

First in Europe - First in Ireland - First in Innovation



Engineering an



Undergraduate Innovation Eco-System

Pictorial Compendium of International & National Innovation Awards



Engineers Ireland Excellence Awards

*“Best in Class” Engineering
Education Excellence Award 2015*



*Cork Institute of Technology
30 Years A Growing
Cork Mechanical, Manufacturing and
Biomedical Engineering Exhibition
Ireland and Europe’s Largest
Educational Engineering Event*



International Prize-Winners **in Engineering Innovation, Design & Entrepreneurship**

Innovative Product Development Laboratories

Recent International student successes include:

Nine First Places and Seven Runner Up Finalists in the Institution of Mechanical Engineers Best Medical Engineering and Design and Development of a Biomedical Device Competitions, London (2015, 2014, 2011, 2010, 2008, 2007, 2006, 2005)
One European Commission “Promoting the Entrepreneurial Spirit” EEPA National Award Winner (2015)
Two European Laureate of Innovation First Place Award - European Student Innovator of the Year 2014 and 2012 - European Student Innovation Finals - Innovact Reims France (2014, 2012)
One University Startup World Cup Finals Sole Irish Finalist Category Finalist Award Winner Copenhagen Denmark (2015)
European Science Engineering and Technology Best European Mechanical Engineering Student One First Place and One Runner Up Babcock Award - SET Finals London UK (2013, 2011)
Two Enterprise Ireland / Invest Northern Ireland Think Outside the Box Academic Innovation Awards (2012, 2009)
One European Laureate of Innovation Third Place Award –European Student Innovation Finals - Innovact Reims (2010)
Two Gold Medals Undergraduate Awards of Ireland and Northern Ireland Engineering/Mechanical Sciences (2011, 2010)
Seven First Places and Six Runner Up Finalists in the Institution of Mechanical Engineers Best Medical Engineering and Design and Development of a Biomedical Device Competitions, London (2011, 2010, 2008, 2007, 2006, 2005)
One Global Student Entrepreneur Finalist Award sponsored by the Entrepreneurs’ Organisation in conjunction with Mercedes-Benz Financial at the GSEA Finals in Kansas City, Missouri, USA (2009)
One SOFE Paris Second Place Award - Institution of Mechanical Engineers (2009)
One First and One Second Place in the ISEA International Sports Engineering Competition, London
Two Queen’s Silver Jubilee awards for Best Mechanical Engineering Degree Project in Ireland and Britain
One Genius 2000 Award for Best New Invention at the Nuremburg Inventors’ Fair
Two Society of Manufacturing Engineering Outstanding Young Engineer Worldwide Awards
Three First Places for Best Published and Presented Paper at the International Manufacturing Conference

National Prize-Winners **in Engineering Innovation, Design & Entrepreneurship**

Innovative Product Development Laboratories

Recent Major National achievements include:

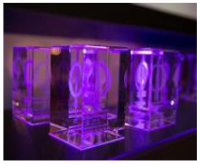
Two Engineers Ireland Excellence Awards - “ Best in Class ” Engineering Education Excellence Awards (2015, 2011)
Seven MEETA Asset Management and Maintenance National Awards (2015(x2), 2014, 2013(x2), 2011, 2006)
Eight Enterprise Ireland / Invest Northern Ireland National Awards of Merit (2015, 2013, 2012, 2010, 2009, 2008, 2007)
Eleven Engineers Ireland Innovative Student Engineer of the Year Awards sponsored by Siemens (2014 L8, 2013 L8, 2012 L8, 2011 L7, 2009 L7, 2008 L8, 2007 L7, 2006 L8, 2005 L8, 2004 L8, 2003 L8)
One Chartered Institution of Water and Environmental Management - AECOM Student Environmental National Award Winner - Sligo (2015)
Five Enterprise Ireland I.Mech.E Speak Out for Engineering Awards (2014, 2013, 2007, 2006, 2004)
One CADFEM Ireland and Ansys Users Conference EI HQ Dublin Best Presentation Paper (2014)
Two Enterprise Ireland / Invest Northern Ireland Young Entrepreneur of the Year First Place Award (2013, 2007)
Four Cruickshank Most Technologically Innovative Project First Place Award (2013, 2009, 2008, 2007)
One GradIreland Graduate Employee of the Year First Place Award Mansion House Dublin (2012)
One NCBI Inclusive Technology Showcase Grand Prize Wood Quay Dublin (2012)
Three Abbott Ireland Intern of the Year Awards (2012, 2011, 2009)
Two Enterprise Ireland / Invest Northern Ireland Academic Innovation Awards (2012, 2009)
One Engineers Ireland Excellence Awards - ESB Award for Outstanding Contribution to Engineering (2011)
One Engineers Ireland Excellence Awards - Chartered Engineer of the Year (2011)
One Inaugural Enterprise Ireland / Invest Northern Ireland Young Entrepreneur of the Year Solving Problems for Industry €7,500 Award (2009)
Two HP Invent Awards for Best Science/Engineering/IT project in Ireland
Three William Eccles Institution of Production Engineers National Awards

**European Campus Student Innovator of the Year 2014
First Place and Outright Winner**



**Engineers Ireland Innovative Student
Engineer of the Year 2014
SIEMENS sponsored by Siemens**

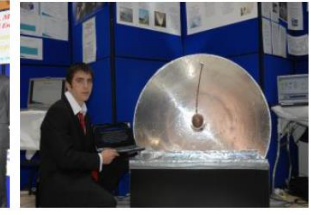





Engineers Ireland "Best in Class" Education Excellence Award Winner 2015



Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition
Ireland and Europe's Largest Educational Engineering Event





CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ

30th Cork Mechanical, Manufacturing & Biomedical Engineering Exhibition
Thursday 28th April 2016 2.00pm – 8.30pm
200 Stands
Ireland and Europe's Largest Educational Engineering Event

Exhibition Theme 2016:
30 Years A Growing!
CIT Engineering Innovation and Entrepreneurship

Engineers on the move

Opening Time:
Thursday 28th April
2.00pm to 8.30pm
Nexus Courtyard - CIT

For further information and group bookings, contact:
Sean F. O'Leary, Senior Lecturer, CIT.
Tel: 00 353 21 4335425

Admission Free
sean.foleary@cit.ie

Design, Innovation & Ethical Engineering

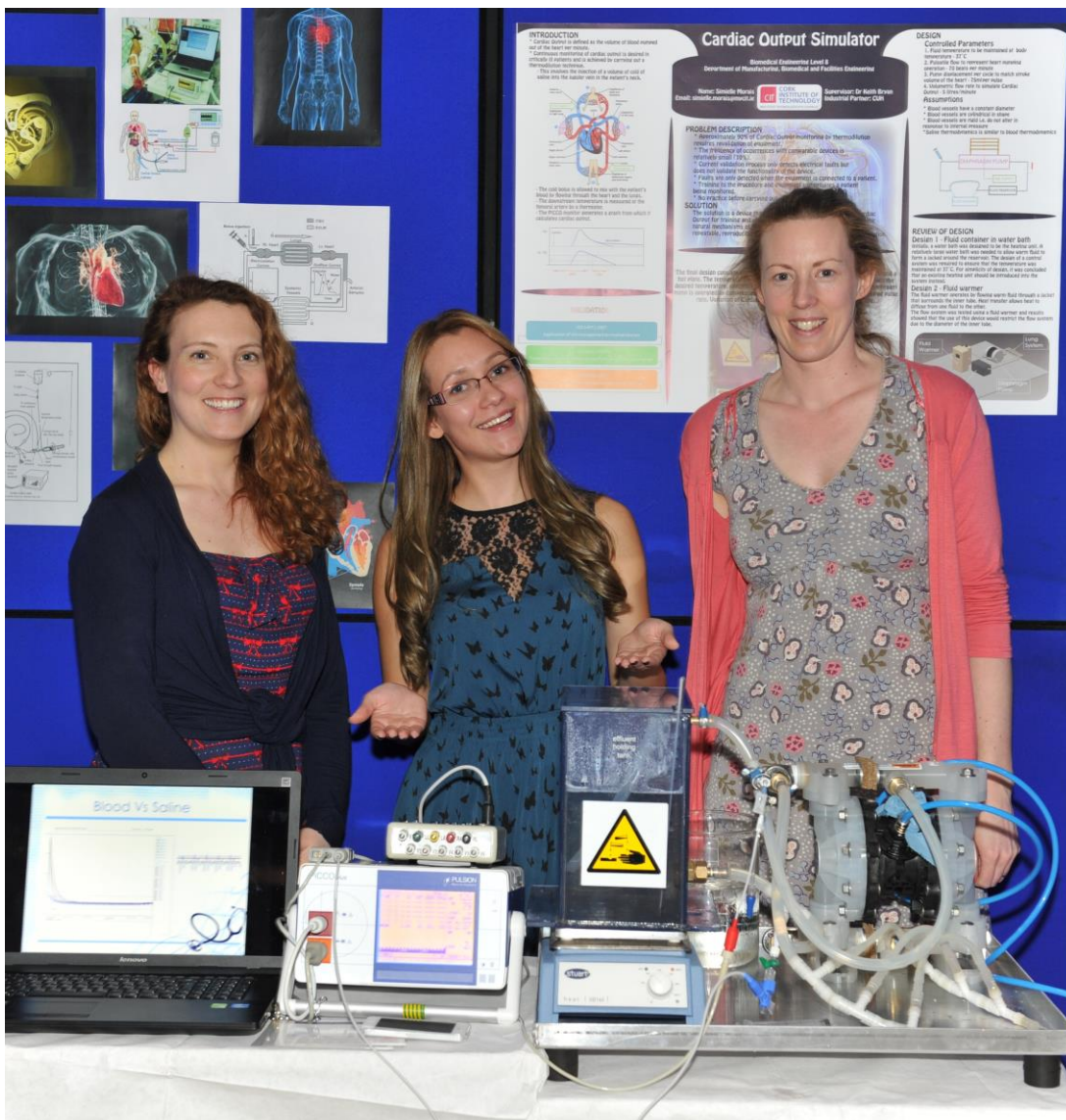


Engineers Ireland Excellence Awards

“Best in Class” Engineering Education Excellence Award 2015



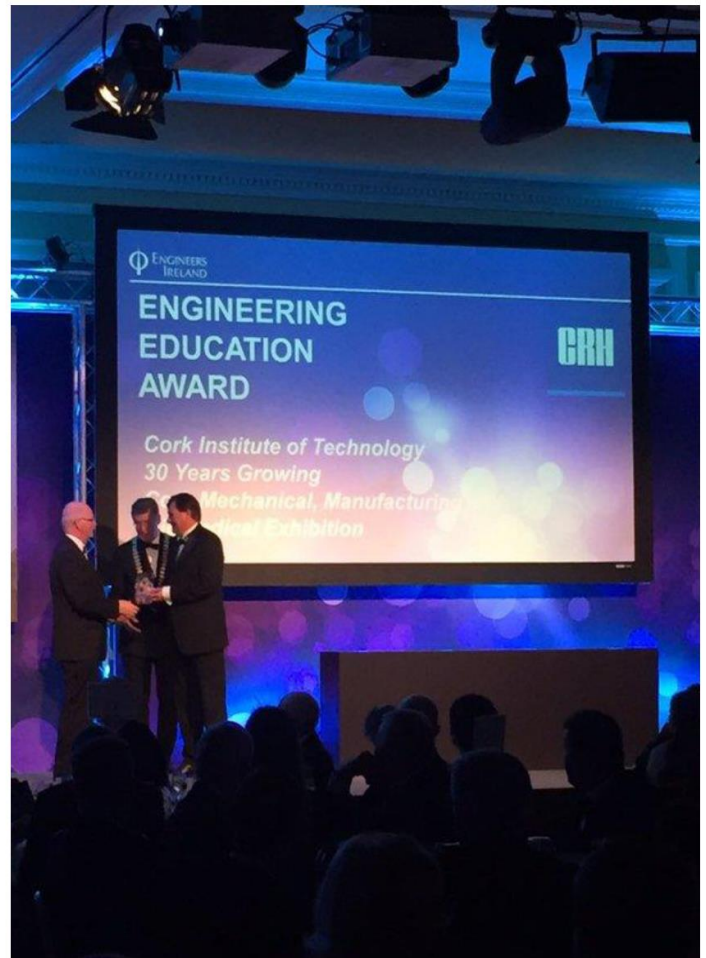
Cork Institute of Technology
30 Years A Growing
Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition
Ireland and Europe’s Largest Educational Engineering Event



Simielle De Morais CIT Final Year Biomedical Engineering Student demonstrates her capstone project on Design, Development and Testing of Cardiac Output Simulator carried out in conjunction with Cork University Hospital to Dr. Aoife Burke and Lecturer Sally Bryan at the Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition

Engineers Ireland Excellence Awards

“Best in Class” Engineering Education Excellence Award 2015



Cork Institute of Technology
30 Years A Growing

Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition
Ireland and Europe’s Largest Educational Engineering Event



Now, in its 30th year, the Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition with over 200 stands is Ireland and Europe’s Largest Educational Engineering Event.

Combining entrepreneurship, multidisciplinary innovative product development and industrial participation, the student centric event features many major themed exhibits, including Formula 1 cars and reproductions of Leonardo da Vinci’s studio/inventions. The Cork exhibition is a seminal fixture in promoting engineering on a national /international level and engineering a highly successful campus educational innovation ecosystem.



Engineers Ireland Excellence Awards

“Best in Class” Engineering Education Excellence Award 2015



Cork Institute of Technology
30 Years A Growing
Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition
Ireland and Europe’s Largest Educational Engineering Event



CIT CORK INSTITUTE OF TECHNOLOGY
 INSTITIÚID TEICNEOLAÍOCHTA CHORCAI

30th Cork Mechanical, Manufacturing & Biomedical Engineering Exhibition
 Thursday 28th April 2016 2.00pm – 8.30pm
 200 Stands
 Ireland and Europe’s Largest Educational Engineering Event

Exhibition Theme 2016:
30 Years A Growing!
CIT Engineering Innovation and Entrepreneurship

Engineers on the move

Opening Time:
 Thursday 28th April
 2.00pm to 8.30pm
 Nexus Courtyard - CIT

Admission Free
 sean.foleary@cit.ie

Design, Innovation & Ethical Engineering

For further information and group bookings, contact:
 Sean F. O’Leary, Senior Lecturer, CIT,
 Tel: 00 353 21 4335425



Westminster London 2015

International Medical Engineering Finals

Wednesday 25th February 2015

First Place - Viccon Prize for

Best Undergraduate Medical Engineering Project 2015



James Fogarty - Cork Institute of Technology

“Design and Development of an Assistive Technology Music System for People with Cerebral Palsy

Westminster London 2015

*The Healthcare Technologies Student and Early Career Awards 2015
International Medical Engineering Finals 25th February 2015*

*First Place - Vicon Prize for
Best Undergraduate Medical Engineering Project 2015*



First Place: James Fogarty - Cork Institute of Technology

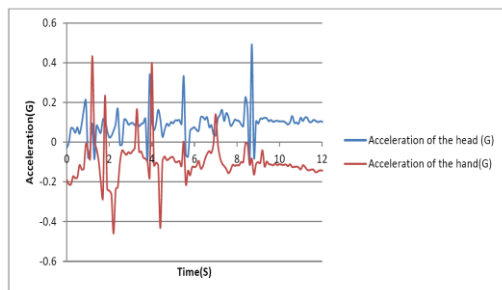
“Design and Development of an Assistive Technology Music System for People with Cerebral Palsy”



Music is something which is engraved into our culture. Music gives us a sense of community, culture and family and is such an integral part of our lives that it can often be taken for granted. For people with disabilities, music participation has been demonstrated to have significant benefits in terms of development of cognitive, physical, communication, social and emotional skills.⁽¹⁾ Music is an effective means of stimulating and focusing attention and may be especially significant for some people who do not respond to other interventions. Music is an important tool in learning. Music also can provide significant assistance in memorization. Scientific evidence exists that rhythm stimulates and organizes muscle response with a significant assist to people with neuromuscular disorders.⁽²⁾ Music therapy has the distinction of being effective at stimulating and motivating speech, as well as providing an avenue for nonverbal communication.⁽³⁾

However, not everybody has the ability to create music. This project thus strives to bridge the gap for people with severe disabilities to express themselves musically. The research, design and development of a viable method for creating music utilising the available movements of a particular subject with hemiplegic cerebral palsy is undertaken - leading to the development of a generic method of music creation to suit a wide range of disabilities.

A systematic design approach is adopted to conceive, design and optimise the novel music system - Music-abilityTM. Iterative prototype design, development and extensive testing is successfully undertaken. The developed hardware and software system efficiently converts head and arm movements into corresponding notes and sound effects. Through extensive liaison, feedback and approval from the subject and music teacher, the created assistive technology music system is optimised and tailored for the unique wants and needs of the subject.



Secondary Head and Hand Testing of Music-abilityTM Prototype

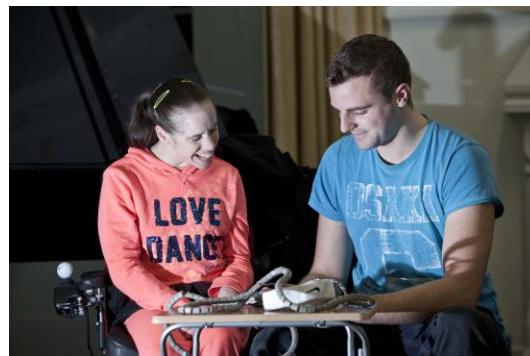
The developing Music-abilityTM system enables the subject to explore different rhythms and to play a range of notes and keys similar to any other instrument. This instrument is electronic and implemented by simple movements. The developing design utilizes a dual three-axis accelerometer and data acquisition module system processed to create more sophisticated music than is possible with current systems. From this original concept, software is designed to achieve the eight basic notes in a scale using simple movements of the arm. Further technical and software development is progressed to utilise both the head and hand movements to create corresponding percussion sound effects. Improvement and optimisation is undertaken to aid the creation of music with additional features such as different

sound effects, calibration and note display. The Music-abilityTM music creation system can be connected to a public address system to play with other musicians live and to record music - this connectivity achieved via auxiliary cable and auxiliary cable jack configuration. The system is tested with the subject and alterations to the software completed to enhance the music creation capability of the subject and ensure consistent performance.

This project concentrates on the study of the range and strength of movement of one particular student - resulting however in the creation of a generic instrument, which enables patients of similar mobility to play, record and enjoy sophisticated music. The developed generic assistive music technology system Music-abilityTM is readily adapted to a wide range of disabilities.

Planned future work includes investigation of incorporation of one axis accelerometers to reduce product cost, wireless accelerometers to enhance aesthetics and flexibility, optimisation of seamless transfer to collaborative software and music creation from digital audio workspace. The final product will be similar in discrete form and size to a wristband and easily fitted on the subject.

The developing system has been tested and calibrated and formal handover (including full supporting documentation) of the Music-abilityTM Prototype to the subject, her parents and the SoundOUT enablement organisation took place on Monday 12th May 2014.



Handover of Music-abilityTM Prototype

(1) Pacchetti, Claudio MD; Mancini, Francesca MD; Aglieri, Roberto; Fundarò, Cira MD; Martignoni, Emilia MD; Nappi, Giuseppe MD, Psychosomatic Medicine: May/June 2000 - Volume 62 - Issue 3 - pp 386-393, Active Music Therapy in Parkinson's Disease: An Integrative Method for Motor and Emotional Rehabilitation
(2) L. L. Morton, J. R. Kershner and L. S. Siegel, (1990), Journal of Music Therapy Volume 27, Issue 4Pp. 195-208, The Potential for Therapeutic Applications of Music on Problems Related to Memory and Attention
(3) Mary M. Rainey Perry, (1990) Journal of Music Therapy Volume 40, Issue 3Pp. 227-246. Relating Improvisational Music Therapy with Severely and Multiply Disabled Children to Communication Development

Design and Development of an Assistive Technology Music System for People with Cerebral Palsy



*James Fogarty Final Year Bachelor of Engineering in
Biomedical Engineering Undergraduate Capstone Project
in conjunction with Enablement Organisation SoundOUT*



Darragh Kane

*James Fogarty
CIT Final Year Biomedical Engineering Student
demonstrates his capstone project on
Design and Development of an Assistive Technology Music System for People with Cerebral Palsy
carried out in conjunction with SoundOUT
to Rebecca Casey at the
Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition*

*First Place - Vicon Prize for
Best Undergraduate Medical Engineering Project 2015
The Healthcare Technologies Student and Early Career Awards 2015
London Medical Engineering Finals
25th February 2015*

European Enterprise Promotion Awards 2015

November 18-20 2015 Luxembourg

See video of Luxembourg Awards Ceremony at:
<https://www.youtube.com/watch?v=M0-iehXI5tE>



Cork Institute of Technology 'Engineering an Innovation Eco-System'

Irish National Award Winner

European Commission for the European Enterprise Promotion Awards 2015
under



"Promoting the Entrepreneurial Spirit"

The European Commission quoted the reasons for Cork Institute of Technology's selection as the
National Winner as

"Delivering innovative product development, multi-disciplinary engineering and ground-breaking education"

The Objectives of the Awards are to:

- Identify and recognise successful activities and initiatives undertaken to promote enterprise and entrepreneurship;
- Showcase and share examples of best entrepreneurship policies and practices;
- Create a greater awareness of the role entrepreneurs play in society;
- Encourage and inspire potential entrepreneurs.

The Award Categories are:

- Promoting the entrepreneurial spirit - promote an entrepreneurial mindset, especially among young people and women;
- Investing in entrepreneurial skills – improve entrepreneurial and managerial skills;
- Improving the business environment - support enterprise start-up and growth, simplify legislative and administrative procedures for businesses;
- Supporting the internationalisation of business - encourage enterprises and particularly small and medium-sized businesses to benefit more from the opportunities offered by markets, both inside and outside the EU;
- Supporting the development of green markets and resource efficiency - support SME access to green markets and help to improve their resource efficiency through, for example, green skills development and matchmaking, as well as funding;
- Responsible and inclusive entrepreneurship - promote corporate social responsibility among small and medium-sized enterprises and entrepreneurship among disadvantaged groups such as the unemployed, legal migrants, disabled, or people from ethnic minorities.



Europe works for SMEs
Forward. Together.

SME Assembly
18th - 20th November 2015
Luxembourg



European
Enterprise Promotion
Awards

National Winner
Promoting the
Entrepreneurial Spirit

Cork Institute of Technology
Ireland

for

'Engineering an Undergraduate Innovation Eco-System'
Delivering innovative product development, multi-disciplinary engineering
& ground-breaking education

Luxembourg, November 2015

Joanna Drake
Chair of the European Enterprise Promotion Awards Jury

In co-operation with



The European Enterprise Promotion Awards 2015 recognise excellence of initiatives supporting SMEs and entrepreneurship among public administrations and public-private partnerships within the European Union and associate countries in the Competitiveness and Innovation Programme (CIP). It is sponsored by the European Commission.



Engineers Ireland Innovative Student Engineer of the Year 2015

SIEMENS *sponsored by Siemens*



*Ms. Emma O'Leary, Ms. Nicolle Dunphy and Ms. Kelly Lane
Final Year Level 7 Biomedical Engineering Degree Students
demonstrate their capstone project on*

“Piglet Mortality Reduction

Automatic Pig Milking Device Design and Development”

*which received a Finalist Award at the
**Engineers Ireland Innovative Student Engineer of the Year 2015
National Competition***

SIEMENS

CIT **CORK**
INSTITUTE OF
TECHNOLOGY
INSTIÚID TEICNEOLAÍOCHTA CHORCAÍ





***CIT Equaliser Team
Shortlisted for
University Startup World Cup
Finals September 14-18 2015 Copenhagen, Denmark
(See <http://universityworldcup.com/>)***



48 Finalists from 24 Countries

Italy, United Kingdom, Denmark, Nicaragua, China, Japan, Netherlands, South Africa, India, Canada, Brazil, Turkey, Iran, United States of America, Croatia, Australia, Korea, Egypt, Serbia, Sweden, Nigeria, Finland, Kenya, Ireland

Cork Institute of Technology's Equaliser Team is the sole Irish team and Adjudged in Top Three Worldwide in Product and Technology Category

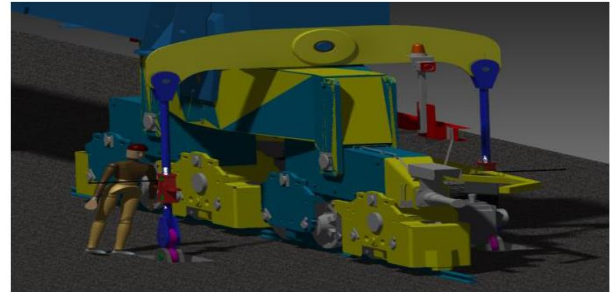
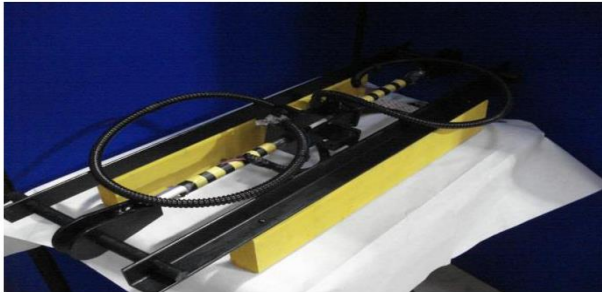




***CIT Equaliser Team Shortlisted for University Startup World Cup
Finals September 14-18 2015 Copenhagen, Denmark
(See <http://universityworldcup.com/>)***

The Equaliser™ Product

Equaliser™ is an extreme weather conditions novel tie-down system for ship to shore cranes, incorporating an equalising beam and torque adjustable features, which has been designed, prototyped, optimised and tested. The tie-down system is a critical device to prevent a container crane from being overturned or pushed along the quay during extreme weather events. The development of Equaliser™ has substantially advanced the safety and design functionality of this important crane component, which is highly influenced by strong damaging wind forces. The innovative design ensures equal distribution of these forces on installed tie-down mechanisms and eliminates irregularities in height difference during operation which is critical.



The Equaliser™ Team

The Equaliser™ development team, comprising of brothers Brian and Ronan Hand, prides itself on inculcating an ethos of sustained dedication and innovation in progressing the novel extreme weather crane tie-down system. Their combined technical and management skills are harnessed to create a highly driven focus to excellence and entrepreneurship in our start-up company. Brian from a mechanical engineering background has primarily taken the role of product development through conducting extensive iterative design, product analysis testing and experimentation. Ronan from an energy engineering background has taken on the role of overseeing the business and marketing elements of the business with developing many of the promotion outlets for their business.



