Making a Difference Grand Award

Students	Molly Cunnane, Katie Hannelly
School	Castlerea Community School, Castlerea, Co. Roscommon
Project	Our Farmers – ‘Deaf as Doornails?’ An Investigation into the Effect of Machine Noise on our Farmers’ Hearing
Teacher	Pauline Dervin

Specsavers Making a Difference Runner-up Award

Students	Sean Moloney, Michael Ware
School	St Brogan's College, Kilbrogan, Bandon, Co. Cork
Project	To Research the Challenges of Transitioning from Primary to Secondary School for Students with Autism and Develop an Information Book Addressing these Challenges to Help Ease their Transition
Teacher	Norma Sheahan

Intel Technology Award

Student	Dara Newsome, Conor Bradshaw, David Hughes
School	Mercy Secondary School Mounthawk, Mounthawk, Tralee, Co. Kerry
Project	Specs - An Adapted Spectacle System for Dementia Patients



Teacher Eimear Nolan

SciFest Life Sciences Award

Student Giulia Baratta

School Toxicological Investigation of Pesticides Using Paramecium as a Model Organism

Project St Andrew's College, Booterstown Ave, Blackrock, Co. Dublin

Teacher Hilary Rimbi

THEA Award

Student Alice Davoren, Emily Cullinan

School Mary Immaculate Secondary School, Lisdoonvarna, Co. Clare

Project The Effect of Greywater on Soil Nutrients and Earthworm Population

Teacher John Sims

ISTA Award 2020

Student Erinn Leavy, Sophie McCardle

School An Analysis of Physiological and Running Metrics in 3 km Cross Country Running in Comparison to Track and Treadmill



Project St Vincent's Secondary School, Seatown Place, Dundalk, Co. Louth

Teacher John White

SciFest Scientist of the Future Award

Student Aoibheann Mangan

School Hospital Holly and Henry - A Mobile Trinal Interactive Solution to Eradicate Children's Fears of Medical Procedures

Project Mount St Michael Secondary School, Convent of Mercy, Claremorris, Co. Mayo

Teacher Paula Campbell

Yale Science and Engineering Association Award

Student Caoimhín O'Leary

School An Image Analysis of Rehabilitating Patients' Exercises to Measure and Improve Recovery

Project Ard Scoil na Mara, Tramore, Co. Waterford

Teacher Niamh Shannon

American Psychological Association Award

Student Ellen Woodward

School 'Inside Out' – A Wearable Device that Externalises Internal Emotions

Project Ursuline College Sligo, Finisklin Rd, Sligo

Teacher Anthony Carolan



American Meteorological Society Award

Student Conor Casey

School AMSIMP: Using Machine Learning to Improve Numerical
Weather Prediction

Project Pobalscoil Inbhear Scéine, Kenmare, Co. Kerry

Teacher Sarah Abbott