Equaliser™ Team Brian and Ronan Hand

Extreme Weather Conditions Novel Tie-down System for Ship to Shore Cranes - Equaliser™

<https://www.youtube.com/watch?v=FYEZ1tMtVnl> and <https://www.youtube.com/watch?v=a3AHciPZrAE> and
<http://www.cit.ie/newsarchive?id=833> and <http://www.cit.ie/equaliser>





**Red Letter Day for
CIT Graduating Class of 2015**
in conjunction with
EMC, Abbott and BioMarin at

**MEETA Asset Management and Maintenance Awards National Finals
Engineers Ireland HQ Ballsbridge Dublin**

**3 MEETA Certificate Awards of Excellence
for CIT Graduating Class of 2015 at
MEETA Asset Management and Maintenance Awards National Finals 2015**

Thursday 19th November 2015 proved to be a Red Letter Day for the CIT Graduating Class of 2015 at the MEETA Asset Management and Maintenance Awards Finals Presentations at Engineers Ireland HQ, Clyde Road, Ballsbridge, Dublin 4.

In the MEETA Student Awards, CIT Mechanical and Biomedical Engineering graduates 2015, Michael Harrington and Kevin Condon undertaking projects in conjunction with EMC and Abbott were selected from a very large student entry to be presented with two of just three MEETA Certificate Student Awards of Excellence awarded nationally.

In the MEETA Industrial Awards, Michael and Kevin's classmate of 2015, Christopher O'Halloran of BioMarin along with colleagues John O'Brien (also a CIT graduate) and Kevin Kilbride of BioMarin were selected from a very large industrial entry to be presented on behalf of BioMarin with one of just two MEETA Certificate Awards of Maintenance Excellence awarded nationally.

A Red Letter Day indeed for the CIT Graduating Class of 2015, EMC, Abbott and BioMarin.

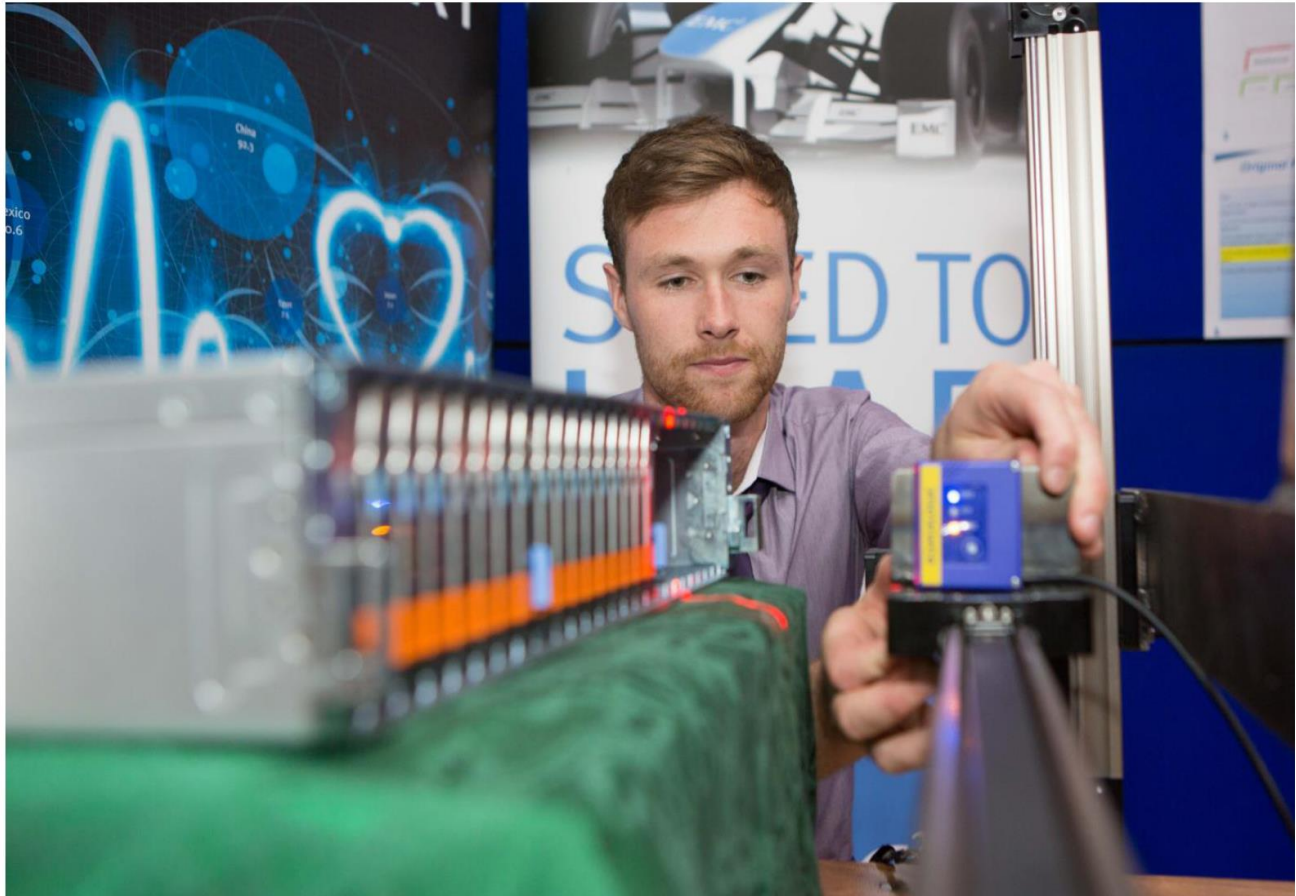




MEETA - Asset Managers Association

National Finals Engineers Ireland HQ Ballsbridge Dublin

Student Certificate Award of Excellence 2015



Michael Harrington Mechanical Engineering CIT

“Design and Development of a Fast Scan System in conjunction with EMC”



Fast Scan System



Fast Scan System

A Happy and Proud Harrington Family

MEETA - Asset Managers Association

National Finals Engineers Ireland HQ Ballsbridge Dublin

Student Certificate Award of Excellence 2015



Michael Harrington Mechanical Engineering CIT

Pictured with John Coleman, Chairman MEETA and Ray O'Neill of ESS

“Design and Development of a Fast Scan System in conjunction with EMC”

Mechanical Engineering Student Michael Harrington’s Final Year Capstone Project “Design and Development of a Fast Scan System” was carried out in conjunction with EMC under the supervision of Lecturer Michael O’Mahony. EMC is a global leader in the design and manufacture of large storage systems for IT departments worldwide. These storage systems contain series of hard-drives, hundreds of thousands of which are used by EMC every quarter. Hard-drive identification is via a unique bar code system. The scanning of hard-drive barcodes and nesting to purchase orders, an essential part of the manufacturing/distribution process, is completely manual and a monotonous/time consuming task. Based on student project identification/proposal while on work placement, EMC agreed to support an investigation of scanning process automation. Following a hugely challenging hardware/software project and personal development process, a fully functional automated fast scan prototype was designed, manufactured, commissioned and tested. Optimum speed, scanner angle, scanner distance and scanner operating modes were determined and implemented to achieve major efficiency and speed benefits. Direct benefits include a scanning process 400% faster, increased productivity and the elimination of human error/monotonous process.

MEETA - Asset Managers Association

National Finals Engineers Ireland HQ Ballsbridge Dublin

Student Certificate Award of Excellence 2015



Kevin Condon Biomedical Engineering CIT

Pictured with John Coleman, Chairman MEETA and Ray O'Neill of ESS

“Preventive Maintenance Optimization of a Split Mold Stent Security Machine in conjunction with Abbott Ireland”



MEETA - Asset Managers Association

National Finals Engineers Ireland HQ Ballsbridge Dublin

Student Certificate Award of Excellence 2015



Kevin Condon Biomedical Engineering CIT

“Preventive Maintenance Optimization of a Split Mold Stent Security Machine in conjunction with Abbott Ireland”

Biomedical Engineering Student Kevin Condon’s Final Year Capstone Project “Preventive Maintenance Optimization of a Split Mold Stent Security Machine” was carried out under the supervision of Lecturer Sally Bryan. This project was undertaken to increase maintenance efficiency at a bottleneck manufacturing station. Through the use of Six Sigma methodology, DMAIC, FMEA and statistical modelling of failure data, the project has established and validated a method of optimizing PM that is transferrable to other equipment families in the organization. The project was not without its challenges. As the equipment family consisted of 35 assets, minimum cost of maintenance models proved inadequate, requiring the development, implementation and validation of more appropriate maintenance mathematical models. The harnessing of stakeholder commitment throughout all project phases was also both challenging and critical. The project has directly resulted in significant efficiency improvements in both planned and unplanned maintenance and a capacity increase of 3000 parts. The devised project solution and methodology, applying scientific process for a vital capacity improvement, is consequently currently being implemented in multiple sites throughout the organization both in Ireland and globally.

MEETA - Asset Managers Association

National Finals Engineers Ireland HQ Ballsbridge Dublin

Certificate Award of Maintenance Excellence 2015

***BioMarin - Kevin Kilbride, Christopher O'Halloran and John O'Brien
Management of Maintenance Assets Project***



In the MEETA Industrial Awards, CIT Mechanical Engineering Graduate 2015, Christopher O'Halloran (centre) of BioMarin along with colleagues John O'Brien (also a CIT graduate) and Kevin Kilbride of BioMarin were selected from a very large industrial entry to be presented on behalf of BioMarin with one of just two MEETA Certificate Awards of Maintenance Excellence awarded nationally.

Pictured with John Coleman, Chairman MEETA and Terence McCarthy and Paul Harte of AESSEAL

The BioMarin Shanbally asset maintenance management program was developed in a threefold structure of elements: BioMarin identified personnel as key to the development of a dynamic and efficient maintenance organisation. An agile team structure was developed with key positions instilled to create an empowered team dynamic with the required skillset and mind set. Critical to the development of the asset maintenance program was the equipment maintenance criticality ranking (ECA). Equipment Maintenance Criticality is a value assigned to each asset indicating its criticality in the event of failure or shutdown within the plant. Equipment criticality ranking was based on Base Criticality Factors - EHS /Business /Quality Impact and Maintenance Factors - Utilization/Time to Repair/Equipment Costs/Mean time Between Failure/ Detection/Visibility Factor. The Maintenance and Reliability programme develops a continuous improvement attitude toward our maintenance systems allowing the systems to develop. An assessment was performed on our People and Organisation, Processes, Systems, Technology & Optimisation and Culture to identify gaps between current and best practice.



The CHARTERED INSTITUTION OF
WATER AND
ENVIRONMENTAL MANAGEMENT



AECOM Student Environmental National Award Winners 2015

Following a very long day indeed of project preparation and presentation in Sligo, the 2015 AECOM National Student Environmental Awards have been announced.

The three recipients of the 2015 AECOM National Student Environmental Awards are:

Brendan Heery Dublin City University PhD Student

Programme of Study - Chemistry

" Sensing platform design for faecal indicator bacterial detection in marine waters "

Aidan Ware Cork Institute of Technology PhD Student

Programme of Study - Environmental Engineering

" Potential of renewable gas production from slaughterhouse waste streams "

Damien Dennehy Cork Institute of Technology Undergraduate Student

Programme of Study - Mechanical Engineering

"Design and Development of an Automatic Flood Defence Barrier - Advanced Hydro Systems"



ADVANCED HYDRO SYSTEMS

Design and Development of an Automatic Flood Defence Barrier



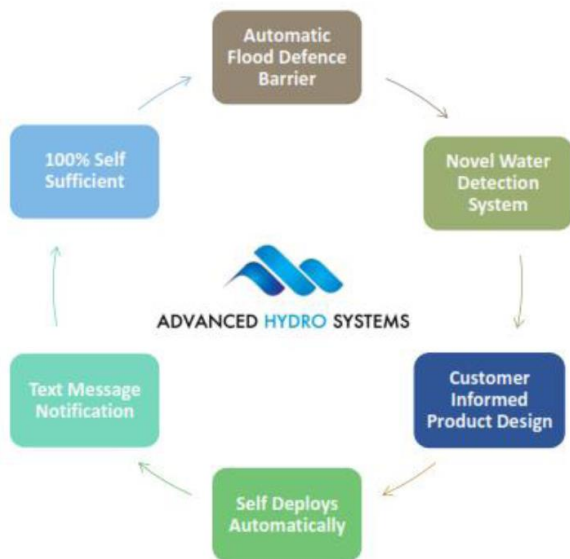
*Damien Dennehy
CIT Final Year Mechanical
Engineering Student
demonstrates his
award winning capstone project
on "Advanced Hydro Systems -
Design and Development of an
Automatic Flood Barrier"
at the
**2015 Cork Mechanical,
Manufacturing and
Biomedical Engineering
Exhibition***



ADVANCED HYDRO SYSTEMS

Design and Development of an Automatic Flood Defence Barrier

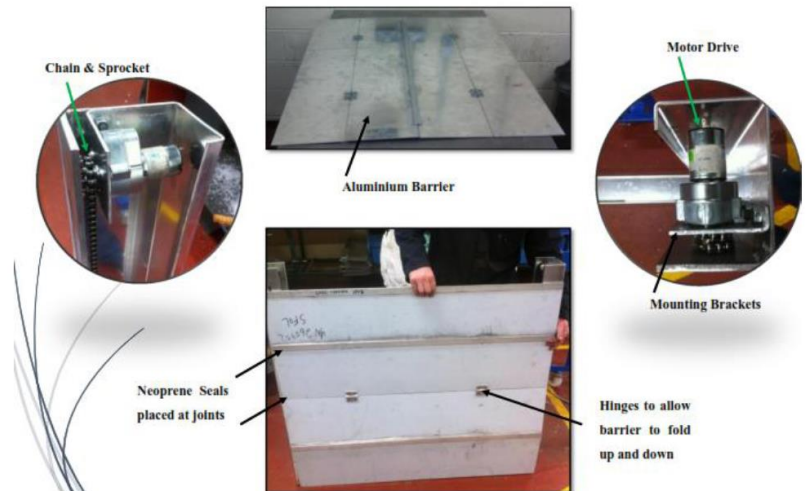
A Prototype Automated Pre-installed Flood Defence Barrier is Conceived, Designed, Manufactured and Tested

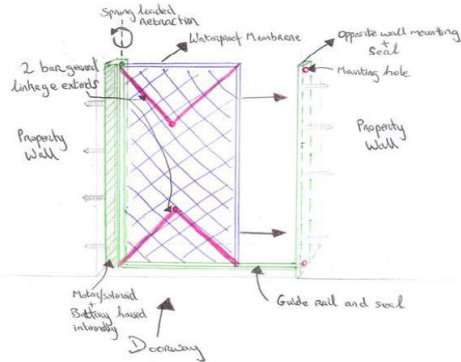


Control System

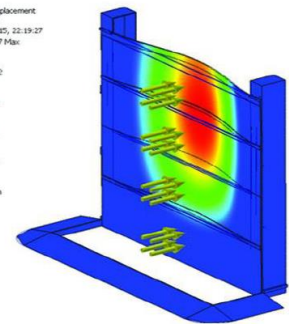
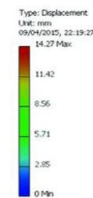


Arduino Uno "Brain" of the System	Specific Code Designed & Hardware Developed	GSM Shield For Text Message Notification	
GSM and Motor Shields	Matching Board Developed to Stack Shields	Match Board For GSM & Motor Shield Compatibility	
Battery Back-Up in Case of Mains Failure	Mains will Bypass to Battery Back-Up	Motor Shield For Precise Bi-Directional Motor Control	
		Arduino Uno Controls all Components	





A systematic design approach, based on rigorous safety / sustainability criteria, is adopted to devise/advance a novel optimal solution.



A range of novel design solutions were conceived and assessed.

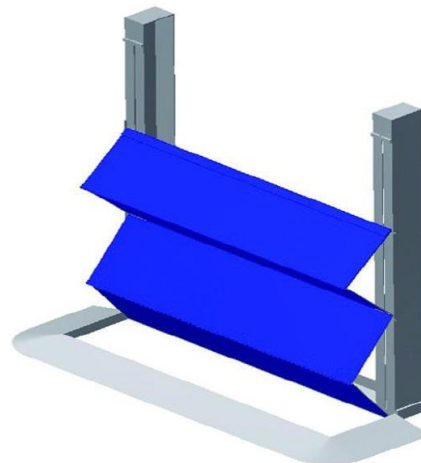
Advanced finite element analysis, material optimisation methodologies and control hardware/software development are employed.

ADVANCED HYDRO SYSTEMS



Advanced Control System

The developed doorway flood barrier system incorporates novel water detection sensor technology, self-deploys automatically during flood events and provides text alert notification to householder/business owner with potential to obviate major loss/damage.





<http://www.pmd-solutions.com/>

€4.2 Million Funding

11 further jobs announced at PMD Solutions

November 2015

PMD Solutions Mission

To revolutionise non-invasive respiratory monitoring, and empowering medical staff to support the early prevention model of healthcare while improving patient care and solving the critical need for a comprehensive and continuous method of respiratory monitoring.

CEO and Founder – 2011 CIT Mechanical Engineering Graduate Myles Murray

It has just been announced that CIT Mechanical Engineering Graduate Myles Murray's PMD Solutions Respiratory Monitor Device (arising from his Final Year Capstone Mechanical Engineering Degree Project 2011 and developed over the past 4 years in the Rubicon Centre) is to receive Horizon 20/20 €4.2 Million Funding and to create 11 further jobs in Cork (10 already employed).



Myles first rose to national prominence in 2010 when his third year multi-disciplinary project team project on the Design and Development of a Portable Intravenous Infusion System Mobilis carried out with student colleagues Gavin O'Sullivan and Mark Keane won an Enterprise Ireland / Invest Northern Ireland Islandwide Enterprise Award at the Young Entrepreneur of the Year Competition 2010 in Dublin.

Between third year and fourth year, Myles undertook his work placement at the CIT MEDIC Centre, where he received expert guidance and excellent experience including introduction to Professor Stephen Cusack of CUH, now Clinical Director of PMD Solutions.

Myles returned to college in September 2010 and commenced his self-conceived individual capstone Mechanical Engineering project on the Design and Development of a Patient Friendly Respiratory Rate Monitor, which progressed to great effect over the 2010/ 2011 academic year.

Myles' project won first place in the CIT Prize for Innovation and the coveted title of CIT Student Entrepreneur of the Year 2011 in March 2011.

Following completion of his mechanical engineering studies in June 2011, Myles took the hugely brave step of not following the traditional professional engineering degree path of employment with a blue chip company – but decided to set up his company PMD Solutions and to develop his early stage biomedical device under the expert guidance and assistance from CIT's Rubicon Centre.

Many congratulations also to all at the CAPP Centre for their super contribution in helping prepare PMD Solution's successful proposal.

The company development over the past four years, based on this expert guidance from the Rubicon and Myles' and the PMD Solutions team drive and dedication, has been meteoric – this announcement a fantastic success for all involved in the CIT Innovation Eco-System.

PMD Solutions Mission

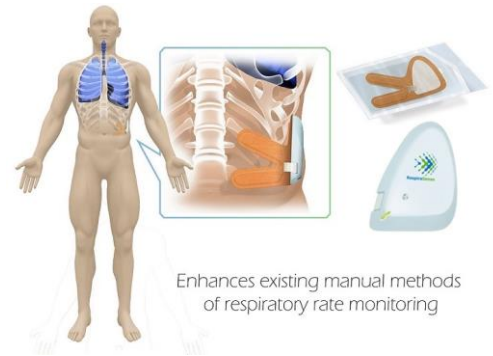
To revolutionise non-invasive respiratory monitoring, and empowering medical staff to support the early prevention model of healthcare while improving patient care and solving the critical need for a comprehensive and continuous method of respiratory monitoring.



CEO - Myles Murray

Single application from admittance to patient discharge

Continuous and comprehensive respiratory rate monitoring



Enhances existing manual methods of respiratory rate monitoring

MEDTEC Ireland Winner - Academy of Excellence



This year MEDTEC launched a brand new Start-Up Academy – a place where start-up businesses showcase their latest innovations to potential partners from the medical device industry.

PMD Solutions was awarded with the title Start-Up Academy of Excellence Winner.

MEDTEC launched the competition with the aim of uncovering the very best in start up innovations from across Europe.

MEDTEC Ireland enables Europe's leading medical device manufacturers to present their propositions to a wider audience across a 2 day event.

RespiraSense receives CE Mark

PMD's premier product, RespiraSense - Breathing Rate Monitoring, has received regulatory approvals for the sale and marketing of the device across the European Union. This milestone now enables PMD to establish a wider presence by leveraging European approvals in countries on other continents.

"RespiraSense was specifically designed to be easily adopted by healthcare providers in order to serve the widest population of patients in the shortest possible time. Delivering respiratory rate to the European market through RespiraSense will enable PMD to work with leading university hospitals and national health authorities to establish a new industry best practice for continuous breathing rate monitoring." says Myles Murray, CEO of PMD Solutions.



Start-up Intern Project Summer 2015



***Rubicon Centre Supported Campus Student Company
€5,000 Grant - Serviced Office and Lab Space - Mentoring
Start-up Intern Project Summer 2015***

Mechanical Engineers

Mr. Vincent Forde and Mr. Timothy Norton

***“Development of In-Line De-Gassing Solution for
Intravenous Medical Applications”***

Demonstrate at 2015 Exhibition

Start-up Intern Project Summer 2015



***Rubicon Centre Supported Campus Student Company
€5,000 Grant - Serviced Office and Lab Space - Mentoring
Start-up Intern Project Summer 2015***

Biomedical Engineers

Ms. Emma O'Leary, Ms. Nicolle Dunphy and Ms. Kelly Lane

"Automatic Pig Milking Device Design and Development"

Demonstrate at 2015 Exhibition

2014 Awards



European Student Innovation Awards



Innovact 2014 Reims France

European Campus Student Innovator of the Year 2014

First Place and Outright Winner

<http://www.innovact.com>



First Place European Campus Student Laureate of Innovation 2014

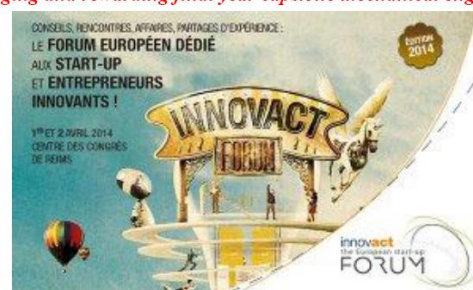
John Roberts PyraAid™ "Wheelchair Enablement Device"

Cork Institute of Technology Ireland



It has been announced on Wednesday 2nd April 2014 before a packed auditorium at the European Innovation Finals Innovact 2014 Reims, France, that First Place and Outright Winner of European Campus Student Innovator of the Year 2014, from hundreds of international entries and 20 shortlisted international finalists is John Roberts of Cork Institute of Technology.

John would like to pay particular tribute to his third year Multidisciplinary Engineering and Business student colleagues: Siobhan Hickey, Alan O'Reilly, Laura Hannon, Sandra Hayes, Thomas Thornton and Stephen O'Brien, who were central and crucial to the early inspiration and development of the enablement project and whose support and encouragement persuaded John to continue on the project as a most challenging and rewarding final year capstone mechanical engineering project.



European Student Innovation Awards Innovact 2014 Reims France

European Campus Student Innovator of the Year 2014 First Place and Outright Winner

<http://www.innovact.com>



First Place European Campus Student Laureate of Innovation 2014

John Roberts PyraAid™ "Wheelchair Enablement Device"

Cork Institute of Technology Ireland



European Student Innovation Awards Innovact 2014 Reims France

Engineers Ireland Innovative Student Engineer of the Year 2014

SIEMENS *sponsored by Siemens*



Naoise Culhane

First Place €1,500 National Award

Winner: James King

Mechanical Engineering Cork Institute of Technology

“Drone Compatible Medical Transportation Pod Design, Development and Testing”



Engineers Ireland Innovative Student Engineer of the Year 2014

SIEMENS

sponsored by Siemens



Naiose Culhane



Naiose Culhane

First Place €1,500 National Award

Winner: James King

Mechanical Engineering Cork Institute of Technology

“Drone Compatible Medical Transportation Pod Design, Development and Testing”

Westminster London 2014

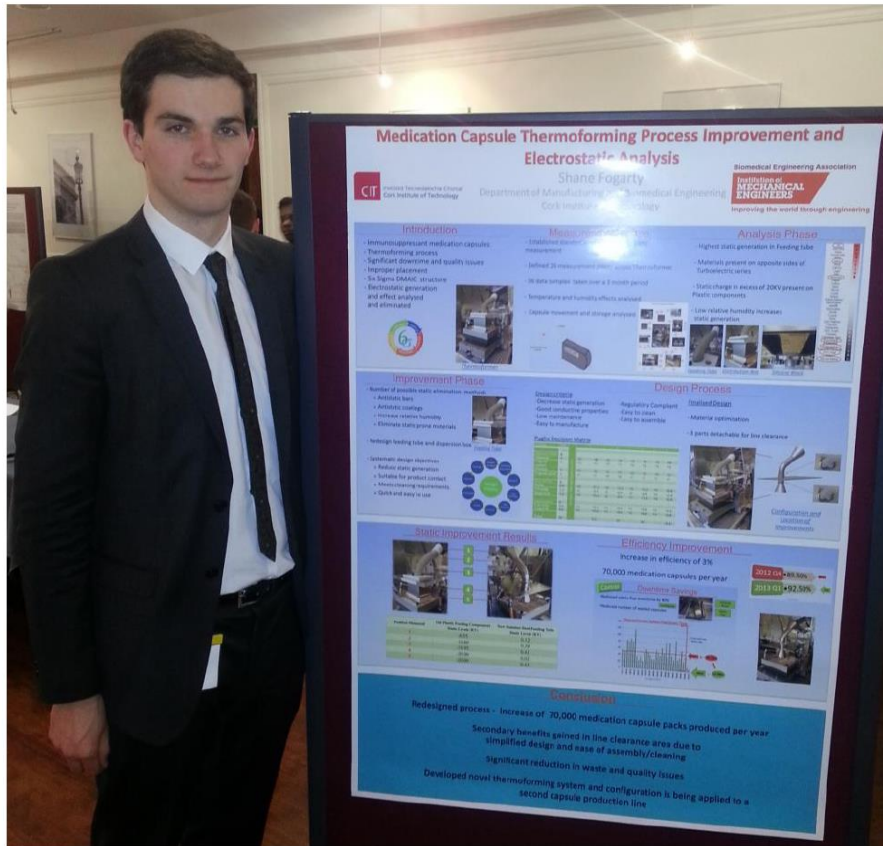
*International Medical Engineering Finals
Thursday 27th February 2014*

*First Place - JRI Prize for Best Undergraduate Medical Engineering
Project Exhibition and Poster Presentation*



First Place: Shane Fogarty - Cork Institute of Technology

“Medication Capsule Thermoforming Process Improvement and Electrostatic Analysis”



*Runner Up Finalist:
David Williams
Cardiff University
“Exploring Knee Loading
Using Magnetic Resonance
Imaging”*

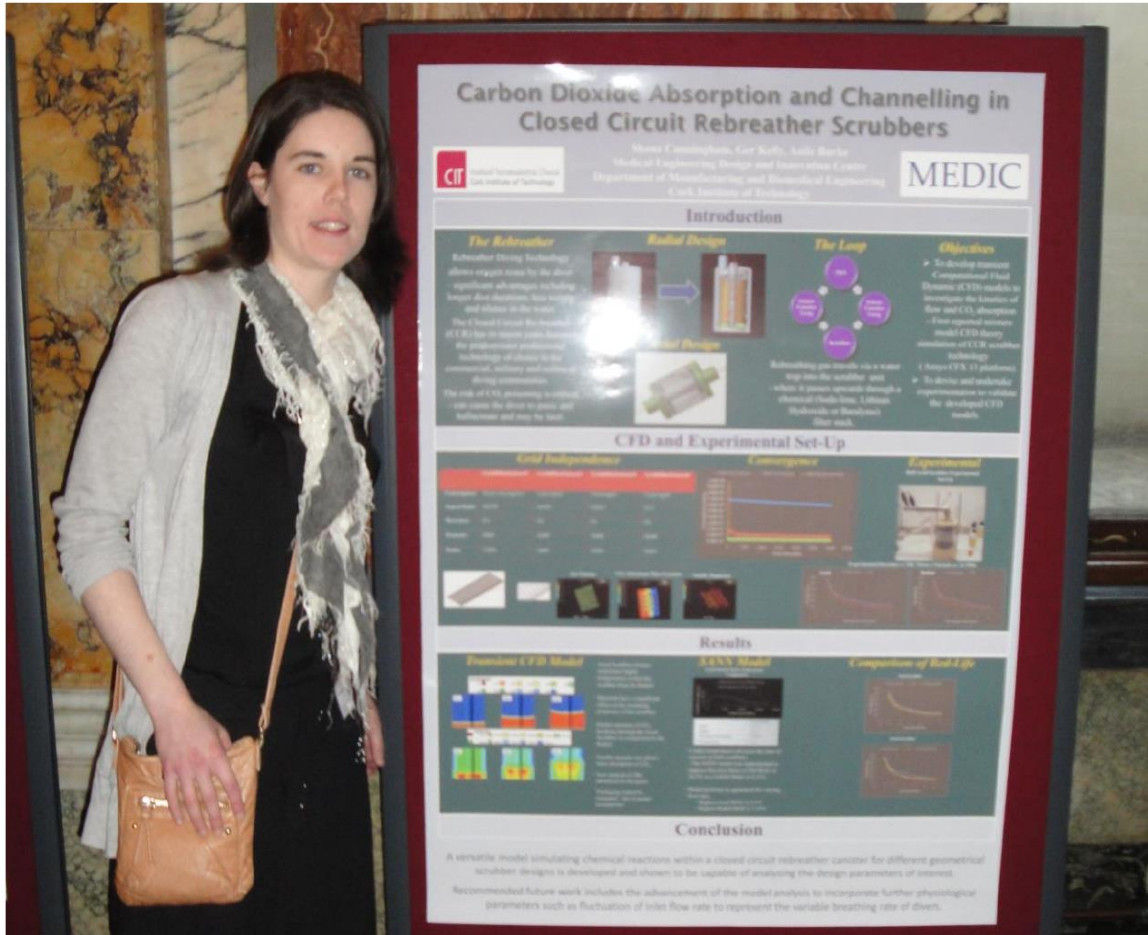
*Runner Up Finalist:
Alaa Abdulali Alsaffar
University of Huddersfield
“Development of Methods To
Pressure Map The Patient
Device Interface In Support
Surface”*

*First Class Honours
Mechanical Engineering
Graduate Shane returns to a
most highly sought after
graduate placement in the
prestigious professional
development programme at
Biomedical company
Abbott Vascular in
Clonmel, Co. Tipperary.*

Engineering in Medicine and Health Division *Westminster London 2014*

*International Medical Engineering Finals
Thursday 27th February 2014*

*Medimaton Prize for Best PhD Medical Engineering Project
Exhibition and Poster Presentation*



*First Place: Dr. Chi Leng Leong
Imperial College London
"Bioengineered Microfluidic Devices for the Real-Time Clinical Measurement of Neurochemicals"*

*Runner Up Finalist: Dr. Shona Cunningham
Cork Institute of Technology
"Carbon Dioxide Absorption and Channelling in Closed Circuit Rebreather Scrubbers"*

Dr. Shona Cunningham of Cork Institute of Technology takes up a most highly sought post-doctorate research position in the area of Computational Fluid Dynamics at the world renowned National Physics Laboratory (NPL) in London

CADFEM Ireland and Ansys Users Conference 2014

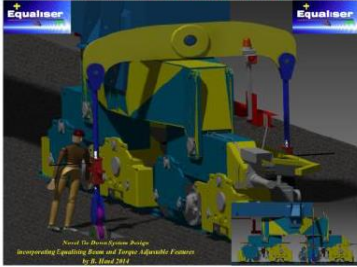
ANSYS

Best Paper Presentation Award

CADFEM

“An Analysis into Wind Induced loading Effects on a Ship-to-Shore (STS) Crane and Investigation into Design Optimisation”

Extreme Weather Conditions Novel Tie Down System for Ship to Shore Cranes



12th September 2014 Dublin

Cork Institute of Technology's Brian Hand Final Year Undergraduate Engineering Project

“An Analysis into Wind Induced loading Effects on a Ship-to-Shore (STS) Crane and Investigation into Design Optimisation”

Wins Best Paper Presentation Award at CADFEM Ireland and Ansys Users Conference 2014 in Engineers Ireland HQ Dublin



Brian's self-devised final year undergraduate capstone project on “An Analysis into Wind Induced Loading Effects on a Ship-to-Shore (STS) Crane and Investigation into Design Optimisation” arose from his work placement at Liebherr Container Cranes of Killarney, Co. Kerry.

Brian had already been extended the exceptional honour for an undergraduate student of being invited to publish and present his findings at this major conference. Competing against primarily PhD students at the conference, Brian's achievement, as the sole undergraduate presenter, in winning the CADFEM Ireland award is a remarkable testament to the rigour and innovativeness of the work undertaken.

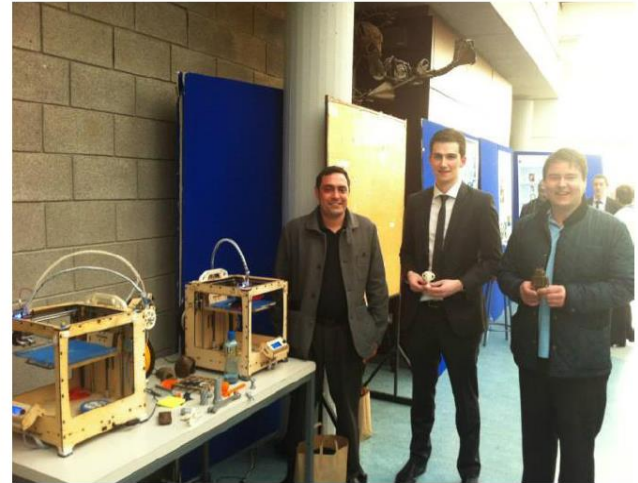
Details of Brian's award winning work, including illustrated summary, full capstone project report and two developed videos, can be found at: <http://www.cit.ie/equaliser>

Brian is to graduate on 20th October 2014 at Cork Institute of Technology with a Bachelor of Engineering in Mechanical Engineering Level 8 First Class Honours Degree

Speak Out for Engineering 2014


First Place National Award

Winner: Shane Fogarty Mechanical Engineering Cork Institute of Technology
 “Medication Capsule Thermoforming Process Improvement and Electrostatic Analysis”



Introduction


- Immunosuppressant medication capsules
- Thermoforming process
- Significant downtime and quality issues
- Improper placement
- Six Sigma DMAIC structure
- Electrostatic generation and effect analysed and eliminated



Thermoformer


Measurement Phase

- Established standardised procedure for static measurement
- Defined 26 measurement points across Thermoformer
- 56 data samples taken over a 3 month period
- Temperature and humidity effects analysed
- Capsule movement and storage analysed




Analysis Phase

- Highest static generation in feeding tube
- Materials present on opposite sides of Turboelectric series
- Static charge in excess of 20kV present on Plastic components
- Low relative humidity increases static generation



Improvement Phase

- Number of possible static elimination methods
 - Antistatic bars
 - Antistatic coatings
 - Increase relative humidity
 - Eliminate static prone materials
- Re-design feeding tube and dispersion box
- Systematic design objectives
 - Reduce static generation
 - Suitable for product contact
 - Meets cleaning requirements
 - Quick and easy to use



Design Process

Design criteria


- Decrease static generation
- Good conductive properties
- Low maintenance
- Easy to manufacture
- Regulatory Compliant
- Easy to clean
- Easy to assemble

Finalised Design

- Material optimisation
- 3 parts detachable for line clearance

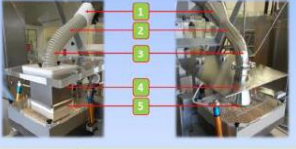
Pugh's Decision Matrix

Criteria	1	2	3	4	5	6
Material	1	2	3	4	5	6
Design	1	2	3	4	5	6
Cost	1	2	3	4	5	6
...
Total	30	32	30	31	30	34.4





Static Improvement Results



Position Measured	Old Plastic Feeding Components Static Levels (kV)	New Stainless Steel Feeding Tube Static Levels (kV)
1	-6.85	0.13
2	-14.60	0.39
3	-18.95	0.41
4	-20.00	0.02
5	-20.00	0.43


Efficiency Improvement

Increase in efficiency of 3%

70,000 medication capsules per year

Control Downtime Savings

- Reduced safety flip downtime by 80%
- Reduced number of wasted capsules





Conclusion

Redesigned process - increase of 70,000 medication capsule packs produced per year

Secondary benefits gained in line clearance area due to simplified design and ease of assembly/cleaning

Significant reduction in waste and quality issues

Developed novel thermoforming system and configuration is being applied to a second capsule production line

MEETA - Asset Managers Association National Student Award 2014



Damien McAuliffe Mechanical Engineering CIT

“GlaxoSmithKline Incinerator Scrubber System Analysis and Optimisation”

When specifying equipment for industrial use, that equipment is regularly oversized to ensure suitability and potential for expansion. The prevalent view is that, if oversized, equipment can adequately achieve specified function, but that undersizing may result in both non-functionality and restriction on expansion. Research is undertaken on the GlaxoSmithKline Incinerator Scrubber System to design, develop and implement modifications to reduce running costs while providing capacity for future expansion.

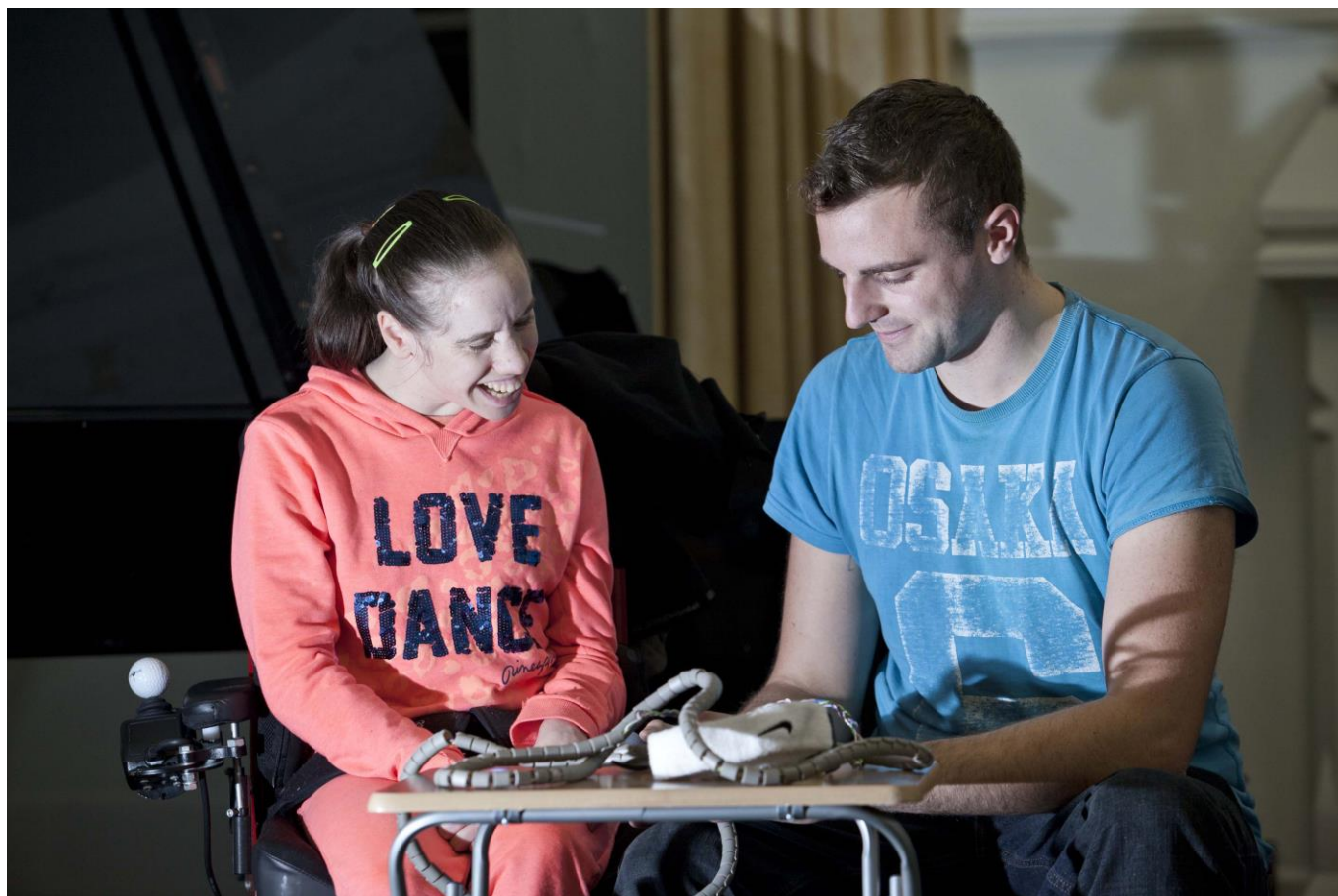
Scrubber operation investigation was carried out to determine critical parameters affecting operation, resulting in determination of an ideal water droplet size to ensure efficient water use and pump motor requirements to supply this water. Testing was successfully undertaken utilising advanced high speed camera technology thereby allowing comparison of droplet size and spray pattern from original and optimised nozzle configuration systems. The recommended and specified new nozzle size configuration enables a 60% reduction in water volume with a payback period of 0.8 years.

2014 Undergraduate Awards

Engineering and Mechanical Sciences

James Fogarty Cork Institute of Technology

“Design and Development of an Assistive Technology Music System - Musicability”



Clare Keogh

CIT Biomedical Engineering Student James Fogarty with Jenny Garde from the SoundOUT Programme

James developed an assistive music technology system “Musicability” to help facilitate music making for the SoundOUT programme in Cork City.

***Highly Commended
The Undergraduate Awards 2014
Top 10% of
4,792 Global Submissions***



Darragh Kane

James demonstrates his project to Rebecca Casey

James' help is music to Jenny's ears



CIT Graduate James Fogarty who developed a piece of assistive music technology to help facilitate music making for the SoundOUT programme in Cork City. With him and the instrument is Jenny Garde from the SoundOUT programme. Picture: Clare Keogh

By Eoin English Irish Examiner Reporter

It has hi-tech accelerometers, complex hardware and specially written coding to beat the band — but it's all music to their ears. Cork Institute of Technology (CIT) engineering graduate James Fogarty has developed a tailor-made “assistive system” to help Jenny Garde, who has cerebral palsy, realise her dream of making music.

James, 23, a biomedical engineer from Co Waterford, who graduated from CIT last month, spent the last year of his course working with Jenny as part of Music Generation Cork City's SoundOUT programme — the inclusive music education programme run in several schools across the city. “It was something I was very passionate about,” James said. “I come from a musical background and was until recently, in a band with my two brothers. “Jenny loves music too. She was very musical but couldn't express it because of her condition.”

He spent months working closely with her, assessing her physical abilities to devise a system that could adapt to and use her movement to create music. He has developed a wrist strap and a head band with in-built accelerometers which have been adapted to pick up on her movements.

Those movements are then converted through automation software in to electronic signals which are passed to a module which plays a sound through a laptop. Jenny can select a guitar or piano sound and can even change the key of the tune so that she can play along with other instruments. “It was a lot of work, with a lot of testing and validating over the months but it was just great to help someone who couldn't create music create it,” James said. While he is due to start work in Abbott Vascular in Clonmel in a few weeks, he plans to continue developing the system, which can be adapted for other uses.

His project was highly commended in the engineering and mechanical sciences category of the Undergraduate Awards 2014, and was ranked in the top 10% of submissions to the 2014 programme, which received 4,792 submissions from undergraduate students around the world.

Cork Institute of Technology
is a major supporter and one of six local funders of
Music Generation Cork City, which is part of
Music Generation, Ireland's national music education programme

Recently two of CIT's engineering students who graduated this Autumn, designed and developed new assistive music technologies to help facilitate music making for the SoundOUT programme

Students James Fogarty and Nicola O' Mahony worked closely with the SoundOUT team and the young musicians involved, in order to develop specific types of technology which would best suit the musicians' needs



Darragh Kane

CIT Student Nicola O'Mahony demonstrates her capstone Biomedical Engineering project on the Adaptation of "The Magic Flute" for People with Restricted Movement carried out in conjunction with the SoundOUT organization.

Engineers Ireland Excellence Awards 2014

Four Seasons Hotel Dublin

Friday November 7th 2014



CIT Graduates Receive 2 Major Awards

*Presented at the glittering and prestigious
Engineers Ireland Excellence Awards Ceremony at
the Four Seasons Hotel, Ballsbridge, Dublin 4:*

*DePuy Synthes Cork “The Journey from
Follower to Global Leader” submitted by
a team led by 2007 CIT Mechanical
Engineering Graduate Robert Hobbs, has
won the Engineers Ireland Excellence Award
for Continuing Professional Development
CPD Employer of the Year 2014 Award. See
following link for EI Summary Paper
authored by Robert on the DePuy Synthes
Team Submission:*

<http://www.engineersjournal.ie/de-puy-engineering-cpd-strategy/>

*Engineers Ireland Excellence Award for First
Place and Engineers Ireland Innovative
Student Engineer of the Year 2014 (Level 8) -
James King - Mechanical Engineering - Cork
Institute of Technology “MediPod - Drone
Compatible Medical Transportation Pod
Design, Development and Testing”.*

See <http://www.cit.ie/medipod>

*CIT graduates Robert Hobbs and James King
Winners of Engineers Ireland Excellence Awards 2014*



Winner - DePuy Synthes Cork “The Journey from Follower to Global Leader”

DePuy Synthes Cork “The Journey from Follower to Global Leader” submitted by a team led by 2007 CIT Mechanical Engineering Graduate **Robert Hobbs** has won the Engineers Ireland Excellence Award for Continuing Professional Development CPD Employer of the Year 2014 Award.

Runner Up Short-listed Companies- Continuing Professional Development CPD Employer of the Year 2014

- ▶ 30 Million by 2017 - A Business Transformation Roadmap - GE Healthcare
- ▶ Delivering Value Through Knowledge Management and External Learning Linkages - Roughan & O'Donovan Consulting Engineers
- ▶ RPS GMIT BIM Revolution - RPS Group Ltd
- ▶ Continuous Improvement and Adaptability Brings Growth for Zimmer Shannon - Zimmer Orthopedics Manufacturing Ltd

ENGINEERS IRELAND EXCELLENCE AWARDS STUDENT ENGINEER OF THE YEAR 2014 AWARDS

First Place and Engineers Ireland Innovative Student Engineer of the Year 2014 (Level 8)

James King - Mechanical Engineering - Cork Institute of Technology

“MediPod - Drone Compatible Medical Transportation Pod Design, Development and Testing”.

Runner Up Finalists

- ▶ **Brian Hand** - Cork Institute of Technology:
“An Analysis into Wind Induced loading Effects on a Ship to Shore (STS) Crane and Investigation into Design Optimisation”
 - ▶ **Oisín Moore** - National University of Ireland Galway
"Improving Breast Cancer Screening - Design of a Microwave Breast Imaging Prototype"
 - ▶ **Niall Ó Murchú** - Dublin Institute of Technology
"Design and Build of an Electromechanical Test Rig"
-

Congratulations also to two other CIT graduates who were also nominated for excellence awards -

Hewson Consulting’s **Bridget Mullane**, CIT 2008 Structural Engineering Graduate, Department of Civil, Structural and Environmental Engineering, was short-listed for Chartered Engineer of the Year 2014 .
The Naval Service’s Cdr **Michael Malone**, 1985 Marine and Plant Engineering Graduate, Cork RTC, paper on " P60 Naval Offshore Patrol Vessel " was short-listed for the Best Paper/Presentation of the Year 2014.



Naiose Culhane

Engineers Ireland Innovative Student Engineer of the Year 2014 Level 7 Finalists
CIT Students Shane O'Gorman, Mark O'Flynn and Patrick Walsh present their project on
Design Development and Testing of a Motorcycle Transport Device to
Shirley McDonald EI and Aiden Cawley Siemens

2013 Awards



2013 Think Outside the Box Finals Galway Three Major Awards Winners for Cork Institute of Technology



*From over 400 Entries and following three gruelling days of Finals in Galway,
Three Major Awards Winners were announced for Cork Institute of Technology by Minister John Perry:*

First Place and Student Entrepreneur of the Year 2013 - €10,000

Most Technologically Innovative Product 2013 - €5,000

Think Outside the Box Award of Merit 2013 - €1,500



*2014 Think Outside the Box Finals
to come to CIT*



2013 Think Outside the Box Finals Galway
First Place and
Student Entrepreneur of the Year 2013 - €10,000



Company AH Technology Product Mastech
Cork Institute of Technology
Animal Healthcare Device Design and Development

CIT Multi-Discipline Start-Up Innovation Team
Nicola O'Mahony, Donal Carey, Kenneth Barry, Damien McAuliffe, Ciaran Malone
Owen Mc Donagh, James Cahill

2013 Think Outside the Box Finals Galway

First Place and Student Entrepreneur of the Year 2013 - €10,000

MasTech™ - an in-line automatic detection system for mastitis in cows.



Mastitis has a significant adverse economic effect on dairy farmers throughout the world. Currently, most detection methods available are for the bulk milk tank. These methods do not facilitate rapid isolation of the infected cow. The developing MasTech™ product is designed to enable early identification of the infected cow during the milking process.

The MasTech™ product, developed by multi-disciplinary student team, AH Technology™, is unique in that it is an automated device which can be retrofit to any existing milking parlour and will test the milk sample during the milking process causing minimal disruption to the farmer. Currently the farmer has to test the cows manually by obtaining milk samples from each cow and then test them. This can be time consuming and is rarely done - so early detection of infected cows is rare.

The early identification and isolation of the infected cow by MasTech™ has major animal welfare and husbandry benefits for the cow and herd, and also has significant and on-going financial benefits for the farmer, creamery, and milk processor.

The product is currently in the prototype stage. Initial proof of concept testing has been undertaken and has proven very promising. Further product consistency testing on the developing prototype is planned to ensure the product works in all conditions that may arise in the milking parlour environment.



CIT Multi-Discipline Start-Up Innovation Team

Nicola O'Mahony, Donal Carey, Kenneth Barry, Damien McAuliffe, Ciaran Malone, Owen Mc Donagh, James Cahill

2013 Think Outside the Box Finals Galway

*Cruickshank Intellectual Property Attorneys
Most Technologically Innovative Product 2013 - €5,000*



*Company Sweet Sounding Electrics Product Hush Hush Hairdryers
Cork Institute of Technology
Electronic Device Development*

*CIT Multi-Discipline Start-Up Innovation Team
John Kelleher, Mariah Reidy, Marco Quatrana, Kieran Minehane,
Colm Kearney, Shane O'Driscoll, Niamh Ryan*

2013 Think Outside the Box Finals Galway

Cruickshank Intellectual Property Attorneys Most Technologically Innovative Product 2013 - €5,000



In the home, excessively noisy hairdryers can wake sleeping children, make it difficult to converse and cause annoyance when watching TV. In the hair salon multiple dryer environment - with noise levels for individual hairdryers measured by the Sweet Sounding Electrics™ team as exceeding 90dB - there are serious concerns for hearing impairment of hair dressers.

Exposure to constant and excessive noise can also cause other health problems including: stress, tinnitus, potential permanent hearing loss, headache, elevated blood pressure, fatigue, Irritability, digestive disorders and increased susceptibility to colds and infections.

Under Irish Law, ear protection must not only be provided - but must be worn in the event of workplace noise levels exceeding 90dB daily. Ear protection however is impractical for both hair salon and home environments.

The Hush Hush Hairdryers™ device, product of multidisciplinary student team Sweet Sounding Electrics™, provides a novel, effective and unobtrusive method of hair dryer noise reduction within both the home and salon environment.



Company Sweet Sounding Electrics Product Hush Hush Hairdryers Cork Institute of Technology

CIT Multi-Discipline Start-Up Innovation Team

John Kelleher, Mariah Reidy, Marco Quatrana, Kieran Minehane, Colm Kearney, Shane O'Driscoll, Niamh Ryan

***2013 Think Outside the Box Finals Galway
National Award of Merit 2013 - €1,500***



***Company 123 Fitness Product Robobox
Cork Institute of Technology
Sports Training Device Development***

***CIT Multi-Discipline Start-Up Innovation Team
Donagh Good, Eoghan McEnery, Brian Hand, Aidan O Sullivan,
David Linehan, James Fogarty, David Waterman***

2013 Think Outside the Box Finals Galway

National Award of Merit 2013 - €1,500



Boxing is in the public eye at the moment due to Ireland's recent success in the Olympic Games. Katie Taylor and John Joe Nevin took home gold and silver medals from the London Olympics 2012.

These wins coupled with the bronze medal wins of Paddy Byrnes and Michael Conlon help solidify the idea of "the fighting Irish".

123 Fitness™ is an Irish based company - the brainchild of a multidisciplinary student team - developing the Robobox™ product - a novel boxing pad trainer.

Not limited to just boxing, Robobox™ also provides a great cardio workout. Robobox™, in fact, provides a mixture between cardio and strength training, which gives the product great flexibility.

The product can also be combined with toning or Boxercise classes, making Robobox™ an all-encompassing product - suitable for men and women of different sports, backgrounds and fitness levels.



Company 123 Fitness

Product Robobox

Cork Institute of Technology

CIT Multi-Discipline Start-Up Innovation Team

*Donagh Good, Eoghan McEnery, Brian Hand, Aidan O Sullivan, David Linehan,
James Fogarty, David Waterman*

Engineers Ireland Innovative Student Engineer of the Year 2013

SIEMENS *sponsored by Siemens*



First Place €1,500 National Award



Winner: Patrick Byrnes

Mechanical Engineering Cork Institute of Technology

“Automation of Ultrasonic Cleaning and Blast Processes at Zimmer Orthopaedics”



Siemens Engineers Ireland Innovative Student Engineer of the Year 2013 First Place €1,500 National Award

Student: Patrick Byrnes, Bachelor of Engineering (Honours Level 8) in Mechanical Engineering
College : Cork Institute Of Technology



Automation of Ultrasonic Cleaning and Blast Processes at Zimmer Orthopaedics



Implementation of automation technology into any modern manufacturing process poses many serious challenges and opportunities. Key factors such as timing and scheduling, financial planning, technical support acquisition and provision, quality control and cost saving all illuminate themselves as a threat to project success. These factors are never more critical to success than in the medical device industry – additional challenges include strict medical body regulation and the highest quality standards.



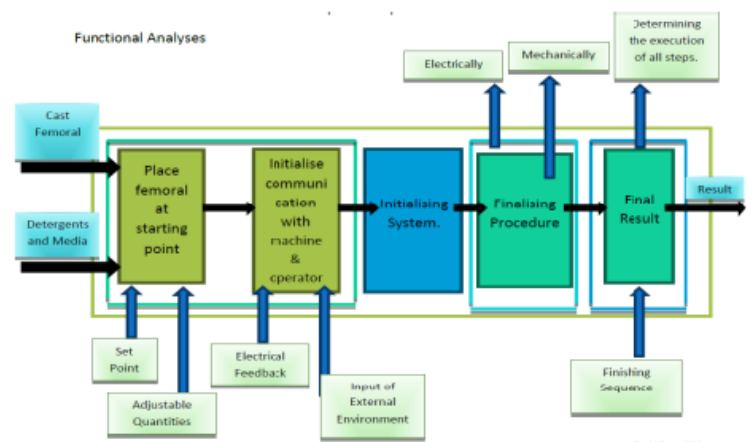
Femoral Orthopaedic Implant



Current Process Manufacturing Route

Medical device companies, who do take the plunge into the automation world, often face enormous corporate investments and suffer large lead times of implementation, all in the interest of streamlining production and lowering product cost.

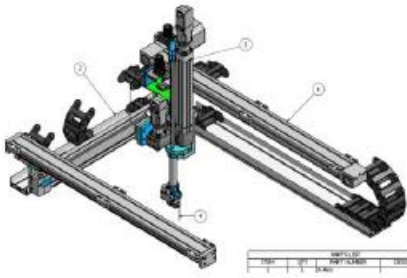
The achievement of a yellow belt in Six-Sigma and the valuable experience gained on work placement at Zimmer Orthopaedics, Ireland, enabled the author, through independent scrutinisation and analysis of existing manufacturing practices and the development of streamlined ergonomic techniques, to identify, formulate and progress this real world manufacturing project.



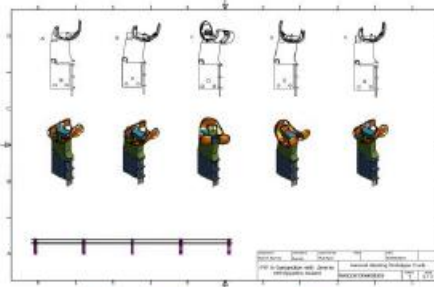
Extensive Systematic Design

Initial analyses identified existing ultrasonic cleaning and blast processing lead times as severe and sustained 'bottle neck' locations. Rigorous time studies, capability studies and gauge repeatability and reproducibility studies are carried out in order to fully characterise and simulate the current process. Various modes of systematic and experimental process design are undertaken by the author to raise the project classification / approval to that of 'budget venture'.

Breaking the manual mould, while simultaneously incorporating technology at minimal cost, is key to project feasibility and recognition. Design concept development, assessment, progression and optimisation are undertaken. Prototype manufacture, commissioning, testing and optimisation is achieved.



CAD Concepts Generation



Part Orientation Plotting



Prototype Development

The critical integration of FDA and ISO quality standards into final design is central to the project ethic and success. The student developed solution dramatically reduces the sub-process cycle time, providing efficiency savings of over €120,000 annually with a payback period of less than 4 months and frees up four personnel from repetitive tasks. The developed process solution is to be integrated into Zimmer’s current manufacturing process.

Ireland hosts over 250 medical device technology companies - many of which contribute to the orthopaedic implant manufacturing industry. The innovation incorporated into this developing budget product has already attracted significant third party interest. The application to smaller outsource manufacturing companies is under progression. The devised process solution significantly demonstrates further applications in the manufacture of other medical device products.

The expertise gained led to the author forming and registering his own start-up company BYNCO Labs, specialising in providing innovative solutions in budget automation projects for the medical device manufacturing environment - first purchase order received in June 2013.

Company Start-Up

BYNCO Labs

- Automation in Medical Manufacturing Processes
- Enterprise Ireland 'New Frontiers'
- First Purchase Order – SLE, Shannon, Co.Clare



(F Byrnes 2013)

BYNCO

LABS



BYNCO Labs Premises
Groom Enterprise Centre



Automation of Ultrasonic Cleaning and Blast Processes at Zimmer Orthopaedics



Student: Patrick Byrnes, Bachelor of Engineering (Honours Level 8) in Mechanical Engineering
College : Cork Institute Of Technology

Siemens Engineers Ireland Innovative Student Engineer of the Year 2013
First Place €1,500 National Award

Speak Out for Engineering 2013

Institution of
MECHANICAL
ENGINEERS
Republic of Ireland
Young Members

First Place National Award

ENGINEERS
IRELAND
young engineers



Developed Pyra-Aid™ Wheelchair Enablement Device
by J. Roberts



Winner: John Roberts Mechanical Engineering Cork Institute of Technology “Design and Development of a Wheelchair Enablement Device”

With 3 million users in the US and 5 million users in Europe, a staggering 1% of the total population of the Western World are estimated to gain mobility and freedom through the daily use of wheelchairs. Unfortunately, this mobility can be severely restricted by every day barriers such as mounting single steps or kerbs.

The design, development and testing of Pyra-Aid™, a retro fitted, user friendly, momentum powered mechanical device to aid in mounting of single steps or kerbs, is undertaken by the author. A systematic design approach, informed by wheelchair user and support group liaison, is adopted in the iterative development of the enablement device. Critical design criteria of the innovative 3 wheeled pyramid configuration include operation, efficiency, stability, safety, ease of attachment /detachment, versatility, wheelchair brand universality, manufacturability, aesthetics and cost.

A Mark 1 Pyra-Aid™ device has been manufactured and tested both in field and laboratory. Initial step / kerb mount tests have proven to be very promising. Design optimisation of the developing device, utilising state of the art manufacturing and material selection methodologies, is undertaken. Advanced analytical, computer aided design and experimental techniques, including finite element analysis and photo-elastic testing, are employed in the development of a Mark 2 prototype.

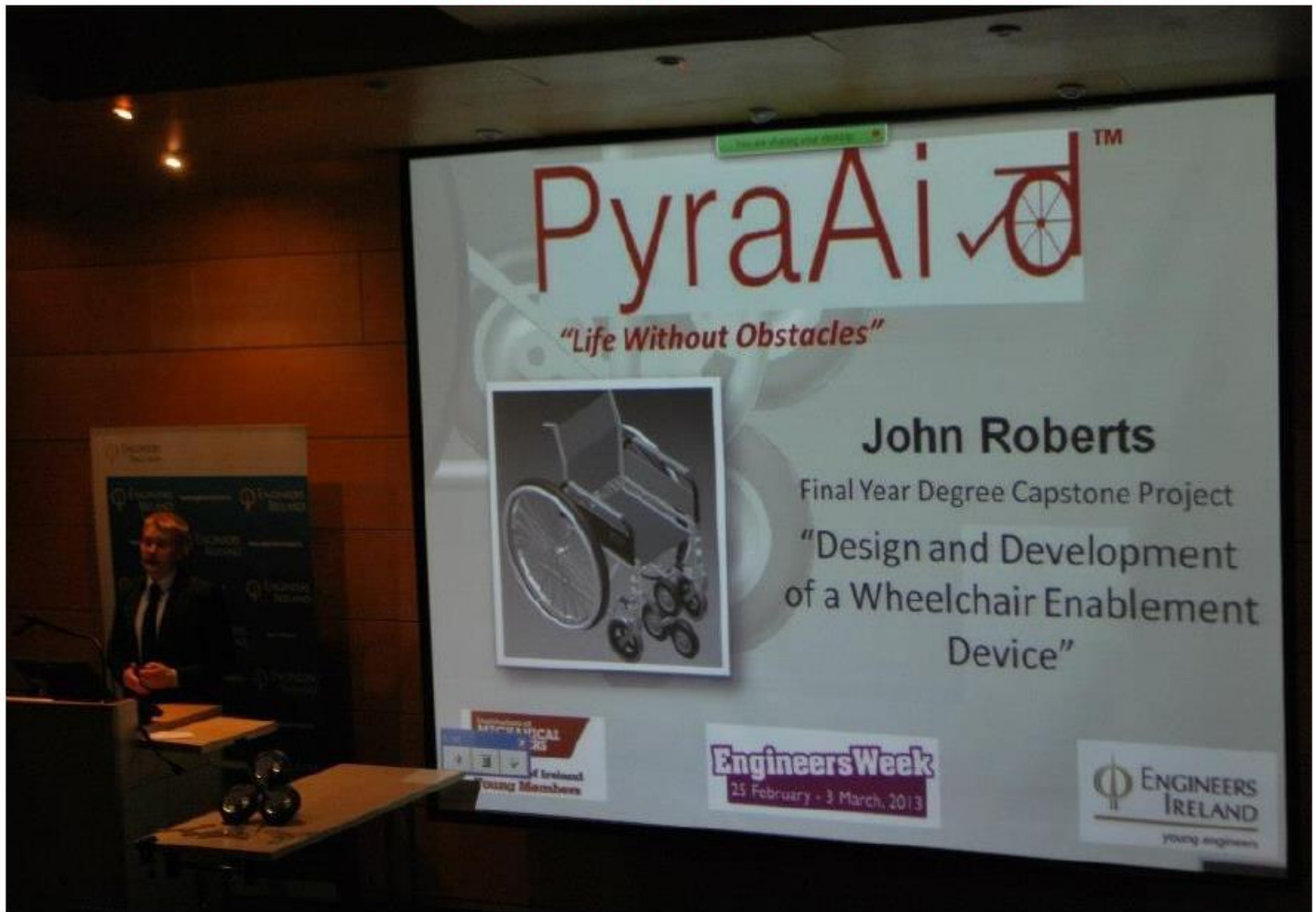
Pyra-Aid™ - a safe, easy to use, low cost aid promoting user comfort, mobility and independence through daily life for wheelchair users.

Speak Out for Engineering 2013

Institution of
MECHANICAL
ENGINEERS
Republic of Ireland
Young Members

First Place National Award

ENGINEERS
IRELAND
young engineers



“Design and Development of a Wheelchair Enablement Device”

The Speak Out for Engineering Finals Ireland 2013, adjudicated on by a distinguished panel drawn from both academia and industry, have just been announced at the Engineers Ireland HQ, Dublin. This prestigious engineering competition is open to all undergraduate and postgraduate engineering students in Ireland.

First Place and Outright Winner of the Speak Out for Engineering Award 2013

*John Roberts - Final Year Mechanical Engineering - Cork Institute of Technology
“Design and Development of a Wheelchair Enablement Device”*

Second Place Fiona Borkin - Letterkenny Institute of Technology - “Multi-Sensory Device for Children with Autism”

Third Place James Foody - University College Cork - “Design and Development of Low Cost Robotic Hand”

Highly Commended Finalists

Austyn Matheson - Trinity College - Dublin “Nerve Conduit Guide Optimization”

Luke Scales - Dublin City University - “Smart Homes - Current and Future Technology”

Aibhne Doherty - Dublin Institute of Technology - “Design, Analysis, Manufacture, and Verification of a Single Seat Racing Car Chassis for Formula Student Application”

Engineers Week
25 February - 3 March, 2013

Engineers Week
25 February - 3 March, 2013

MEETA - Asset Managers Association National Student Awards 2013 MEETA Overall Student Award First Place 2013



***Winner: Shane Fogarty Mechanical Engineering CIT
"Process Improvement and Electrostatic Analysis of Thermoforming Machine"***



Medication Capsule Thermoforming Process Improvement and Electrostatic Analysis

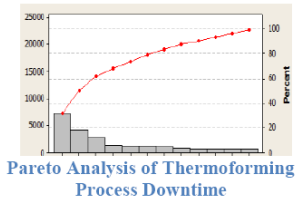
Shane Fogarty Mechanical Engineering CIT - MEETA National Award Winning Final Year Capstone Project

The manufactured pharmaceutical product medication capsule reduces patient immune system activity and is applied to prevent the rejection of transplanted organs – most prominently in kidney, liver and heart transplants.

Significant product waste and downtime during an industrial thermoforming process - designed to place the medication capsules into a continuous web of blister sheets - are observed and analysed by the author. Static electricity generation is believed to be the root source of the downtime and waste issues. Static analysis determines that the thermoformer is running at an all time low of 89.5% efficiency. Static related downtime is initially estimated at circa 2.2% or 4,700 minutes - equating to an estimated loss of 40,000 medication capsule packs per year.



Capsule Flow Disruption



Pareto Analysis of Thermoforming Process Downtime



Original Capsule Thermoforming Process Technology and Configuration

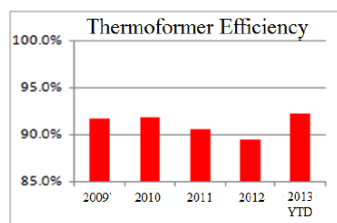
Electrostatic analysis of capsule flow through the thermoforming process in a pharmaceutical environment is undertaken and the theoretical basis of electrostatic generation in an industrial setting formulated by the author. Validation is achieved through the development and implementation of standardised electrostatic measurement procedures, leading to identification and quantification of major areas of electrostatic generation in the thermoforming process. Medication capsule movement is mapped out using a devised process map - static measurement points taken in each area. Temperature and humidity readings are taken and recorded to determine effect on static generated. 56 sets of static data are gathered over a three month period covering different batch sizes, different capsule sizes and product combinations. Varying environmental and storage conditions of the capsules are also taken into consideration.

A systematic design approach is devised and applied to develop a novel medication capsule feeding system. Critical design criteria identified and implemented include static generation reduction, uniform capsule dispersal, good conductive properties, ease of assembly, manufacture and cleaning, low maintenance and FDA approval. A series of designs are developed and Pugh's decision matrix approach utilised to determine optimal design configuration. Optimised 3D model design generation is achieved and novel prototype capsule feeder system fabricated and commissioned. Product quality assurance and regulatory compliance are central to the devised and undertaken validation testing. Prior to entry into commercial use, extensive validation processes and documentation including process failure mode effect analysis, microbiology testing, functionality report, material certificates, manufacturing certificates, working drawings, cleaning standard operating procedures and line clearance standard operating procedures are undertaken and prepared by the author.



Developed Novel Capsule Thermoforming Process Technology and Configuration

The root cause of electrostatic generation is identified and eliminated - resulting in a highly significant increase in medication capsule thermoforming manufacturing efficiency (including secondary savings above initial estimates) of 3%. The redesigned process results in the thermoforming process operating at a four year high of 92.5% efficiency –

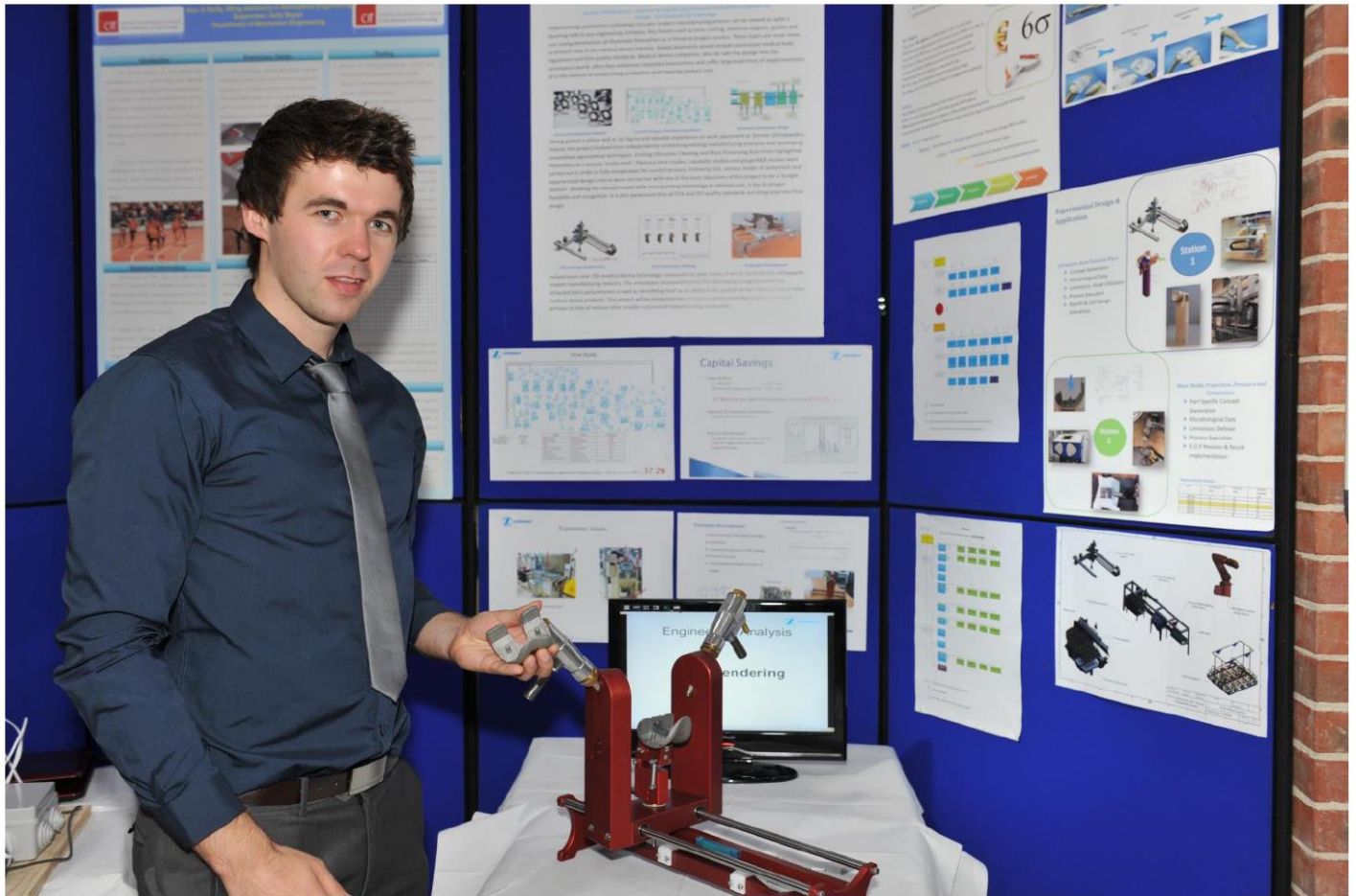


Thermoformer Efficiency Four Year High

representing an increase of 70,000 medication capsule packs produced per year, reduced line clearance time due to simplified assembly and a significant reduction in waste and quality issues. The developed novel thermoforming system and configuration is currently being applied to a second medication product line, leading to further predicted significant efficiency, waste reduction and maintenance gains and a projected additional 110,000 organ transplant medication capsule packs produced per year.



MEETA - Asset Managers Association National Student Award 2013



Patrick Byrnes Mechanical Engineering CIT

“Automation of Femoral Implant Ultrasonic Cleaning and Blast Processes”



2012 Awards



European Student Innovation Awards



Innovact 2012 Reims France

European Student Innovator of the Year 2012
First Place and Outright Winner

Kieran O'Callaghan of VisionRE™



Etaion Ni hAilpin Kieran O'Callaghan Norma Downing

VisionRE™ Team Cork Institute of Technology - "Terrain / Obstacle Detect"

Graduate Employee of the Year GradIreland 2012

CIT Mechanical Engineering Graduate 2010

Connor Barry (Abbott) wins

Graduate Employee of the Year 2012 at GradIreland Awards, Mansion House, Dublin

The winners of the GradIreland Graduate Recruitment Awards were announced on Wednesday 25 April 2012 at a gala dinner in The Mansion House in Dublin. Voted for by students and judged by an independent panel of industry experts, these awards recognise Ireland's most popular recruiters across a range of employment sectors.

Connor graduated with a First Class Honours Bachelor of Engineering Degree in Mechanical Engineering at Cork Institute of Technology in 2010, thereafter securing a place on the highly selective Abbott Ireland Professional Development Programme.

Connor has completed three of his four rotations on this programme and is currently working on assignment as a global buyer in the Abbott Nutrition Supply Chain in Columbus, Ohio, the first Irish Professional Development Programme recruit to be offered such a global assignment. Connor's previous rotations were as a process development engineer and quality engineer in Abbott Vascular's Irish operations.



Pics: Nikki Browne



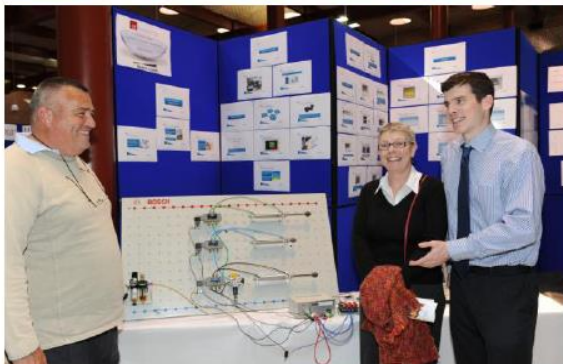
The gala dinner and awards ceremony were attended by 500 of Ireland's most respected employers, third level careers services and professional bodies, making it the biggest gathering of the graduate recruitment community in Ireland.

Graduate Employee of the Year GradIreland 2012

**Winner: Connor Barry (Abbott)
CIT Mechanical Engineering Graduate**

Graduate Employee of the Year Shortlist:

- Aidan Sandys, Abbott
- Aine Sheehan (Deloitte)
- Niall Goulding (Deloitte)
- Ciara McNestry (First Derivatives)
- Ken O'Shea (InterTradeIreland – Eirgen Pharma)
- Niall McSkeane (InterTradeIreland – JFC Manufacturing)
- Rachel Murray (Learnosity)
- Damian Cunningham (Medtronic Vascular)
- Lisa Archer (Sigmar Recruitment)
- Elizabeth Conlon (Vision Consulting)



Connor at 2010 CIT Engineering Exhibition



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

*Engineers Ireland Innovative Student
Engineer of the Year 2012
sponsored by Siemens
First Place €2,000 National Award*



Winner: Martin Evans Mechanical Engineering Cork Institute of Technology

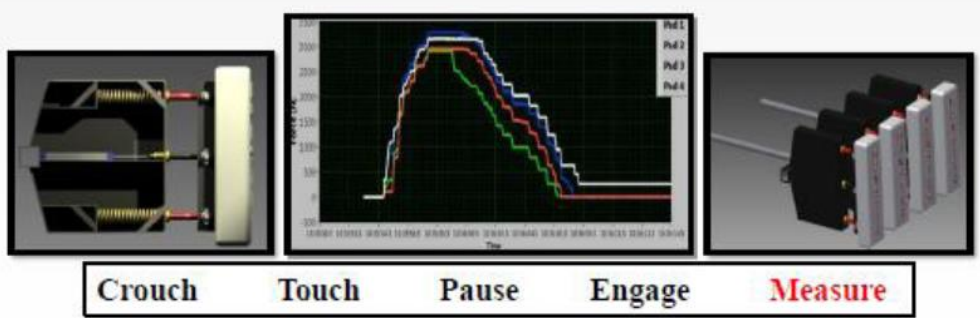
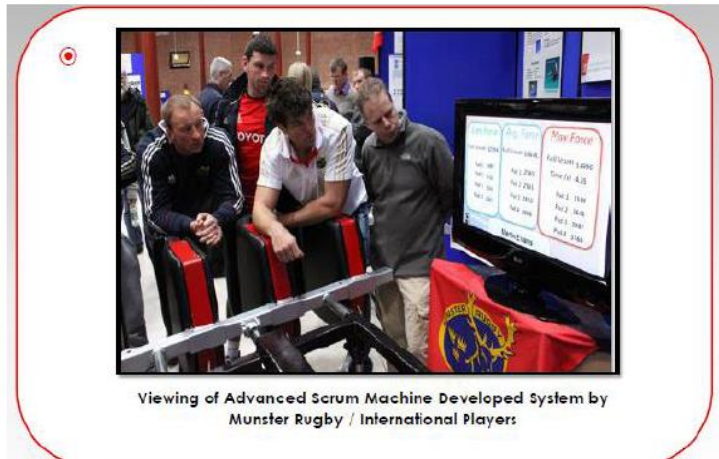
*“Design and Development of an Advanced Scrum Machine in
conjunction with Munster Rugby”*



“Design and Development of an Advanced Scrum Machine in conjunction with Munster Rugby”

Crouch Touch Pause Engage Measure

Crouch, Touch, Pause, Engage is a well known instruction delivered by rugby referees before scrum engagement. The modern game places an ever increasing pressure on rugby teams to improve scrum performance – hence the need to determine a reference to allow pack and individual team member performance comparison and incremental improvement. The author was given carte blanche to increase - through redesign / remanufacture and virtual instrument development - the functionality of an existing intermediate level scrum machine to the level of an advanced machine with data acquisition and scrum performance measurement capabilities. Hence Crouch, Touch, Pause, Engage and Measure.



MUNSTER RUGBY

Design and Development of an Advanced Scrum Machine in conjunction with Munster Rugby



European Student Innovator of the Year 2012 First Place and Outright Winner

<http://www.innovact.com>



Pic: Guillaume Gellert

First Place European Laureate of Innovation 2012 Kieran O'Callaghan VisionRE™

*"Real Time Interactive Obstacle Detection and Navigation Aid for the Visually Impaired"
Cork Institute of Technology Ireland*



*Second Place Thibaud Arnault et al WebShell
"A New Computing Language to allow Developers to make Web
and Mobile Applications in 10 minutes instead of 10 days "
University of Epita France*

*Third Place Modeo Salvatore et al MRS - Material Recovery
"Electromechanical System to Select and Salvage the Waste of the
Empty Room (Thermal Evaporation) to maintain Evaporation ".
University of Salento Italy*

It has been announced on Wednesday 28th March 2012 before a packed auditorium at the European Innovation Finals Innovact 2012 Reims, France, that First Place and Outright Winner of European Student Innovator of the Year 2012, from hundreds of international entries and 42 shortlisted international finalists from 28 European countries, is Kieran O'Callaghan of Cork Institute of Technology.

This is the first time that the accolade of

First Place Laureate in European Innovation has been won outright by an Irish student.

*Enterprise Ireland / Invest Northern Ireland
Academic Innovation Award Winner
Think Outside the Box Finals Dublin 2012*



*Enterprise Ireland / Invest Northern Ireland Academic Innovation Award Winner 2012
Senior Lecturer Sean F. O'Leary of Cork Institute of Technology
with Ms. Gillian Slattery of Enterprise Ireland and Mr. Frankie McCourt, Invest Northern Ireland
Think Outside The Box Finals Dublin*



Enterprise Ireland / Invest Northern Ireland



Student Finalist Award Winners



Think Outside the Box Finals Dublin 2012



Enterprise Ireland / Invest Northern Ireland
Student Finalist Award Winners 2012

CIT Multidisciplinary Group Muscle Stress Indicator MSI

represented by

Rebecca Lyall, Colm Keane, Declan Cotter,
Richard O Sullivan, Sean Leahy, Daniel
Corkery, Richard Childs

with Mr. Tom Hayes,

Head of Micro Enterprises and Small
Business, Enterprise Ireland,

at the Think Outside The Box Finals
Dublin 2012



Enterprise Ireland / Invest Northern Ireland
Student Finalist Award Winners 2012

CIT Multidisciplinary Group

Wheelchair Enablement Device PyraAid™

represented by John Roberts, Alan O'Reilly, Laura
Hannon, Sandra Hayes, Siobhan Hickey,

Thomas Thornton, Stephen O'Brien

at the Think Outside The Box Finals

Dublin 2012



Abbott Ireland Intern of the Year 2012

Eoin Lyons CIT Biomedical Engineering



CIT Biomedical Engineering student Eoin Lyons has been selected as and presented with the highly coveted Abbott Ireland Intern of the Year 2012 Award.

Eoin, chosen from a group of over 30 students from third level institutions across Ireland who had undertaken internships with Abbott Ireland, was presented with the Abbott Intern of the Year Crystal Trophy and €1,000 bursary by Ms. Kelly Henry, Talent Acquisition Specialist, Abbott Ireland at a glittering ceremony at the Abbott stand at the 2012 CIT Career Fair on Tuesday 2nd October 2012.



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

Excellent Night for CIT Graduates at Engineers Ireland Excellence Awards 2012 Four Seasons Hotel Dublin



Engineers Ireland Excellence Award Winners and Finalists 2012 CIT Mechanical Engineering Graduates

Danny Johnston, Engineering Manager OpenHydro Technology,

Alan Bateman, Automation and Control Engineering Manager, Janssen Pharmaceuticals,

*Eoin O'Donovan, Technical Operations and Maintenance Manager for Renewables, Bord Gáis Energy pictured with
CIT Head of School of Mechanical, Electrical & Process Engineering Matthew Cotterell and Senior Lecturer Sean F. O'Leary*

The Engineers Ireland Excellence Awards 2012 were presented at a glittering ceremony, hosted by RTE's Mary Kennedy, at the Four Seasons Hotel, Ballsbridge, Dublin. CIT graduates were very much to the forefront of the accolades presented at the Excellence Awards 2012.

CIT Mechanical Engineering Graduate Alan Bateman, Automation and Control Engineering Manager at Janssen Pharmaceuticals, was presented on behalf of Janssen Supply Chain (Ireland) with the Engineers Ireland Continuing Professional Development (CPD) Company of the Year Award. Cork-based multinational Janssen's overhaul of its business model ensured more than 500 hi-tech jobs were sustained across its two locations, Little Island and Ringaskiddy, in Cork. The Engineers Ireland CPD Company of the Year Award aims to recognise and reward the successful and sustainable achievement of an engineering employer's strategic vision through the use of best practice CPD initiatives.

CIT Mechanical Engineering Graduate Danny Johnston, Engineering Manager, OpenHydro Technology, was part of a four man team from OpenHydro presented with the Engineers Ireland Technology of the Year Award. OpenHydro designs and manufactures marine turbines to generate renewable energy from tidal streams. This award highlights Irish innovation in technology that clearly demonstrates a real impact on society, coupled with an actual or future contribution to society.

CIT Mechanical Engineering Graduate Eoin O'Donovan, Technical Operations and Maintenance Manager for Renewables at Bord Gáis Energy, was short-listed to just six very impressive finalists for Engineers Ireland Chartered Engineer of the Year 2012 from over 450 nominated engineers nationwide and internationally. Eoin O'Donovan joined Bord Gáis Energy in 2010 from SWS Energy, where he was responsible for developing the wind operations team. Prior to SWS, Eoin worked for Pharmaceutical Multinational, GlaxoSmithKline, as a plant reliability engineer. Eoin's project concerned the Delivery of a Sustainable Operations and Maintenance Management Model in the Wind Industry.





First Place and Grand Prize 2012

<http://www.cit.ie/currentnews?id=350>



CIT's Kieran O'Callaghan Enablement Product AquaEye™ (Swimming Aid for People with Vision Impairment) wins the National Council for the Blind of Ireland Grand Prize Wood Quay Dublin

Nine designers of inclusive technologies battled against each other in an exhibition-style showcase.

The Mission - to promote digital inclusion in Ireland, with a specific focus on vision and vision loss. Design entries comprised technologies which were designed in an inclusive way and those which specifically address the needs of users who are blind or have a vision impairment.

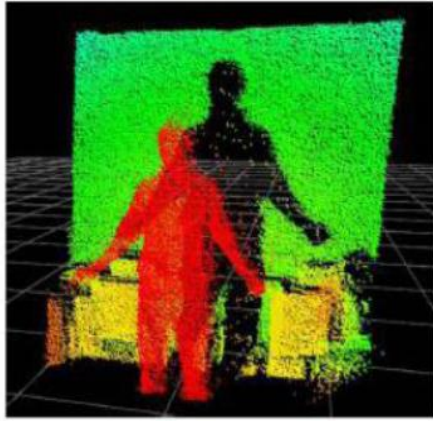
The other finalists included:

- *AutonoMi: A personal security alarm for older people living independently.*
- *An accessible version of the RTE Player.*
- *RowMate Access: A Smartphone App which allows vision impaired rowers to train independently using an indoor rowing machine.*
- *VisionRE: A navigation aid for detecting obstacles while walking.*
- *HomeSense: A system which alerts the user to potential hazards within the home, such as open cupboard or appliance doors, allowing safe and independent navigation around the house.*
- *ABAIR: A prototype Irish Language Reader with AB AIR Synthetic Voices incorporated into digital talking books (using the DAISY format).*
- *Voices as Gaeilge for PC and Mac: Software which can be installed on Mac OS X (& later on PC) as an additional screenreading voice, speaking in Irish.*
- *LookAround App: A Smartphone App which announces the current street, city, cross street, heading and nearby points of interest.*
- *Storybud: A website of stories for children or adults which can be easily read or listened to.*

VisionRE™

The Design and Development of a Real Time Interactive Obstacle Detection and Navigation Aid for the Visually Impaired

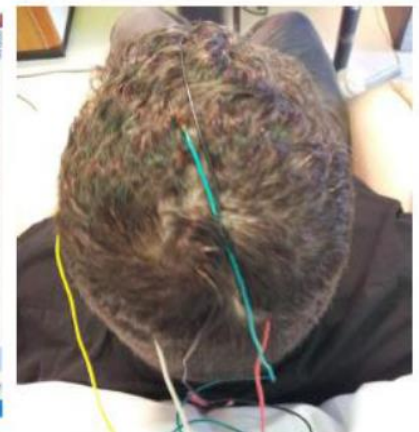
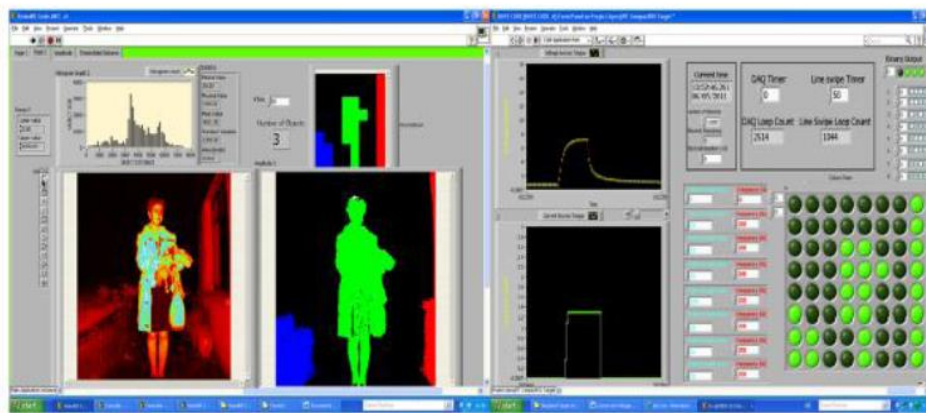
3D Obstacle Segmentation



Neurophysiology Testing of the Device



Optional Braille Interface



Design, Development and Testing of VisionRE™ Tongue Display Unit

Kieran's developing VisionRE™ device segments and classifies 3D objects/obstacles in real-time and presents the 3D information to the user in a more intuitive manner via multimodal electro-tactile, vibro-tactile and audio Human Machine Interfaces. The device identifies the presence, description and distance of objects and conveys that information to the user in a simple form. This kind of information can be used to allow the user to perform simple functions such as avoid obstacles as well as giving the user the ability to recognise their surroundings. This latter aspect of the device allows the vision impaired person to broaden their routines and be more independent.

The highly innovated Tongue Display Unit, developed by Kieran, has been designed and operates as a subject control and information system - the subject tongue effectively acts as a computer mouse, enabling the visually impaired user to select and control focus, range and breadth of determined Time of Flight vision data. The segmented visual information from the TOF camera is coded into electro-tactile pulses and presented to the user on the 64 channel electro-tactile tongue display unit designed by the author. The tongue is ideally suited to receive sensory information via electro-stimulation. The saliva in the mouth acts as an electrolyte which provides excellent electrical conductivity between the tongue and stimulator.

Recent advances in Time of Flight (TOF) imaging technology have presented new opportunities to develop improved sensory substitution systems for compensation of visual sensory loss. In sensory substitution, information from an artificial receptor/sensor is relayed to the brain via a Human Machine Interface. The brain is able to utilise this information as a substitute for what is usually transmitted from an intact sense organ such as the eye. EEG subject testing of the developing VisionRE™ device has demonstrated evoked potentials detected in the visual cortex. The potential for plasticity visual development/learning in the visually impaired points to a genuinely world class and life changing product for the visually impaired.



VISION RE™

Vision Research Enterprises

<http://visionre.cif.ie>

Presented by:

Kieran O' Callaghan
Norma Downing
Etaoin Ni hAilpin



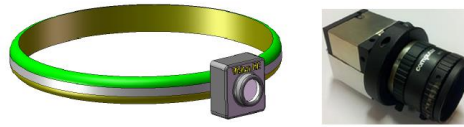
Ambassador for the Irish Guide Dogs for the Blind
Ambassador for Cork City and County



VisionRE™

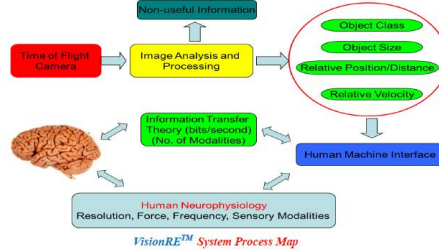
Terrain / Obstacle Detection System for the Visually Impaired

The VisionRE™ device utilizes a developmental TOF camera to map the environment in front of the visually impaired user in three dimensions at a rate of 30 frames per second. The camera employs an integrated eye safe light source (850nm), which modulates from 18 to 21MHz. The emitted light is reflected by objects in the scene and travels back to the camera.

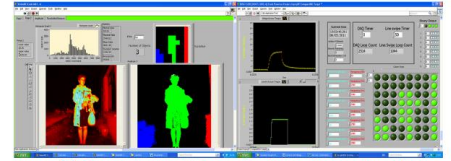


VisionRE™ Headset (Solid Model Design and Prototype by VisionRE™)

A process map for the VisionRE™ system is illustrated below. Machine Vision algorithms are developed to segment, classify, and encode spatial information from a TOF sensor in an intuitive manner. The developed device is capable of working in complete darkness and is unaffected by changes in lighting conditions due to the sun and clouds.



The designed VisionRE™ obstacle segmentation process classifies obstacles and hazards in front of the visually impaired user in order of importance, with the closest objects in the direct path of the user given highest priority. The user can detect obstacles/hazards up to a maximum distance of 8 meters. The user has the option to reduce the maximum range of the device if desired.

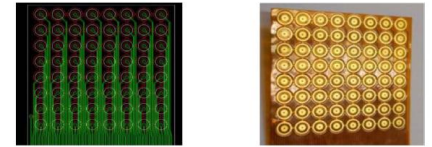


VisionRE™ 3D Environmental Mapping and Obstacle/Hazard Segmentation Process

The VisionRE™ code transmits the following extensive range of obstacle information to user in real-time via the designed HMI (Human Machine Interface).

1. Overall size of object/hazard. (Area information)
2. Obstacle Height (Y), width (X) and position within the user's Field of View (FOV).
3. Distance (Z) to objects in user's path.
4. Velocity of detected objects.

The VisionRE™ HMI was developed to evaluate the bimodal performance of the tongue and aural senses at interpreting segmented and coded visual information from a TOF sensor. The TDU element of the HMI consists of 64-electrodes, each with independent ground terminals to ensure localization and consistency of electro-tactile stimulation. The array measures 32mm x 32mm. All electrodes are gold plated and separated by a polyimide coverlay.

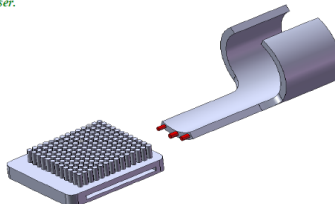


Wire Diagram and Manufactured 64 Channel Electro-Tactile Array

VisionRE™ Braille Viewer

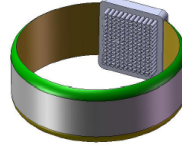
Terrain / Obstacle Detection System for the Visually Impaired

The VisionRE™ Braille Viewer is capable of analysing the full surrounding 3D environment at an ultra-high real time rate of 52 times a second. VisionRE™ can detect objects at distances of up to 8 meters. The VisionRE™ system can also read road warning signs and automatically alert the user.



VisionRE™ Human Machine Interface Detachment System
Solid Model Design by VisionRE™

The communication between headset and handset has been designed as a wireless system. The customer has the personalised tactile interface option of removal of the Braille Human Machine Interface Pad from the handset and placement on another body part, such as their arm, leg or back, using the developed VisionRE™ flexible strap, as illustrated.

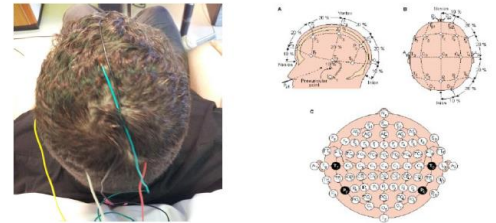


VisionRE™ Human Machine Interface Alternative Body Positioning System
Solid Model Design by VisionRE™

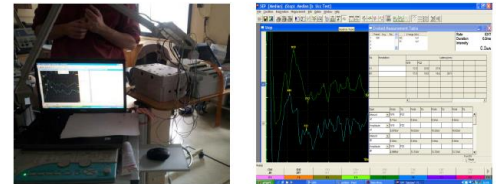
This innovation empowers the visually impaired individual with the capability of use of both hands simultaneously.

Visual Evoked-Potential (VEP) and Somatosensory Evoked-Potential (SSEP) Testing

Visual Evoked-Potential assessment is achieved by the author through electrode testing on the surface of the scalp. The electrodes are used to monitor the electrical response in the visual cortex. EEG subject testing of the developing VisionRE™ device has demonstrated evoked potentials detected in the visual cortex. The potential for plasticity visual development/learning in the visually impaired would truly be ground-breaking and points to a genuinely world class and life changing product for the visually impaired.



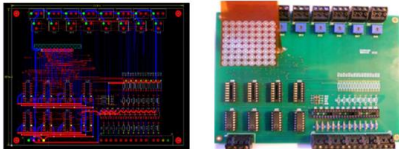
Visual Evoked-Potential (VEP) and Somatosensory Evoked-Potential (SSEP) Testing



VisionRE™ Device Evaluation and evoked potentials produced in the Somatosensory Cortex of the Inventor Kieran O' Callaghan 2012

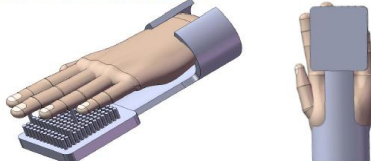
The novel aspects of our design include:

1. The ability to real time and interactively select and control focus, range and breadth of determined Time of Flight vision data achieved by enabling the user tongue to act as an ultra-sensitive computer mouse, operating the subject control and information system.
2. The ability to provide distance, area and classification information via audio means for objects selected by the tongue on the TDU (Feedback Loop).
3. The use of a TOF sensor to segment, classify and encode the spatial information regarding the users environment.
4. The use of independent ground electrodes to produce consistent and localised electrical stimulations.
5. An integrated constant current source to allow for changes in saliva and tongue resistance in order to keep the perception of stimulus constant.



VisionRE™ Printed Circuit Board Layout and Manufactured Tongue Display Unit Circuit Board

A large area of the Somatosensory Cortex is dedicated to receiving sensory information from the tongue and hand compared to other parts of the body. A parallel hand based Braille Viewer system is also being developed by the author to take advantage of the high nerve density and excellent spatial resolution of the human hand.



VisionRE™ Braille Viewer Handset (Solid Model Design by VisionRE™)

VisionRE™ Sign Detection

Our extensive qualitative and quantitative research strongly indicates that VisionRE™ can greatly increase the spatial awareness of the visually impaired and in turn greatly increase the confidence. The VisionRE™ system can also read road warning signs and automatically alert the user via and audio warning.



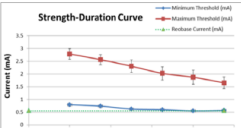
Pedestrian Crossing, Pedestrian Walkway and Stop Sign Detection - VisionRE™ 2012

VisionRE™ is to distribute our products via direct mail through our website <http://visionre.cif.ie> and also through the NCBI website: www.ncbi.ie



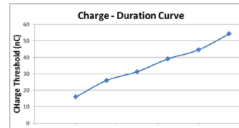
VisionRE™ Sample Test Results

Minimum and Maximum Sensory Thresholds



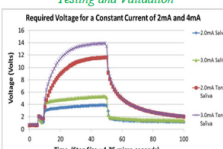
Minimum and maximum current thresholds for the anterior region of the tongue for pulse lengths between 20-95µs (Step size = 15µs) n=96

Charge-Duration Relationship



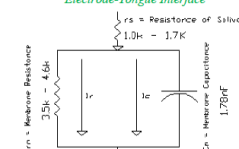
Minimum charge threshold for the anterior region of the tongue for pulse lengths between 20-95µs (Step size = 15µs) n=48

Tongue Capacitance and Electric Field Testing and Validation

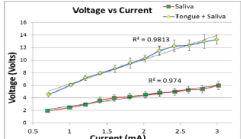


Voltage kept to maintain constant current pulses of 2mA and 4mA for size electrode of the VisionRE HMI in contact with the tongue and saliva: n=120

Electrical Equivalent Circuit Design for the Electrode-Tongue Interface

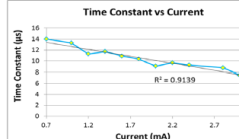


Resistance of the Electrode - Tongue Interface



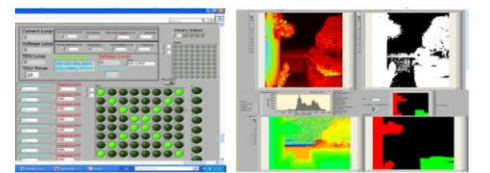
The voltage required to pass constant current pulses across one electrode covered with saliva only and in contact with the tongue and saliva: n = 192

Membrane Time Constant (τ) Determination

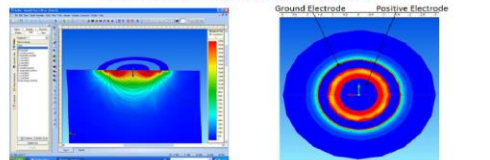


Membrane time constant (τ) for 50µs constant current pulses between 0.7-3.0mA: n = 93

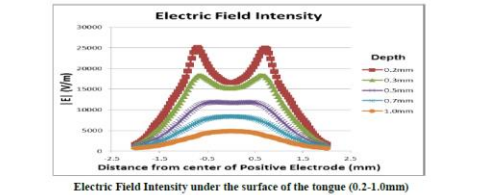
Designed Tongue Display Unit Evaluation Control Panel - Kieran O' Callaghan 2012



Electric Field Intensity Modelling and Validation



Electric Field Intensity (red-blue) and equipotential voltage distribution (black lines) for a vertical cross-section of one VisionRE TDU electrode (left). Plan view of electrodes (Right)



Electric Field Intensity under the surface of the tongue (0.2-1.0mm)



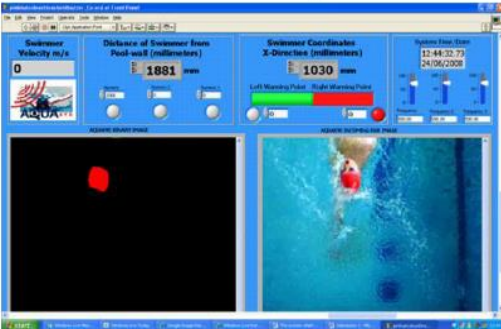
NCBI CFIT Technology Showcase

AquaEye™



The Design and Development of a Swimming Aid for the Visually Impaired

Designed and Developed Swimmer Detection Control Panel and Prototype Receiver for AquaEye™



Abstract

People with visual impairment generally have lower levels of fitness than their sighted peers. Furthermore, daily living activities of the visually impaired demand increased energy. Swimming is one of the best exercise activities as few obstacles are encountered. Currently, a visually impaired swimmer must depend on an assistant to warn him/her of the approaching pool wall by a single tap on the head/shoulder. The "Tapper" system has proved demeaning, inadequate and occasionally dangerous.

Research, analysis, prototype design, development and testing of diverse technologies including Bluetooth, Sonar, Passive Infra-Red, Photo-Electric Detection and Machine Vision systems was undertaken. The suitability of each technology was assessed to meet requirements in relation to safety, reliability, portability, aesthetics and ease of use. These criteria were based on a survey of visually impaired swimmers.

Machine Vision based systems (individual swimmer-centric and comprehensive pool-wide solutions) have been designed and developed to alert swimmers of pool wall approach. On swimmer detection, a warning signal is encoded and transmitted. The transmitted warning signal is decoded by a developed waterproof receiver. The swimmer is alerted via form fitting audio earpiece and tactile feedback. A working prototype has been developed and has been extensively tested for functionality and quality. The developing product also shows significant further potential to facilitate in-pool training for sighted swimmers and as a real time coaching aid for competitive swimmers. The establishment of the AquaEye™ Irish Software and Technology as a standard installation in swimming pools worldwide is planned. The author wishes that every visually impaired individual in the world is empowered with the same opportunity to swim as their sighted peers.

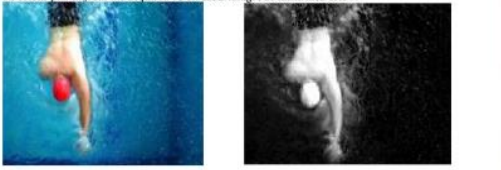


Stephen Campbell, Irish Paralympic Swim Team - Project Partner

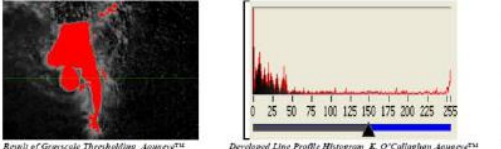
Analysis of Acquired Images:
Over thirty image sequences were acquired during testing. Each image sequence lasted 15 seconds. In total 450 individual images were analysed. Vision Analysis Software was utilised to view each image within an image sequence as illustrated.



Processing of 32 bit Images:
The acquired 32 bit RGB (Red, Green, Blue) test images of the swimmer contained up to 16.7 million different pixel values. Using image acquisition and analysis software, the author was able to extract 8 bit colour planes from the acquired 32 bit RGB images as illustrated below.



The extracted colour planes were analysed in the hope of detecting the swimmers but using grayscale thresholding, image filters and grey morphology techniques. The data obtained from grayscale thresholding was then represented on linear histograms for in depth analysis into the variation of pixel intensity within the image.



The extraction of 8 bit colour planes and subsequent grayscale thresholding resulted in the entire swimmer's body being detected along with the swimmer's red hat. The author deemed this method unsuitable as the leading edge of the swimmer was not always constant. After much research and deliberation, the author concluded that the only alternative was to try and detect the swimmer's red hat in the more processor intensive 32 bit image format and then convert to an 8 bit format.

Introduction

AquaEye™ is a swimming aid for the visually impaired, designed to alert swimmers on pool end-wall approach. People with visual impairment generally have lower levels of fitness than their sighted peers. Furthermore, activities of daily living of the visually impaired demand increased energy. Swimming is one of the best exercise activities as few obstacles are encountered.



Current Modes Operated - The Inadequate "Tapper" System

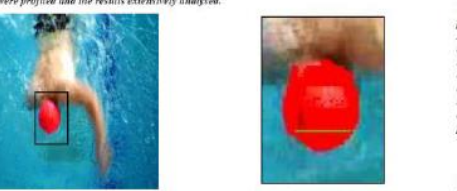
Currently, a visually impaired swimmer must depend on an assistant to warn him/her of the approaching pool wall by a single tap on the head/shoulder. The "Tapper" system has proved demeaning, inadequate and occasionally dangerous.

"Our own top swimmer, Stephen Campbell, has had quite a few accidents. On one occasion he crashed into the wall at the pool while swimming and broke his nose". Geraldine Conway, Manager, Irish Paralympic Swim Team.

All research, analysis, prototype development, manufacturing and experimentation work presented in the essay, utilising Photo-electric and Machine Vision and Data Acquisition systems, are the sole work of the author.

During the systematic design stages of AquaEye™, an extensive survey of potential users identified six key design criteria - safety, reliability, cost-effectiveness, portability, aesthetics and ease of use. A further five performance criteria were established by the author as the project progressed.

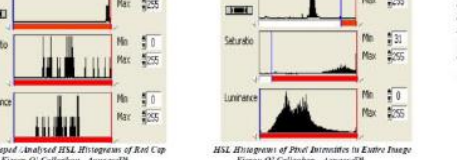
Processing of 32 bit Images:
The acquired 32 bit RGB test images were then converted to their corresponding HSL (Hue, Saturation, Luminance) values. The variation in HSL pixel intensities that represented all three colour swimming hats were profiled and the results extensively analysed.



HSL Image of swimmer with Red Hat AquaEye™

Line profile of Red Hat AquaEye™

The distribution of the pixel intensities for the red cap and entire image are illustrated below:



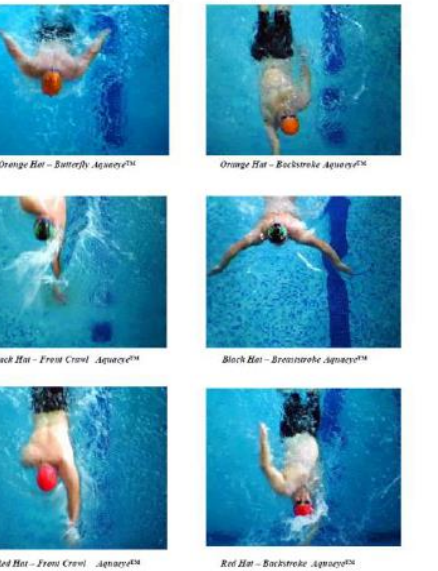
Developed Analyzed HSL Histograms of Red Cap

HSL Histograms of Pixel Intensities in Entire Image

Particle Analysis:
The distribution of pixel intensities for the Hue, Saturation and Luminance values required to produce the colour red corresponding to the swimmers hat were analysed using histogram techniques. Using these results a filter was designed to accept only the range of pixel intensities required to accept the colour red. The chosen range of pixel intensities resulted in an 8 bit binary image of the swimmer's hat.

Vision Detection System Investigation - Major Solution

With the permission of LeisureWorld swimming complex the author mounted a web camera above the pool end-wall and acquired images of swimmers. The author used Orange, Black and Red colour swimming hats as these colours would result in the largest variation in pixel intensity (contrast) against the pale blue background. The Front crawl, breaststroke, backstroke and butterfly were all recorded using each colour hat. A selection of the acquired images may be seen below:



The Developed AquaEye™ Solution

AquaEye™ is a swimming aid for the visually impaired, designed to alert swimmers on pool end-wall approach.

The AquaEye™ designed and developed comprehensive pool-wide solution utilises Machine Vision and Data Acquisition Technology. AquaEye™'s ability to monitor the position of swimmers in the pool as they swim is unique on a world wide scale. The developed systems comprehensively address all design and performance criteria in relation to safety, reliability, accuracy, swimmer tracking, pool position feedback, stroke analysis, velocity measurement, cost effectiveness, portability, ease of use, aesthetics, ergonomics, financial viability and ease of maintenance/installation.

Open swimmer detection, a warning signal is encoded and transmitted. The transmitted warning signal is decoded by a developed waterproof receiver. The swimmer is alerted via form fitting audio earpiece and tactile feedback. A working prototype has been developed and has been extensively tested for functionality and quality.

- AquaEye™ uses 4, 6 or 8 cameras, depending on pool size and shape. These cameras are of a similar size to a web-cam and will go unnoticed as they will be attached to the pool ceiling.

An additional advantage of the developed AquaEye™ system is that it may be used as a communication device between swimmer and coach. As each swimmer carries a radio headset, a coach or friend now has the ability to talk to the swimmer as they swim. The coach selects the individual swimmer channel (frequency) and relays a message through his walkie-talkie.

The developed communication capability signifies further potential in facilitating in-pool training for sighted swimmers and as a real time coaching aid for competitive swimmers.

Unique features of AquaEye™ include:

- More accurate, reliable, and safer than other warning methods currently available.
- Guides alerts swimmers to their position relative to the pool lane dividers.
- The swimmer can adjust the distance before warning of wall.
- The swimmer's position is updated 60 times a second.
- Measures the speed of each swimmer.
- Playback Feature can be used to analyse swimmer stroke and technique.
- Transmitter Encoder and Receiver Decoder System - 100% reliable and interference free.
- Individual coach to swimmer communication.
- Extremely light weight and portable.
- Adjustable mechanism to fit all for maximum comfort.
- Durable neckband holds headpiece in place even when diving.
- Filtration function to most needs of visual hearing impaired swimmers.
- Suitable for visually impaired swimmers, competitive swimmers, learner swimmers and (back stroke) sighted swimmers.
- 100% Waterproof.
- Form fitting silicone earpieces readily adjust to provide watertight fit for individual ear canals. (Figure 3 and Figure 4)

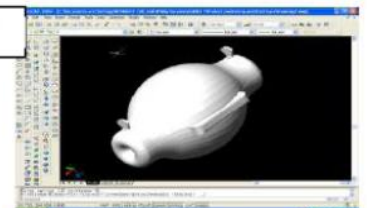
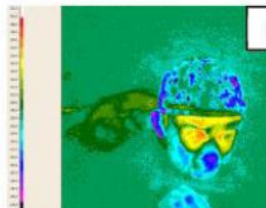


People with visual impairment generally have lower levels of fitness than their sighted peers. Furthermore, activities of daily living of the visually impaired demand increased energy. Swimming is one of the best exercise activities as few obstacles are encountered.



Currently, a visually impaired swimmer must depend on an assistant to warn him/her of the approaching pool wall by a single tap on the head/shoulder. The “Tapper” system has proved demeaning, inadequate and on occasion dangerous. “Our own top swimmer, Stephen Campbell, has had quite a few accidents. Last year he crashed into the wall at the pool while swimming and broke his nose”- Geraldine Conway, Manager, Irish Paralympics Swim Team.

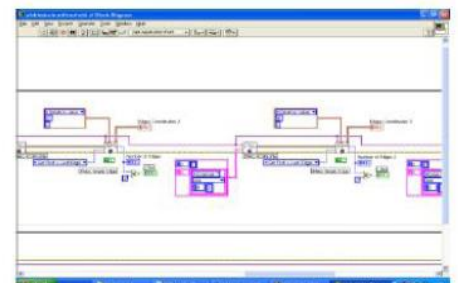
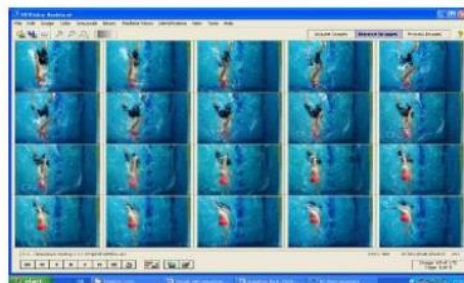
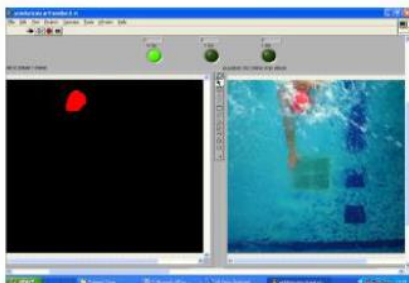
Based on a survey of Visually Impaired Swimmers, I undertook research, analysis, prototype design, development and testing of Bluetooth, Sonar, Passive Infra-Red, Photo-Electric Detectors and Machine Vision Software to meet requirements in relation to safety, reliability, portability, aesthetics and ease of use.



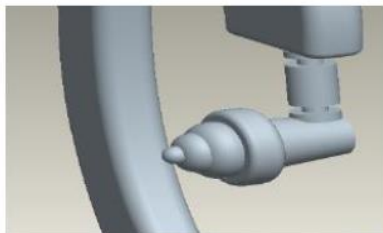
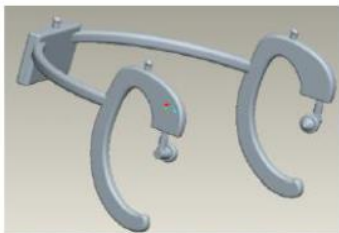
Experimental Assessment of PIR System - Thermal Camera

Aquaeye™ Developed Detector Buoy System

Two individual systems have been designed to alert swimmers as they approach the pool wall. Once the swimmer is detected a warning signal is encoded and transmitted. A waterproof receiver decodes the warning signal and alerts the swimmer via an audio earpiece and tactile feedback. A working prototype has been developed and has been extensively tested for functionality and quality.



Aquaeye™ Developed Machine Vision and Data Acquisition System



Headphone Developed Solid Model - Aquaeye™ Designed and Developed Swimmers Radio Headset

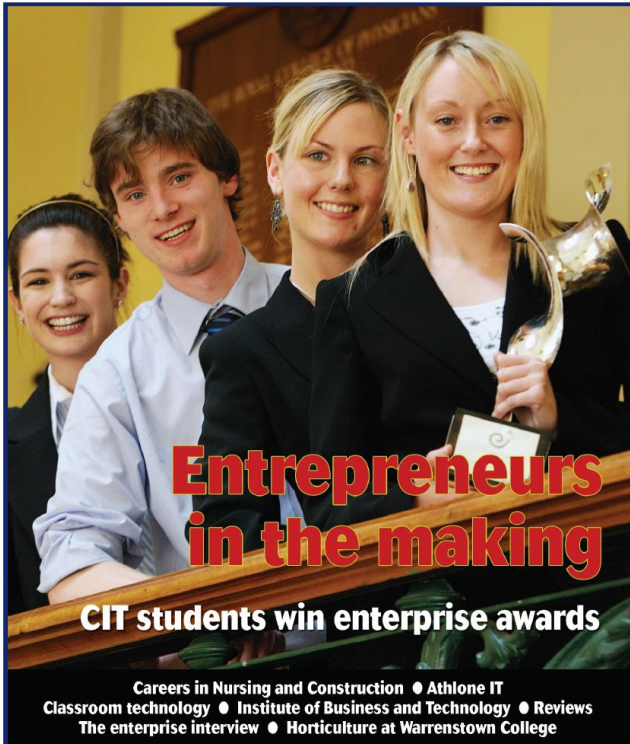
Developed Marketing Website

The developing product also shows significant further potential to facilitate in-pool training for sighted swimmers and as a real time coaching aid for competitive swimmers.

Education

Vol. 20

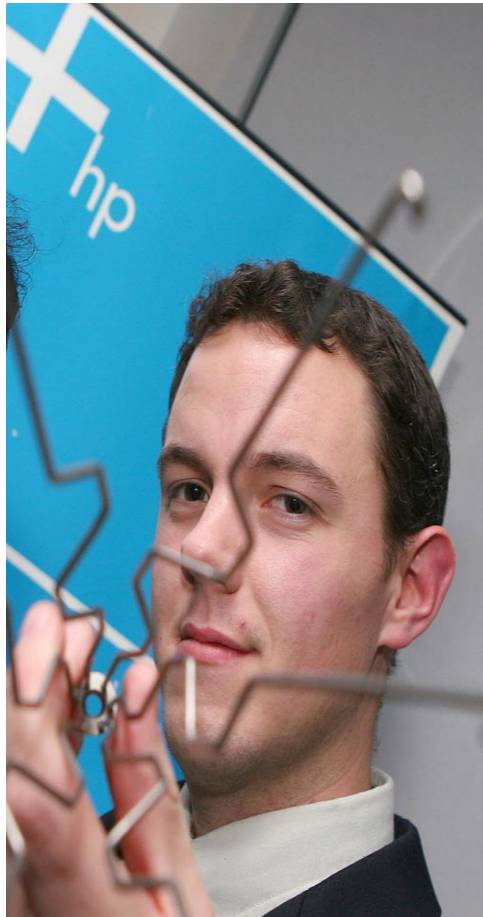
Issue 4



Entrepreneurs in the making

CIT students win enterprise awards

Careers in Nursing and Construction • Athlone IT
Classroom technology • Institute of Business and Technology • Reviews
The enterprise interview • Horticulture at Warrenstown College



2011 Awards

*2011 European Science Engineering and Technology
SET Awards Millennium Hotel London*

The Babcock Award

European Mechanical Engineering Student of the Year 2011

First Place

<http://www.setawards.org/>



First Place Babcock Award - Best European Mechanical Engineering Student 2011:

Rian Edman of Cork Institute of Technology

Thermodynamic Analysis, Testing and Evaluation of a Concept 6 Stroke Engine

Runners Up Finalists:

Benjamin Lindley of the University of Cambridge

Waste incineration in a pressurised water reactor

Ross Doak of Heriot-Watt University

Design of a spherical mobile robot





CIT's Rian Edman wins Babcock Award Best European Mechanical Engineering Student 2011 2011 European Science Engineering and Technology SET Award Finals

– see <http://www.setawards.org/set/newstpl.php?pid=228>



Mike Homer, Managing Director of the Marine and Technology Division at Babcock International Group presents Rian Edman with the Babcock Award for Best European Mechanical Engineering Student 2011 at the 2011 European Science Engineering and Technology SET Award Finals during a glittering awards ceremony in the Millennium Hotel, Grosvenor Square, Mayfair, London

At a glittering awards ceremony in the Millennium Hotel, Grosvenor Square, Mayfair, London and following a gruelling and intense final day of competition comprising project presentation, demonstration and personal interview before a distinguished panel of Industrial and Academic judges in Birdcage Walk, Westminster, London, the following result has just been announced at the 2011 European Science Engineering and Technology SET Award Finals:

Rian was presented with his First Place Mechanical Engineering 2011 European Science Engineering and Technology SET Award at a spectacular ceremony bringing together hundreds of technology students and academics, as well as senior figures from industry, government, science and the media.

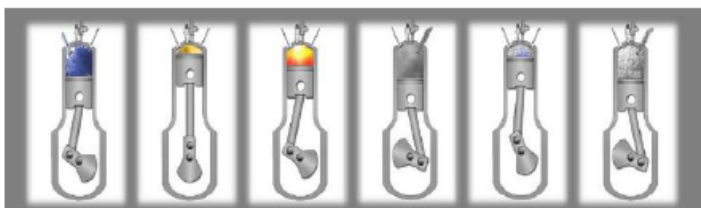
This is the first time a student from Cork Institute of Technology (or indeed from any Institute of Technology in Ireland) has been short-listed for the European Science Engineering and Technology SET Awards - so it is indeed magnificent achievement and a great honour to have won the First Place Mechanical Engineering Babcock Award.

The Science, Engineering & Technology Student of the Year Awards are established as Europe's most important awards for science and engineering undergraduates

– see <http://www.setawards.org/index/europe>

Rian had travelled home from Boston, USA, to compete in the Finals.

Rian hails from Raleigh, Macroom, Co. Cork. This is not the first international achievement for the Edman family. Rian's father Lars founded, owns and runs the internationally renowned Toy Soldier Factory in the beautiful West Cork Village of Cill na Martra – see <http://www.princeaugust.ie/cork-visitor-centre-activities/>



**6 Stroke Engine Concept Design
by R. Edman 2011**

Engineers Ireland Excellence Awards 2011

ESB Award for Outstanding Contribution to Engineering

presented to

CIT Senior Lecturer Sean F. O'Leary



CIT Senior Lecturer Sean F. O'Leary and Mary O'Leary with the ESB Award for Outstanding Contribution to Engineering at the Engineers Ireland Excellence Awards in the Four Seasons Hotel Dublin on November 4th 2011.



Pic:Maxwells

The national award was presented to Senior Lecturer Sean F. O'Leary based on his contribution over many years to the promotion and achievement of excellence in the engineering profession both in Ireland and on the international stage.

Over the past two years alone, students tutored and mentored by Sean have won a glittering array of international and national awards including the Babcock Award for Best European Mechanical Engineering Student, the European Laureate of Innovation "Innovact" Award, The Vicom and Corin International Medical Engineering Awards, The Engineers Ireland Innovative Student of the Year Award, The Oscar Wilde and William Butler Yeats Gold Medals, Undergraduate Awards of Ireland and Northern Ireland and The MEETA Asset Managers National Student Award.

The CIT Innovative Product Development Laboratories major submission "Engineering an Innovation Eco-System", authored by Senior Lecturer Sean F. O'Leary, was also declared the Inaugural Winner of the Best in Class Engineering Education 2011 Award at the Engineers Ireland Excellence Awards.

*Siemens Engineers Ireland - Innovative Student of the Year 2011
First Place National Award
MEETA - Asset Managers Association - Student Award 2011
First Place National Award*



Winners: Daniel Allen, Patrick Byrnes, Richard Childs Mechanical Engineering CIT



“Automation of Prosthetic Shoulder Stem Blasting Process”

Abbott Ireland Interns of the Year 2011

John Caplice – CIT Mechanical Engineering

Marlene Clarke – CIT Chemical Engineering



Pictured Left to Right :

Ms Elaine Fennessy, Talent Acquisition Specialist, Abbott Ireland

Minister Sean Sherlock TD, Minister for Research & Innovation

Ms. Marlene Clarke CIT, Abbott Intern of the Year 2011

Mr. John Caplice CIT, Abbott Intern of the Year 2011

Dr. Barry O'Connor, Registrar and Vice President for Academic Affairs, CIT

Minister of State at the Department of Education and Skills, Sean Sherlock T.D., presented the inaugural Abbott Ireland Intern Bursary Award to two students from Cork Institute of Technology.

John Caplice from Mallow, and Marlene Clarke from Rylane, were chosen from a group of 30 students from third level institutions across Ireland who had undertaken internships with Abbott Ireland and were presented with a €1,000 bursary each. Patrice Bohan, Senior Talent Acquisition Manager, Abbott Ireland said that John and Marlene had been selected for the inaugural bursary for "Exceeding the expectations of their respective roles, and making a strong contribution to Abbott."

John, who is studying mechanical engineering in CIT, spent six months working with Abbott Ireland's vascular facility in Clonmel while Marlene, who is studying chemical engineering spent six months in Abbott Ireland's pharmaceutical facility in Sligo.



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

*Engineers Ireland National Award
Chartered Engineer of the Year 2011
First Female Winner of
Chartered Engineer of the Year Accolade*



Louise Connolly, ESBI, CIT Mechanical Engineering



Graduating from CIT with an honours degree in Mechanical Engineering in 2004, Louise joined ESB International. She is currently a consultant engineer in ESBI Engineering's power plant department and works on Irish and international power plant and gas pipeline projects.

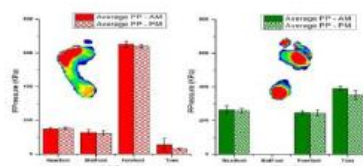
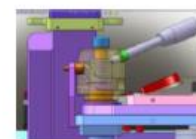
Westminster London 2011

CIT Students Mark Quigley, Padraig Herbert and Gavin O'Sullivan achieve Second Place Overall and Top Undergraduate Awards at the 23rd Annual International Medical Engineering Project Competition - 23 February 2011 Westminster London



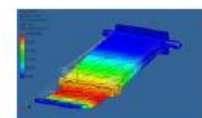
Following short-listing from a large international entry and an exhaustive process of submission investigation, CIT Students Mark Quigley, Padraig Herbert and Gavin O'Sullivan undertook prototype presentation, demonstration and exhibition before a distinguished adjudication panel of internationally renowned Medical Engineering Industrialists and Professors at the 2011 International Medical Engineering Finals and Extravaganza in Westminster, London.

*Corin Group Prize for Best Healthcare Technology Project
Joint Second Place Overall and First Placed Undergraduate Student
Mark Quigley - Cork Institute of Technology
" Contact Lens Manufacturing Process Optimisation " - Bausch and Lomb*



*JRI Prize for Best Medical Engineering Exhibited and Presented Project Joint Second Place Overall and First Placed Undergraduate Student
Padraig Herbert - Cork Institute of Technology
" Dorsiflexion Assistance and Stability Control of the Talocrural Joint in a Subject with Post Polio Syndrome "*

*JRI Prize for Best Medical Engineering Exhibited and Presented Project
Finalist Award - Gavin O'Sullivan - Cork Institute of Technology
" Design and Development of a User Friendly, Integrated, Ergonomic Wheelchair "*



2011 Undergraduate Awards of Ireland and Northern Ireland

presented by President Mary McAleese on Oct 28 in Dublin Castle

Oscar Wilde Gold Medal Winner

<http://www.undergraduateawards.com/>



*Rian Edman - Oscar Wilde Gold Medal Winner 2011
Engineering and Mechanical Sciences pictured with
Mr. Barry Leach, Chairman of the Distinguished
Adjudication Panel, UAINI*



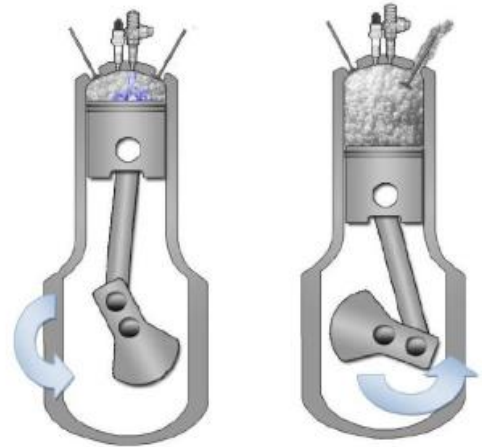
Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

2011 Undergraduate Awards of Ireland and Northern Ireland Engineering and Mechanical Sciences Oscar Wilde Gold Medal

<http://www.undergraduateawards.com/>

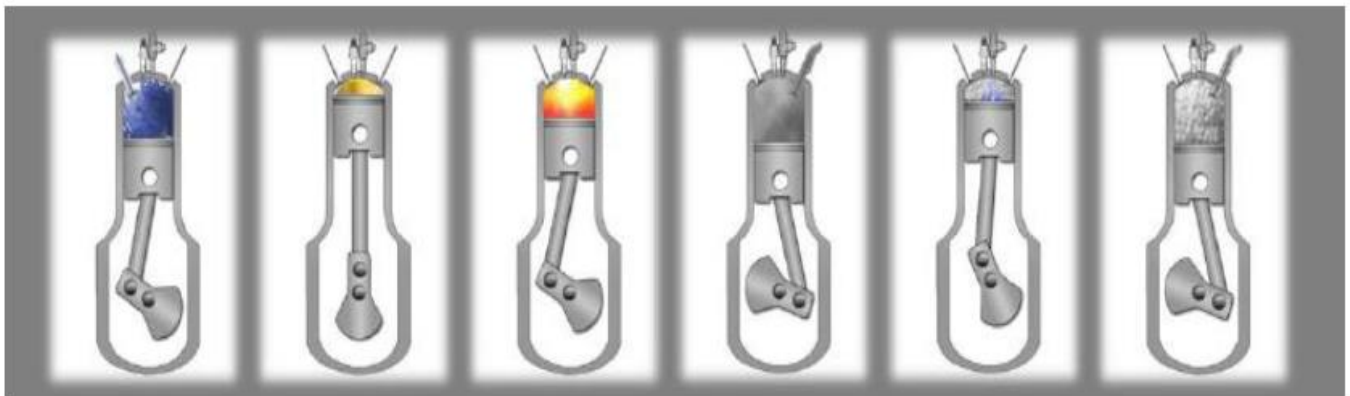


Thermodynamic Analysis, Testing and Evaluation of a Concept 6 Stroke Engine



Concept Design Drawing by R. Edman 2011

*Rian Edman, Final Year Mechanical Engineering
Self Conceived Student Capstone Project*



6 Stroke Engine Concept Design by R. Edman 2011

Cork County and City Enterprise Boards CIT Prize for Most Technically Innovative Product 2011



€2,000 First Place Award 2011



**Winner: Eamon Hayes of Safety First™
Final Year Mechanical Engineering
Cork Institute of Technology**

Wire Rope Safety Barrier



Upon impact, WRSBs deflect more than other barrier types, resulting in relatively less vehicle damage and occupant injury.



WRSBs are more forgiving to vehicle occupants when performing their function of containing and redirecting vehicles, which have left the roadway.

The Human Cheese-Cutters

The Future installation of such barriers is under review in a number of European countries - including Britain, Austria, Norway and the Netherlands - on safety grounds.

However, the National Roads Authority (NRA) is currently installing the wire rope barriers on all major roads where the central median is 15 metres or less.

Existing wire rope barriers in Britain are to be removed when in need of replacement

In Norway, the Ministry of Transport announced a prohibition on further use of wire rope barriers until the safety concerns have been addressed

In Europe, Australia and the United States, concern about wire ropes is mounting - particularly from motorcyclists.

Engineers Ireland Excellence Awards

“Best in Class” Engineering Education

Inaugural National Award 2011



Engineers Ireland “Best in Class” Engineering Education Award Winners 2011

*Engineering an Innovation Eco-System IPD Laboratories Development Team of Cork Institute of Technology
Michael Walsh, Daithi Fallon, Matt Cotterell, Sean F. O’Leary, Chris Gibbons, Michael J. O’Mahony* Pic: Maxwells

The CIT Innovative Product Development Laboratories major submission

“Engineering an Innovation Eco-System”, authored by Senior Lecturer Sean F. O’Leary, was declared the Winner of the “ Best in Class ” Engineering Education 2011 Award at the Engineers Ireland Excellence Awards



Presented to Matt Cotterell

*Head of School of Mechanical and Process Engineering
Four Season Hotel Dublin - November 2011* Pic: Maxwells

The development and delivery of ground-breaking Innovative and New Product Development Multi-Disciplinary Engineering / Business Laboratories modules and projects at Cork Institute of Technology has dovetailed with the implementation of major initiatives including CIT innovation start-up company internships, CIT innovation week and student prizes for innovation, CIT engineering and innovation exhibition (180 stands in 2011) to engineer a college-wide student innovation eco-system. Apart from the critically important benefit of the inculcation and enablement of an innovation / entrepreneurial spirit and ethos amongst the student body, the implementation of the new Innovative Development Laboratories has also led to an unprecedented flowering of Irish student international / national achievement.

"Best in Class" Engineering Education Inaugural National Award Engineering an Innovation Eco-System at Cork Institute of Technology



SafetyPot Child Proof Cook Friendly Secure Saucepan Lid Development Team
Daniel Collins, David Irwin, Maria O Shea, Olivia Tobin, Damien O Hea and Paul O Sullivan

Child Proof Cook Friendly Secure Saucepan Lid Development

What the problem is? The importance

How It Works

Competitive Advantage

Strategic Partners



SOSair Emergency Breathing Aid Development Multi-Discipline Start-Up Innovation Team
Robin Holbein, Jamie Hodnett, Isabel Rossiter, Brendan Weathers and Eugene Byrne

Emergency Underwater Breathing Device

How It works

Intellectual Property

Testing

Market Potential

Competition

Competitive Advantage

Strategic Partners

Online Presence



FlowStopper Water Leak Detection and Cut-Off Multi-Discipline Start-Up Innovation Team
Ciaran Connolly, David Lewis, Cillian Crowley, Tracey Murphy, Jason McCarthy, Maurice O'Brien

The Need for FlowStopper

The Big Freeze 2010

Overall Function

FlowStopper Solid Model Design

Manufactured and Commissioned Proof of Concept Prototype

Schematic Tree of FlowStopper Software Development

FlowStopper Monitoring and Control Programme Output

Route To Market

Product Markets

	Year 1	Year 2
Projected Market	711,000	1,008,000
Target Market	14,620 (2%)	30,240 (3%)
Selling Price	€170	€170
Revenue	€2,485,400	€5,160,800

Requirements & Funding



PING Automated Glass Polishing Machine Multi-Discipline Start-Up Innovation Team
Jonathan Miller, Denise Keogh, John Caplice, Sean Garvey, Maria Cronin, Timothy Lane, Erik Broderick

Automated Glass Polishing Machine

Origin of Idea

Need of Product

Intellectual Property

Prototype Development

Prototype

Competition

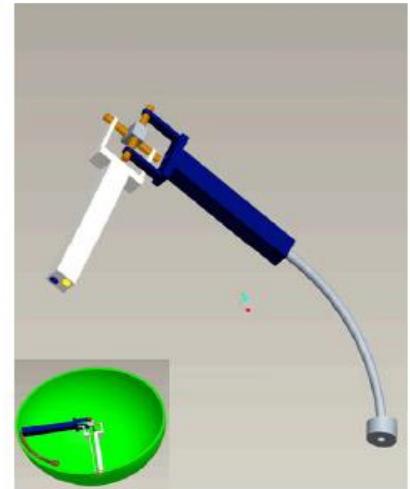
Product Production Cost

Requirements & Funding

2010 Awards



European Laureate of Innovation 2010 Ms. Xiao Fang Zhang



Med-Ware™ 2010

*Medical Infusion System Air Bubble Extractor Design and Development
by Ms. Xiao Fang Zhang, Final Year Mechanical Engineering Degree,
Cork Institute of Technology in conjunction with Cork University Hospital*

*Three Innovact Student Laureates 2010 Announced in Reims
Finals of the European Student Innovation Awards - Innovact 2010 March 3rd Reims*



From a large Europe-wide entry and 28 short-listed European finalists, the three European Innovation Student Laureates 2010 are:

*Cecille Schomollgruber - Stereolabs - France
Eric Hogner - Windflip - Norway
Xiao Fang Zhang - Med-Ware™ - Ireland*

A delighted Ms. Xiao Fang Zhang of Med-Ware™ of Cork Institute of Technology has been interviewed by French Television.

The Med-Ware™ team comprises: Ms. Xiao Fang Zhang, Bachelor of Engineering in Mechanical Engineering and Mr. Peter Sullivan, Ms. Michelle Bouse, Ms. Carmel Linehan, Bachelor of Business Studies in Information Systems.

Inventor and Designer, Ms. Xiao Fang Zhang drew her project inspiration from both Chinese and Irish sources, quoting dual inspiration from Mr. Ger Flynn, Chief Biomedical Engineer, Health Service Executive Southern Region, Cork University Hospital, her Lecturer, and Mr. Gou Yu Zhang, Veterinary Surgeon, Liao Ning Province, China, her Dad.



2010 European Hopes for Innovation Innovact – L'ORS – L'Etudiant

Medical Infusion System Air Bubble Extractor Med-Ware™

Cork
University
Hospital

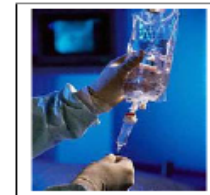
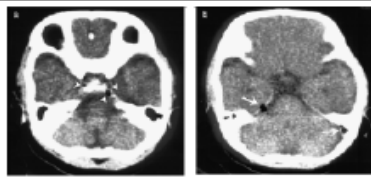
The European Hopefuls for Innovation - 8th Edition Innovact 2010
Medical Infusion System Air Bubble Extractor
Med-Ware™



Xiao Fang Zhang, Peter Sullivan, Michelle Bouse, Carmel Linehan

Intravenous infusion is the most common access method in both hospital and paramedic services of administering nutrition and medication. Air introduced to an infusion drip line constitutes a critical hazard of the intravenous infusion process. Air access frequently occurs when the infusion tubing becomes entangled while a patient is getting out of bed, causing coma, paralysis or death depending upon its size, duration and location.

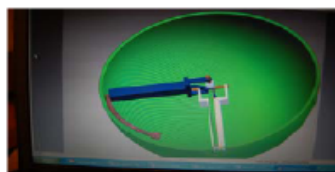
Intravenous infusion induced air bubbles in the carotid arteries and venous sinuses of an 11 weeks old infant



Preventative measures, devised by both hospitals and medical device manufacturers, comprise complicated "air-in-line" detector and bubble removal processes. The current standard procedures are manual and time consuming, requiring the physical exclusion of the air and the monitoring of the infusion process.

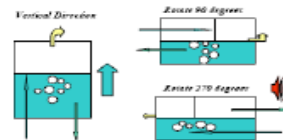
The project aim is thus to remove all air bubbles passing through an infusion drip line system before the bubbles reach the blood stream and without stopping the infusion process. The Inventor and Designer, Ms. Xiao Fang Zhang, hails from Liao Ning Province, China and drew her project inspiration from both Chinese and Irish sources, quoting dual inspiration from Mr. Ger Flynn, Chief Biomedical Engineer, Health Service Executive Southern Region, Cork University Hospital, her Lecturer, and Mr. Gou Yu Zhang, Veterinary Surgeon, Liao Ning Province, China, her Dad.

Analysis of the physical source of the air bubbles and the effect on patient health is undertaken. Performance and design criteria for air removal are determined and implemented. Filter, ultrasonic vibration and diverse gravity application methodologies are conceived and investigated. Vertical axis air elimination testing is undertaken and validated. Double ball and storage chamber, sink and floating ball, modified universal joint concepts are investigated and comparatively assessed. A comprehensive 360 degree orientation air bubble removal system solution, incorporating novel application of airplane fuel tank technologies, is achieved and validated. Optimised prototype production and proof of concept testing are undertaken.

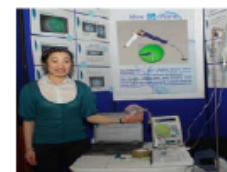


Concept Design/ Solid Model by X. F. Zhang

Limitation of Gravity Force



360 Degree Orientation Air Bubble Removal System Prototype Testing by X. F. Zhang



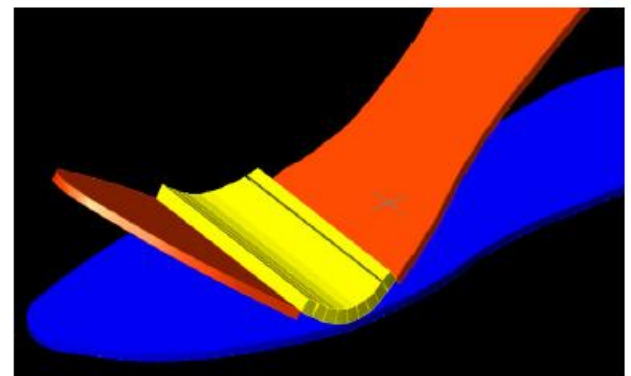
Prototype miniaturisation and further medical validation is researched and planned. Commercialisation of the developing solution is investigated. A patent is filed on the developing technology. Market potential is assessed. Competitive analysis is undertaken. The brand Med-Ware™ is established.

Presided over by Philippe VANRIE, CEO - European Business Network

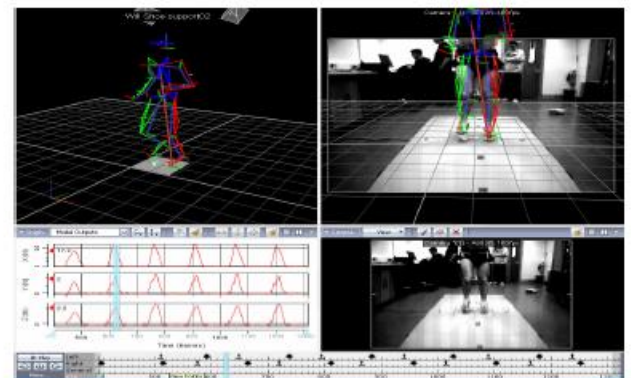
2010 Undergraduate Awards of Ireland and Northern Ireland Engineering and Mechanical Sciences Gold Medal

Winner:

***William Holland**
Mechanical Engineering
Cork Institute of Technology*



*Design, Modelling, Prototype Production and Testing
of Innovative Sports Footwear Outsole*

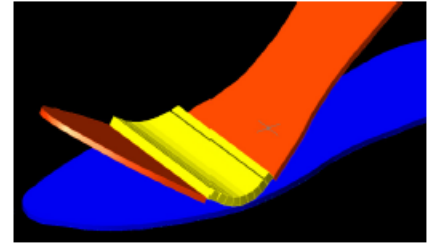
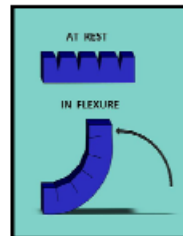
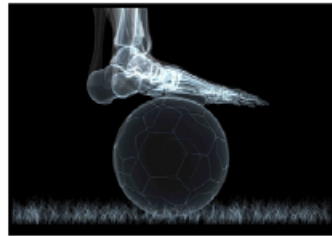


***Outsole Design for the Enhancement of Support and
Performance in Sports Footwear***

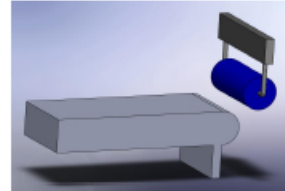
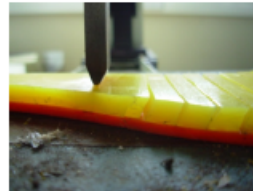
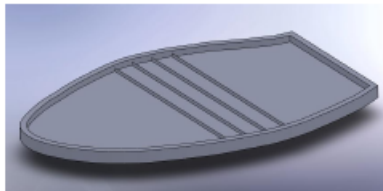
OUTSOLE DESIGN FOR THE ENHANCEMENT OF SUPPORT AND PERFORMANCE IN SPORTS FOOTWEAR

William Holland - Mechanical Engineering - Cork Institute of Technology

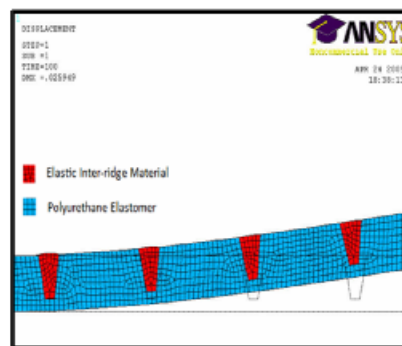
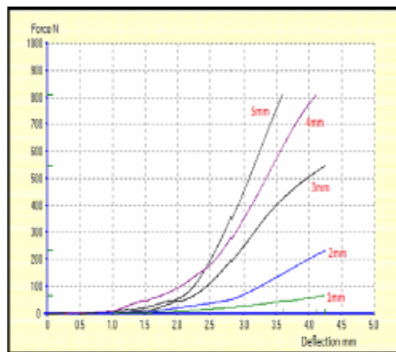
Inspired by a sports injury suffered by a housemate and a personal interest in football, this student conceived project is concerned with the enhancement of support and performance in the outsole of football boots and other certain types of sports footwear. The innovative device is designed to increase acceleration and reduce metatarsal fracture caused by excessive foot flexure. Metatarsal fracture is an injury which has, in recent years, affected many high profile footballers, including five members of the current English international football team.



A concept design for an innovative castellated outsole has been developed to provide support to the metatarsals at the critical point of excessive flexure. When the ridges meet, the stiffness of the outsole increases rapidly, thus providing support to the metatarsal bones. Installation of a highly elastic material between the ridges provides an energy return and highly beneficial enhanced acceleration from the outsole to the foot during the toe-off phase of the gait cycle of the footballer or athlete.



A prototype has been manufactured using a castable polyurethane elastomer. Mechanical experimentation, fatigue testing, gait analysis and computer aided design finite element analysis are investigated and undertaken to validate, progress and optimise the innovative design.



The design and testing of the Meta-Sol™ innovative sports footwear outsole has proven to be very promising and warrants further major development to fully exploit its significant potential. Specialist consultation, including international sportswear designers / athletes / footballers and the Medical Engineering Design and Innovation Centre (MEDIC), is of critical importance to the project and innovative product advancement.

Financial and promotional expertise is harnessed through establishment of links with business students to formulate the “Meta-Sol™” business plan and brand. A patent is filed on the developing technology.

Reduction in metatarsal injuries and legitimate enhanced athletic performance are determined as realistic and achievable goals for the developing Meta-Sol™ innovative product.

Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year Competition 2010
National Enterprise Award €6,500

Mobilis™

The Portable Intravenous Infusion Solution



Winner: Mobilis™ of Cork Institute of Technology

Mark Keane, Myles Murray, Gavin O'Sullivan - Mechanical Engineering



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

Westminster London Thursday 24th June 2010
CIT Undergraduate Students David Kelleher and Ciara McKenna
Win Overall First and
Three of Top Four Awards at the
22nd Annual International Medical Competition



Ms. Ciara McKenna, Senior Lecturer Sean F. O'Leary, Mr. David Kelleher at London Finals

Following short-listing from a large international entry and an exhaustive process of submission investigation, prototype presentation demonstration and exhibition before a distinguished adjudication panel of internationally renowned Medical Engineering Industrialists and Professors, the 2010 International Medical Engineering Student Award Winners were announced on Thursday 24th June in Westminster, London:

International Medical Engineering Competition Overall Prize for Best Published and Presented Paper
Open to all Undergraduate and Postgraduate (Masters and PhD) Entries

First Place - David Kelleher, Cork Institute of Technology
Development of Bovine Teat 3D Sensing System for Disinfection Purposes

International Medical Engineering Competition Best Project involving the Design or Development of a Medical Device

Open to recent graduates (2009), third/fourth year undergraduates and taught Masters degree students, who have completed or are working on a project involving the design or development of a medical device

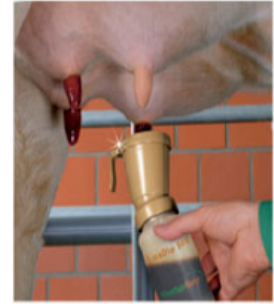
First Place - David Kelleher, Cork Institute of Technology
Development of Bovine Teat 3D Sensing System for Disinfection Purposes

Second Place - Ciara McKenna, Cork Institute of Technology
Evaluation of the Pullout Strength of Orthopaedic Screws in a Developing Novel Bone Cement

Development of Bovine Teat 3D Sensing System for Disinfection Purposes

David Kelleher - Final Year Mechanical Engineering Undergraduate Degree Project

Recent research (1) indicates that the occurrence of bovine mastitis on dairy farms is increasing, thereby giving rise to major economic and animal welfare concerns. The balanced application of teat disinfectant is the most effective method of preventing mastitis infection. Over-application has adverse implications for natural immunity against the disease. Under-application undermines the efficacy of prevention (2). Current manual methods are both labour intensive and unreliable. Current automated disinfection systems are either unsuitable for grazing based dairy systems or apply excessive solution to the udder region as these systems do not accurately locate and measure the teat parameters.



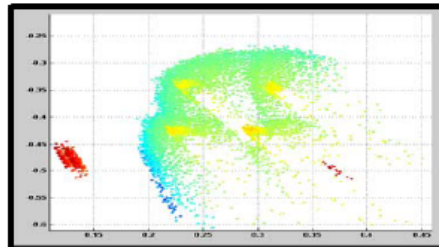
A case study of a high production Irish dairy farm by the author indicates significant economic and animal husbandry benefits to effective and appropriate disinfection application.

The development of a vision-based sensing system to comprehensively locate and describe the teats for disinfection purposes is undertaken. Suitable sensor technologies are investigated and assessed. A comprehensive sensor selection process is undertaken. Experimental time of flight camera technology is selected and employed. In-situ milking parlour experimentation is undertaken including the establishment and optimisation of 3D depth map camera settings and positioning. Field of view image filtration, segmentation and identification methodologies are investigated, assessed and employed. A robust teat identification methodology, based on bovine teat statistical data, is devised, applied and tested.

The development of and implementation of an image processing algorithm, incorporating neighbourhood assessment and region growth capabilities, is undertaken. The developed algorithm enables the accurate and precise identification and measurement of the bovine teat surface parameters and characteristics with a view to optimal disinfection application. Experimental methodologies to test the effectiveness of the system are developed and validated.



Study of Optimal Camera Position



Normalisation of Udder Data



Identified Teat

A 3D vision system laboratory based test rig and methodology is designed, manufactured and commissioned. The developed test rig allows the system to be tested on a wide variety of teat and udder arrangements. Initial tests are highly promising with successful identification for a diverse range of commonly occurring bovine teat / udder configurations. Commercialisation of the developed solution is investigated. Market potential is assessed and competitive analysis is undertaken.

Future work includes more extensive testing and optimisation of the 3D teat sensing system and the parallel development of compatible robotic disinfectant applicator technology.

- (1) Kelly, P. T. (2009). *Farm management factors associated with bulk tank somatic cell count in Irish dairy herds*. Irish Veterinary Journal Volume 62.
- (2) *Use post-milking teat disinfection- spray or dip at every milking*. Countdown:
<http://www.countdown.org.au/pdf/technotes/TN%2007%20-%20disinfect%20-%202003%20Feb.pdf>

Evaluation of the Pullout Strength of Orthopaedic Screws in a Developing Novel Bone Cement

Introduction

Conventional polymethylmethacrylate (PMMA) cements, Calcium Phosphate cements (CPC) and more recently Bisphenol-a-glycidyl dimethacrylate (BIS-GMA) composite cements are employed in applications in dentistry, vertebral augmentation, stabilization of prosthetics and as anchors for various screw and plate constructs in osteoporotic bone. Unfortunately disadvantages associated with these materials have emerged including, a high curing exotherm, the incorporation of toxic components in their formulations, and critically, exhibition of a modulus of mismatch between cement and bone. Glass polyalkenoate cements (GPCs) have been considered as an alternative material. GPCs are bioactive with mechanical properties similar to bone. GPCs adhere to both surgical metals and the mineral phase of the bone and set without shrinkage or significant heat evolution. GPCs have had major success in dental applications. However the suitability of GPCs for skeletal applications is limited by the presence of the aluminium ion (Al^{3+}), a neurotoxin, which causes defective bone mineralisation and aluminium-induced encephalopathy. Fortunately, Zn^{2+} can act in a similar fashion to Al^{3+} thereby giving rise to the development of GPCs based on calcium-zinc silicate glasses. Zn-based GPCs (Zn-GPCs) have potential for orthopaedic applications. These cements have relatively good strengths, but have not yet been evaluated.

Objectives

The objective of this research is to evaluate the pullout strength of orthopaedic screws in a Zn-based GPC in accordance with the standard that governs the uniaxial pullout testing of orthopaedic screws – ASTM F543-07. One formulation of a Zn-GPC is evaluated as a function of time from one to 21 days and as a function of different pH levels, 3 and 7.4. The Zn-based GPC formulation evaluated in this project is found to have a very short working time and setting time, making it a relatively difficult material with which to work. Previous research has shown that the addition of an organic additive TSC (Trisodium citrate) to this cement formulation has improved the working time and setting time without adversely affecting the compressive and biaxial flexural strengths. This project also determine what affect the addition of TSC has on the pullout strength of orthopaedic screws in this novel bone cement. The evaluated Zn-GPC formulation comprises of a glass component, termed BT101; a bioactive glass comprising of zinc, silicon, calcium, and strontium, an acid component, Polyacrylic Acid (PAA), and distilled water.



Fig. 1: Test setup

Methodology

- Glass Synthesis
- Physiological solution preparation (ISO 10993-14)
- Cement Synthesis
- Specimen preparation
- Incubation
- Testing

Results

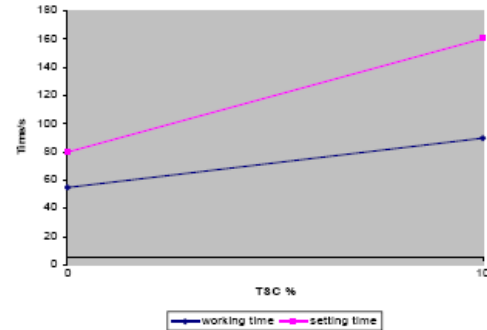


Fig. 1: Effect of TSC on working and setting times
The addition of TSC was found to increase the working time and setting time of the experimental bone cement improving the workability and handling of the cement.

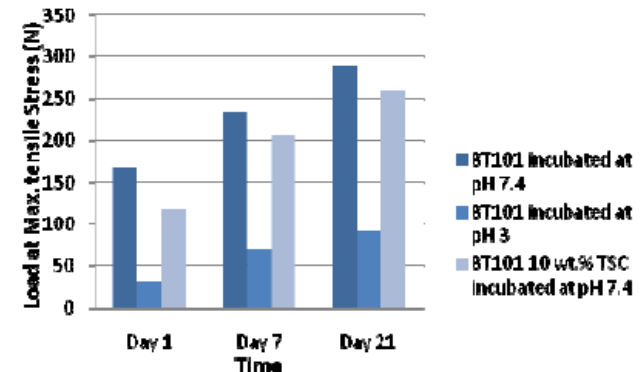


Fig. 2: Pullout Loads at max. Tensile stress (N)
The specimens containing 0% TSC that were incubated in the pH 7 solution exhibited the highest pullout strengths over the specified time frame. The incorporation of TSC was found to have an adverse effect on the pullout strength. The strengths of the specimens immersed in the pH 3 (acidic) solution were found to be poor in comparison.

Conclusion

All results show an increase in pullout strength with time. This increasing strength is associated with a gradual increase in the density of ionic cross-links forming within the matrix. PMMA cements inhibit pullout strengths in the range of 2000N while CPCs have been found to have considerably lower strengths in the region of 300N. As the experimental bone cement exhibits strengths near to those of CPCs it indicates that this bone cement may have potential as a candidate for orthopaedic applications. The pullout strengths may be suitable for the initial fixation of screws and prostheses, and promote long term biological fixation. However, further improvements are required for increasing mechanical strength. Several factors can affect the mechanical properties. Such factors include; the concentration and molecular weight of the PAA, the powder to liquid ratio in the cement composition and the overall composition of the cement.

*Cork County and City Enterprise Boards
CIT Prize for Innovation 2010
Entrepreneur of the Year 2010
First Place €4,000 Award*



*Winner: Laurence Barry of Hydrostack™
Final Year Mechanical Engineering
Cork Institute of Technology*

*“ Design and Development of an
Innovative Heat Exchanger for a Chimney Flue ”*



MECHANICAL ENGINEERING DEGREE - CA0 Code CR108

*Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year Competition 2010
National Enterprise Award €4,000*



Winner: Tip Top Cue Tips™

*Jonathan Howley, Aidan Vaughan, Daniel Henderson, Ronan O'Donoghue
Third Year Mechanical Engineering
Cork Institute of Technology*

*“ Design, Development and Testing of an
Innovative Chalk Free Cue Tip ”*

*Pictured with
Minister Billy Kelleher,
Minister for Trade and Commerce*

*Cork County and City Enterprise Boards
CIT Prize for Innovation 2010
Most Technologically Innovative Project 2010
First Place €2,000 Award*



Winner: Tip Top Cue Tips™

*Jonathan Howley, Aidan Vaughan, Daniel Henderson, Ronan O'Donoghue
Third Year Mechanical Engineering
Cork Institute of Technology*

*“Design, Development and Testing of an
Innovative Chalk Free Cue Tip”*



MECHANICAL ENGINEERING DEGREE - CA0 Code CR108

2009 Awards



*Kansas City
Missouri, USA*



*Global Student Entrepreneur 2009
Award for
CIT's Kieran O'Callaghan*



*Global Student Entrepreneur Finalist 2009 Award
sponsored by the Entrepreneurs' Organisation in conjunction with
Mercedes-Benz Financial*



Vision Research Enterprises - Vision RE™ - is a machine vision research, development and consultancy student company - the company name (phonetically Visionary) reflecting the main technology development / research interests, commercial applications and entrepreneurial ethos of the core organisation.

The Vision RE™ Company was formed after the exceptional success of Kieran's first entry level product AquaEye™. Vision RE™ are currently designing and developing two major hallmark innovative products for Heavy Goods Vehicles (HGV's) - Drive Safe™ and the Visual Impaired Community - VisionRE SE™.

<http://visionre.cit.ie>

*Enterprise Ireland / Invest Northern Ireland / Cruickshank
Student Enterprise Awards
Academic Innovation Award 2009
Cork Institute of Technology*



Island-wide Innovation Award Winning CIT Student Teams



*Senior Lecturer Sean F. O'Leary
of Cork Institute of Technology
pictured with
Mr. Donal O'Connor,
Cruickshank Intellectual Property Attorneys
and
Mr. Richard Murphy, Enterprise Ireland*

*Siemens Engineers Ireland
Innovative Student Engineer of the Year 2009
National Competition
First Place
€2,000 Award*



*Winner: Artificer Colm O'Brien
of Cork Institute of Technology
and the Naval Service*

*“ Design and Development of an Automated Home/Office Environment
through Intelligent Tags ”*



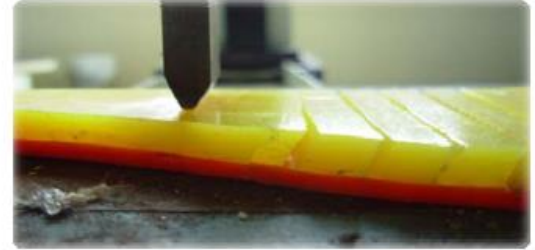
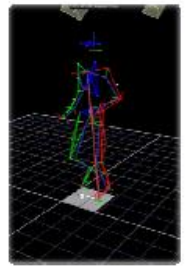
Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology



SOFE Paris 2009

Award for

Ireland's William Holland



Great news from Hotel Mercure at the base of the Eiffel Tower, Paris, where the results of the Paris 2009 Speak Out for Engineering Awards have just been announced:

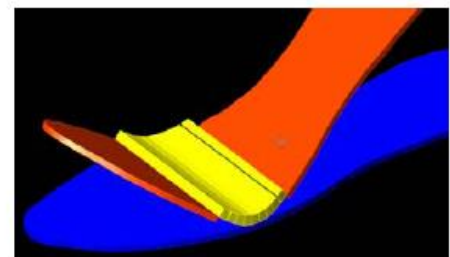
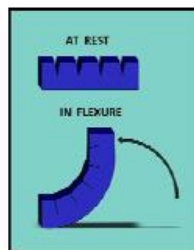
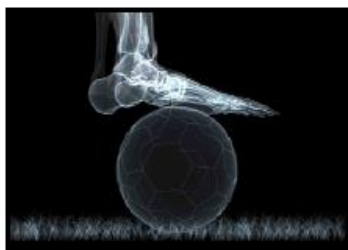
First Place Overall and Outright Winner:

Ms. Catherine Marshall, EOLE Renewable Energy Systems - Mediterranee, Avignon, France - "Wind Energy in France"

Second Place Overall and First Undergraduate Student Project:

*Mr. William Holland, Cork Institute of Technology, Cork, Ireland
"Design and Development of an Innovative Sports Footwear Outsole"*

Inspired by a sports injury suffered by a housemate and a personal interest in football, this student conceived project is concerned with the enhancement of support and performance in the outsole of football boots and other certain types of sports footwear. The innovative device is designed to increase acceleration and reduce metatarsal fracture caused by excessive foot flexure. Metatarsal fracture is an injury which has, in recent years, affected many high profile footballers, including five members of the current English international football team.



META-SOL™

*Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year Competition 2009
Solving Problems for Industry
€7,500 First Place Award*



Winner: Nebulaer™ of Cork Institute of Technology

*Ciara McKenna – Biomedical Engineering
Kevin Gilmartin – Mechanical Engineering*

*Luke Crowley – Mechanical Engineering
William Murray – Mechanical Engineering*

“Nebuliser Noise Attenuation System Development”

Many nebuliser users and fellow patients / families complain of aural distress and increasing isolation during often prolonged periods of nebuliser treatment. The primary objective of NebulAer™ is to reduce the excessive, irritating and potentially damaging noise levels outputted by existing current nebulizer units.

The NebulAer™ system is designed and developed from student concept to working prototype for universal use with the wide range of commercially available nebulisers. The NebulAer™ universal solution system allows current nebulizer users (both hospital and home based) to employ their nebulisers as normal , critically without that annoying and isolating sound!

*Cork Institute of Technology Prize for Innovation
Entrepreneur of the Year First Place €5,000 Award
Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year Competition 2009
National Award of Commendation €2,500 Prize*



Winner: Rigi-JigTM of Cork Institute of Technology

*Fiona Hedderman – Mechanical Engineering
Dave Cronin – Biomedical Engineering*

*Damian Buttimer – Mechanical Engineering
William O’Shea – Mechanical Engineering*

Rigi-JigTM “Innovative Engine Tool Development”

With a growing auto service market and a declining new car market, innovation in car engine maintenance has assumed increased importance. Rigi-JigTM is a unique innovative engine tool designed and developed from student concept, which remarkably reduces work time for a particular engine operation from 6 hours to between 30 and 60 minutes. The product confers significant time saving and safety competitive advantage to utilizing garages, thereby driving potential sales.



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

**Enterprise Ireland / Invest Northern Ireland
 Young Entrepreneur of the Year Competition 2009
 Cruickshank Most Technologically Innovative Project
 €7,500 First Place Award
 €20,000 Intellectual Property/ Patent Consultancy Award**



VisionRE™ of Cork Institute of Technology

“ Terrain / Obstacle Detection System for the Visually Impaired ”

***Etaion Ni hAilpin – Business Administration
 Norma Downing – Business Administration
 Kieran O’Callaghan – Mechanical Engineering***

Supervisors: Lecturer Finbarr Sheehan, Dr. Michael J. O’Mahony, Lecturer Chris Gibbons, Senior Lecturer Sean F. O’Leary

Inaugural Abbott Ireland Intern Award and Bursary 2009

Paul Walsh

Final Year Mechanical Engineering Degree



Pictured Left to Right :

Dr. Michael J. O'Mahony, Course Coordinator, CIT, Dr. Barry O'Connor, Registrar, CIT, Mr. Paul Walsh, Final Year Mechanical Engineering Degree, CIT, Ms. Elaine Fennessy, Talent Acquisition Specialist, Human Resources, Abbott Ireland, Vascular Division, Dr. Brendan Murphy, President, CIT, Mr. Matt Cotterell, Head of School of Mechanical and Process Engineering, CIT

*The Inaugural €1,000 Abbott Ireland Award and Bursary
was based on Paul's excellent participation as a
CIT Work Placement Student in Abbott Ireland, Vascular Division,
Clonmel, Co. Tipperary during the academic year 2008/9.*



Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology

2008 Awards



*CIT Mechanical Engineers Kieran O'Callaghan and Xiao Fang Zhang
International and National Award Winners 2008*



*CIT Prize for Innovation Multi-Discipline Team 2008
Mechanical Engineering - Kieran O'Callaghan
Business Studies - Imelda Callanan, Aidan Sheehan and Stephen Hunt.*

***CIT Mechanical Engineer Kieran O'Callaghan
declared Outright Winner of***

- Siemens Engineers Ireland Innovative Engineer
National Award Dublin 2008***
- Design and Development of a Biomedical Device
International Award London 2007***

IRCSET PostGraduate Scholarship 2008 - €24,000 per annum



***Mr. Kieran O'Callaghan, Final Year Mechanical Engineering Degree Student
Cork Institute of Technology***

***Project Title: " Design and Development of a Swimming Aid for the Visually Impaired "
Industrial Partners: National Council for the Blind Ireland
The Irish Paralympics Swimming Team***



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108



Design and Development of Swimming Aid for the Visually Impaired



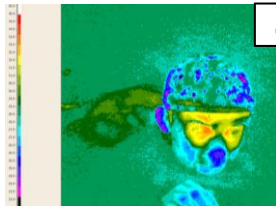
Student: Kieran O'Callaghan, Final Year Mechanical Engineering

People with visual impairment generally have lower levels of fitness than their sighted peers. Furthermore, activities of daily living of the visually impaired demand increased energy. Swimming is one of the best exercise activities as few obstacles are encountered.

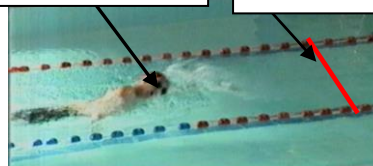


Currently, a visually impaired swimmer must depend on an assistant to warn him/her of the approaching pool wall by a single tap on the head/shoulder. The "Tapper" system has proved demeaning, inadequate and on occasion dangerous. "Our own top swimmer, Stephen Campbell, has had quite a few accidents. Last year he crashed into the wall at the pool while swimming and broke his nose"- Geraldine Conway, Manager, Irish Paralympics Swim Team.

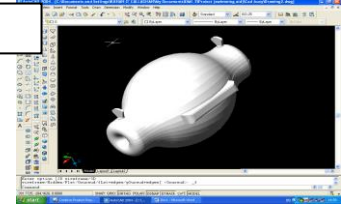
Based on a survey of Visually Impaired Swimmers, research, analysis, prototype design, development and testing of diverse technologies was undertaken. Bluetooth, Sonar, Passive Infra-Red, Photo-Electric Detection and Machine Vision Software systems are assessed as to suitability to meet requirements in relation to safety, reliability, portability, aesthetics and ease of use.



Swimmers Radio Headset



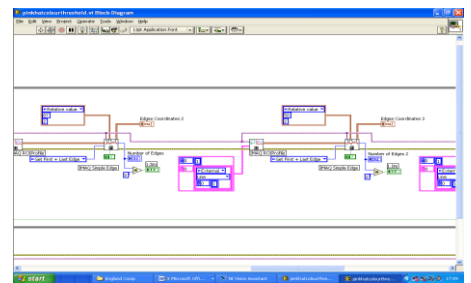
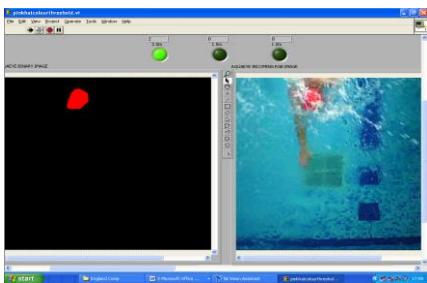
Detector Buoy



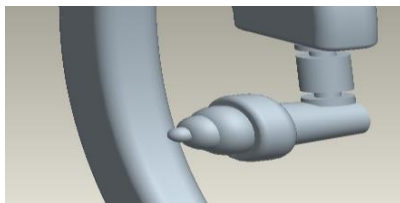
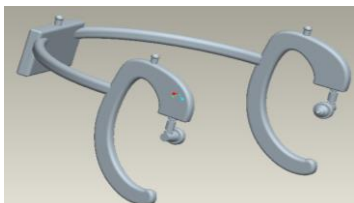
Experimental Assessment of PIR System - Thermal Camera

Aquaeye™ Developed Detector Buoy System

Dual complimentary systems (individual swimmer-centric and comprehensive pool-wide solutions) have been designed and developed to alert swimmers of pool wall approach. On swimmer detection, a warning signal is encoded and transmitted. The transmitted warning signal is decoded by a developed waterproof receiver. The swimmer is alerted via form fitting audio earpiece and tactile feedback. A working prototype has been developed and has been extensively tested for functionality and quality.



Aquaeye™ Developed Machine Vision and Data Acquisition System



Headphone Developed Solid Model - Aquaeye™ Designed and Developed Swimmers Radio Headset Developed Marketing Website

The developing product also shows significant further potential to facilitate in-pool training for sighted swimmers and as a real time coaching aid for competitive swimmers.

National Academy for the Integration of Research, Teaching and Learning (NAIRTL Ireland)

Inaugural Excellence in Teaching Award



presented to

CIT Senior Lecturer Sean F. O'Leary

CIT lecturer receives Excellence in Teaching award

by Áilín Quinlan

OVER the years his students have won a glittering array of international and domestic prizes — now it's teacher Seán O'Leary's turn to receive a prestigious award for his innovative work.

O'Leary, a senior lecturer at the Department of Mechanical Engineering at Cork Institute of Technology's School of Mechanical and Process Engineering, has just been selected for one of five inaugural Excellence in Teaching Awards.

The awards are being made by the National Academy for the Integration of Research & Teaching

& Learning (NAIRTL), an organisation set up by the third level sector to honour exemplary teachers who are also innovative researchers in higher education.

A second Excellence in Teaching award goes to a group of four staff at the UCC School of Nursing and Midwifery; Irene Hartigan, Angela Flynn, Siobhán Murphy and Nuala Walsh. Three others are to be presented to academics at Trinity College Dublin and NUI Galway.

"The award is a recognition not just of myself, but of the quality of teaching at CIT and of the quality of the graduates we produce," said Mr O'Leary, a father-of-four from

Ballinspittle, Co Cork.

In recent years O'Leary's students have swept the board at award ceremonies in Ireland and abroad.

In five out of the past six years, his students won the most prestigious engineering award in Ireland, the Siemens' Engineers Ireland Innovative Engineer of the Year Awards (2008, 2006, 2005, 2004 and 2003) along with an array of gold and silver medals at a number of prestigious international competitions.

"This award is also a recognition of the new teaching methods we have developed in the college, including the new innovative

product development modules, where students are given the opportunity to come up with ideas and products which they then design and develop to prototype stage."

Mr O'Leary is the founder and organiser of the college's hugely successful annual April exhibition of students' projects and prototypes, to a mixed audience of industrialists, academics, schools and student peers — which is the biggest academic engineering exhibition in the country.

Recent years saw displays of Ferrari and Jordan Formula One Racing Cars at the exhibition, as well as a display of the engineering inventions of Leonardo da Vinci.



Sean O'Leary: Recognition of quality of teaching staff.



*Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year Competition 2008
Cruickshank Most Technologically Innovative Project
€10,000 First Place Award
IRCSET Post-Graduate Scholarship 2008
€30,000 per annum*



*Innovative Product
Development Laboratories
Multi-Discipline Team
Med--Ware™*

Xiao Fang Zhang

*Bachelor of Engineering
in Mechanical Engineering*

Peter Sullivan Michelle Bouse Carmel Linehan

*Bachelor of Business Studies
in Information Systems*

*Medical Infusion System Air Bubble Extractor Design and Development
by Ms. Xiao Fang Zhang, Final Year Mechanical Engineering Degree
in conjunction with Cork University Hospital*



*Institiúid Teicneolaíochta Chorcaí
Cork Institute of Technology*

HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

2007 Awards



**Ulster Bank Enterprise Ireland / Invest Northern Ireland
Young Entrepreneur of the Year 2007**

€10,000 First Place Award

**Cruickshank Most Technologically Innovative Project 2007
€5,000 First Place Award**



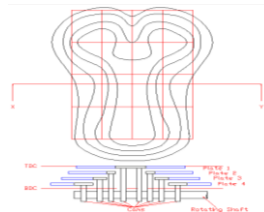
First Placed Innovation Team – ApriCot (Awards presented by Ruth Badger of TV's Apprentice Fame)

Mechanical Engineering Student - John J. Barry - Designer and Inventor

**Accounting and Information Systems Students - Niamh Brady, Orla Houlihan, Regina O'Donoghue
- Developers of Business Plan**

This is the first time in the 23 year history of this prestigious islandwide innovation competition – 132 entries in 2007 at PhD, Masters and Undergraduate Team levels – that the top two awards have been won by one project and team.

This product encapsulates the development, testing, analysis, and design of a sleeping aid to simulate womb conditions.



An integrated system to mimic the slow pulsation of a heart and the gentle motion of a person breathing is central to the operation of the developed human contact simulation product.



HONOURS LEVEL 8

MECHANICAL ENGINEERING DEGREE

Celebrating 25 Years of Success at the Enterprise Ireland / Invest Northern Ireland Student Awards

Cork Institute of Technology's ApriCot Centrepiece at Farmleigh House Launch



Donal O'Connor, Senior Partner, Cruickshank Intellectual Property Attorneys; John J. Barry - Designer and Inventor, ApriCot, CIT; Minister for Enterprise, Trade and Employment Micheál Martin T.D.; Niamh Brady - Developer of Business Plan, ApriCot, CIT; Jay Bourke, Enterprise Ireland Student Awards Ambassador; Regina O'Donoghue - Developer of Business Plan, ApriCot, CIT; and Frank Ryan, Chief Executive Officer, Enterprise Ireland.



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE -- CA0 Code CR108

CIT's ApriCot Centrepiece at Farmleigh House Launch

The launch of the 2008 Enterprise Ireland Student Enterprise Awards took place on Wednesday 21st November, in the august surroundings of Farmleigh House, Phoenix Park, Dublin.

The Cork Institute of Technology ApriCot Team - Project "Therapeutic Sleeping Aid for Infants" won the €10,000 First Place Award in the Ulster Bank Enterprise Ireland/Invest Northern Ireland Young Entrepreneur of the Year 2007 Competition and the €5,000 First Place Award in the Cruickshank Most Technologically Innovative Project 2007 Competition. This is the first time in the 25 year history of this prestigious islandwide innovation competition that the top two awards have been won by one project and team. There were 132 entries in 2007 at PhD, Masters and Undergraduate Team level.

Minister for Enterprise, Trade and Employment Mr. Micheál Martin T.D. announced details of the €65,000 prize fund and competition. The audience of journalists, entrepreneurs and academics were also addressed by Mr. Frank Ryan, Chief Executive Officer, Enterprise Ireland and Mr. Jay Bourke, Enterprise Ireland Innovation Ambassador.

The CIT ApriCot team, Outright Winners of the 2007 competition from hundreds of entries islandwide, were lauded at length by all speakers and took centre stage right throughout the proceedings. An extensive photo shoot, focussing on the ApriCot team, took place with the backdrop of the internal splendour, imposing façade and extensive grounds of the ancestral home of the Guinness family. A major campaign to promote the 2008 competition is to be undertaken by Enterprise Ireland over the coming months and the ApriCot team have pledged all possible support in this promotion of innovation and entrepreneurship.



*Apricot Demonstration by John J. Barry at
2007 Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition*

Design and Development of Human Contact Simulator

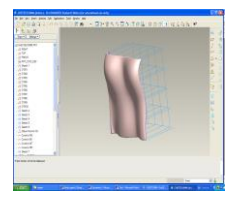
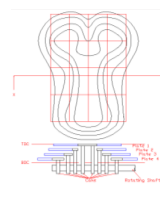
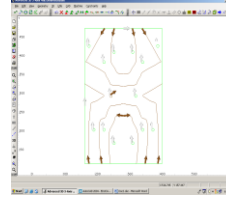
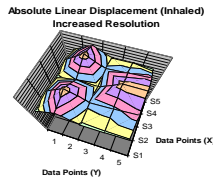


ApriCot™

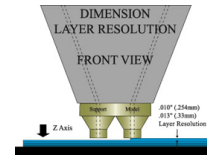
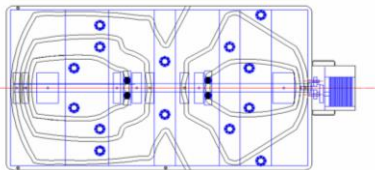
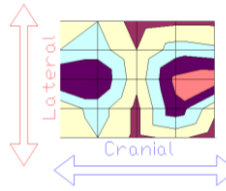
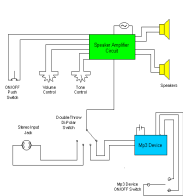
John J. Barry - Designer and Inventor

**Niamh Brady, Orla Houlihan, Regina O'Donoghue - Developers of Business Plan
Cork Institute of Technology**

ApriCot™ is an apparatus, which acts as a therapeutic and sleeping aid for infants, promoting healthy sleeping patterns in both baby and parent. An integrated system to mimic the slow pulsation of a heart and the gentle motion of a person breathing is central to the operation of the developed human contact simulation product. The developing device is also designed to address critical recommendations of the FSIDS to reduce Infant Sudden Death Syndrome.



Experimental Investigation of respiratory changes in the configuration of the chest wall in a female subject are undertaken. Self-generated anthropometric research, including numerous anthropometric experiments, are conducted. Data acquisition software is utilised to attain and analyse results. PeopleSize 2000 anthropometric largest civilian database software is employed to yield data on infant sizes. Human chest motion reproduction incorporates detailed design drawings generated for contour plates in the vertical direction. Design and analysis for manufacture of the device is undertaken. Numerous suitable materials are investigated. Calculation of critical design components are undertaken.



Heart and womb simulation critical design parameters employed include: Speaker system to output sound, high bass to output vibration, recordings of heart and womb, memory to store information, medical expert recommended motion/timer sensor system to trip device on/off and to aid Human Contact incorporated. Simulator for progressive weaning of Infant is developed and implemented. Application of Catalyst software to develop the physical ABS models. State of the art rapid prototyping technology is utilised to build the representative 3D models from bottom up. Complexity of the final design and data interpretations incorporated.



Current Human Contact Simulator Prototype Design Iteration

Modeling is undertaken of relative difference of fully inhaled and exhaled female representative chest and the formation of separate entities or islands at certain contour levels identified with medical research paper validation.

ApriCot™ meets the Health and Safety regulations / classification requirements of the M.D.D. as a Class 1 Medical Device.

Extensive medical validation has also been undertaken through consultation and demonstration of the developing product with internationally renowned medical professionals in the areas of neo-natal and paediatrics. Medical feedback has been very positive and further device enhancements identified. A four page article on the developing device has just been published in the Autumn 2007 issue of the "Spectrum" Biomedical and Clinical Engineering Magazine.



Developed Promotional Website

A comprehensive Business Plan, incorporating extensive Market Research, International and National Sales Forecasts, Competitor Evaluation, Financial Marketing Analysis, Profitability Analysis, Company Portfolio and Organisational Plan, has been developed in conjunction with Enterprise Ireland / Innovation Centre consultants. Specialist Patent Lawyers have also been consulted and a Patent on the developing technology filed with the Irish Patent Office. The ApriCot™ Brand has been established. A promotional Website, with Marketing, Ordering and Sales capabilities/potential, has been developed.

Following a highly competitive island-wide competition from hundreds of submitted entries, ApriCot™ has been adjudged the **Outright Winner of the €10,000 Ulster Bank Enterprise Ireland / Invest Northern Ireland Young Entrepreneur of the Year and the €5,000 Cruickshank Innovation 2007 Awards** – the first time in 25 years that the Enterprise Ireland top two entrepreneurship and technical innovation awards have gone to one product and team.

Gold Medal
International Medical Engineering Competition
Design and Development of a Biomedical Device
International Award London 2007 – First Place



AQUA EYE – Swimming Aid for the Visually Impaired

Mechanical Engineering Students

***Kieran O'Callaghan, Ciara Dwan, Ken Allen, Finbarr Brassil,
Paul O'Keeffe***

Designers and Inventors

Accounting and Information Systems Students

***Imelda Callanan, Norma Barry, Colin Aherne, Ciara Aherne,
David Barker***

Developers of Business Plan



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

Kenneth Bourke, Final Year Mechanical Engineering, CIT

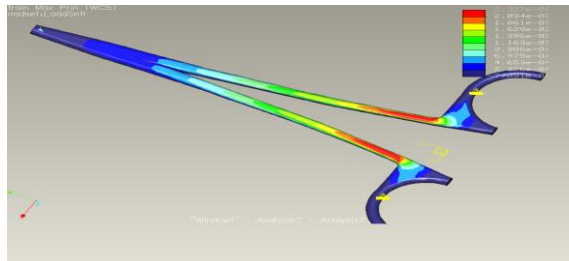
Sutures are used to close wounds in skin, internal organs, blood vessels and other tissues of the human body after they have been severed by surgery or trauma.

The goals of wound closure in the primary care setting are to stop bleeding, prevent infection, speed healing and preserve the function and appearance of the wounded area.

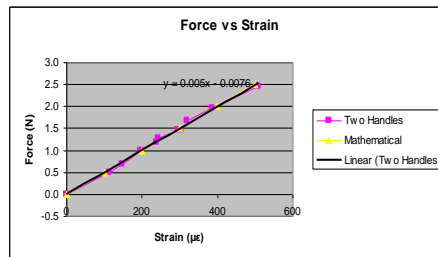
Surgeon experience over many years points to a relationship between suture tension and wound healing. This relationship has not been scientifically investigated to date as no method has been developed to measure the tension in a suture as a wound is closed.

The objective of this project is to therefore to research and design an experimental technique to allow the surgeon to accurately measure the tension required to close a wound.

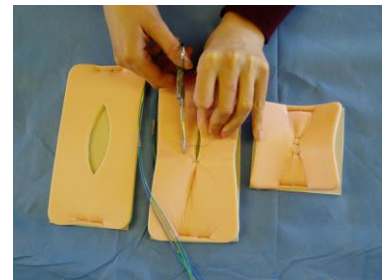
Initial research is undertaken into the suturing process and measurement technologies. Mathematical and Finite Element models of the suture and needle holder tensioning process are developed. A direct correlation between suture tension and needle holder strain is established. Optimum strain measurement location and orientation is determined. An initial single gauge prototype measurement device is developed and validation experimentation undertaken.



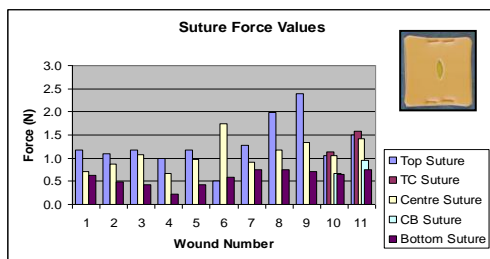
Finite Element Model by K.Bourke
 Prototype Testing by Surgeon



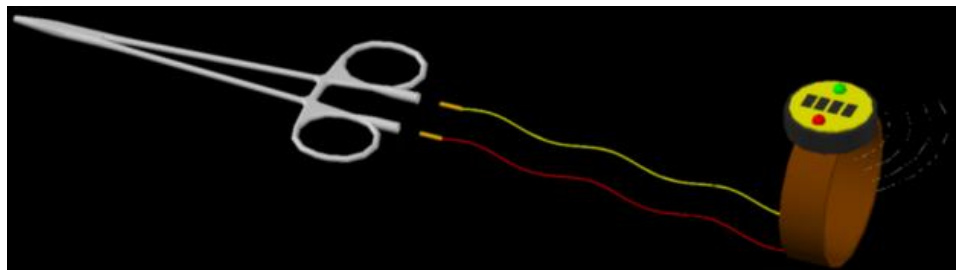
Accuracy of Developed Prototype ± 2%



An optimal dual gauge measurement configuration is designed, developed and tested yielding greatly enhanced accuracy. Laboratory testing of the developed measurement system is undertaken by the partner surgeon on a variety of specimen wounds in 'suture foam'. Experimental parameters investigated include suture size, technique of wound closure, wound size variation and controlled versus underlined wound comparison. Initial surgeon tests are highly promising - conforming to surgeon expectation and results consistent with current best theatre practice. These results are to be formally presented to the Royal College of Surgeons of Ireland national conference.



Surgeon Suture Force Measurement



Future Development - Embedded and Bluetooth Conceptual Design by K.Bourke

Commercialisation of the developing measurement technique is investigated with potential markets and uses identified including basic research device, surgeon training tool and theatre surgical aid applications. Future development work encompasses investigation of embedded and bluetooth technologies and data acquisition / analysis.

The developing technique has major applications both in addressing the current research knowledge deficit in regards to suture tension versus wound scarring relationship and as a much needed aid to surgeons in the accurate measurement and appropriate application of suture tension in a variety of surgical procedures.

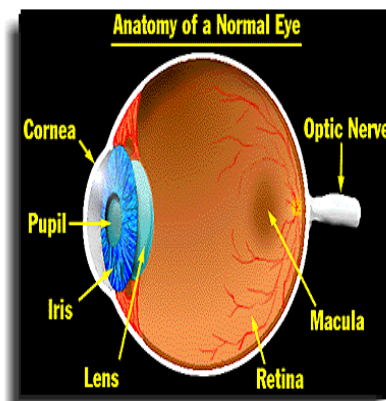
FIRST PLACED ENGINEERING DEGREE PROJECT IN IRELAND 2007



National Competition Finalists from TCD, UCD, NUIG, DCU, DIT and CIT

Bill Quinn, a Final Year Mechanical Engineering Degree student at Cork Institute of Technology, has achieved First Place in the Enterprise Ireland Institution of Mechanical Engineers 2007 National "Speak Out for Engineering" Competition Finals

Bill's Award Winning project titled "Optimisation of Capping Chamber Parameters in Contact Lens Manufacture" was carried out in conjunction with Bausch & Lomb Ireland, Waterford



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

FIRST PLACED ENGINEERING TECHNOLOGISTS OF THE YEAR NATIONAL AWARDS 2007

**CIT Students declared Joint Winners of the
Inaugural Engineers Ireland
Engineering Technologist of the Year 2007 Competition**

**The result of the Inaugural Engineers Ireland
Engineering Technologist of the Year 2007 National Competition was announced
by Mr. Jack Golden, President, Engineers Ireland:**



Joint First Place

***Student: Michael Kinsella - Cork Institute of Technology
Project Title: "Process for Converting Rape Seed to Repoleum Fuel"
Course: Bachelor of Engineering in Electrical Engineering (Level 7)
Department: Electrical Engineering***



Joint First Place

***Student Team: Damien Healy, Joseph Jameson, Jason Mullins - Cork Institute of Technology
Project Title: "Design and Development of Fusion Folding Press"
Course: Bachelor of Engineering in Manufacturing Engineering (Level 7)
Department: Manufacturing, Biomedical and Facilities Engineering***

***This double victory in the first ever Engineering Technologist National competition
represents a remarkable success for both students and supervisors and is a resounding
validation of the standard of engineering courses presented at Cork Institute of Technology.***

**Enterprise Ireland / Invest Northern Ireland
National Award of Merit 2007
€2,000 Award**

***The Development of an Anti-Claw Splinting Device for
Ulnar Nerve Palsy Treatment
was undertaken by the “ Ulnar Pal ” Multi-Discipline
Mechanical Engineering / Business Student Team.***



National Award of Merit Innovation Team – Ulnar Pal

***Mechanical Engineering Students - Designers and Inventors
Tadhg Lyne, Joshua Walsh, Kieran Aherne, Dermot Drew, Paul Nolan***

***Accounting and Information Systems Students - Developers of Business Plan
Helena Fleming, Padraig O'Shea, Alan Meely***

UlnarPal Ltd. is a student development company, specialising in the design, patenting and marketing of medical devices related to the ulnar nerve palsy niche market.

Ulnar Nerve Palsy is a condition which occurs, when the nerve traveling from the shoulder down to the wrist, has been damaged due to prolonged pressure or trauma.

The design and development of a glove is undertaken with a view to increasing patient stability and enhancing recovery rates.



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE - CA0 Code CR108

2006 Awards



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

***CIT Mechanical Engineer Kathleen Hurley
declared Outright Winner of***

- Siemens Engineers Ireland Innovative Engineer
National Award Dublin 2006***
- Design and Development of a Biomedical Device
International Award London 2006***



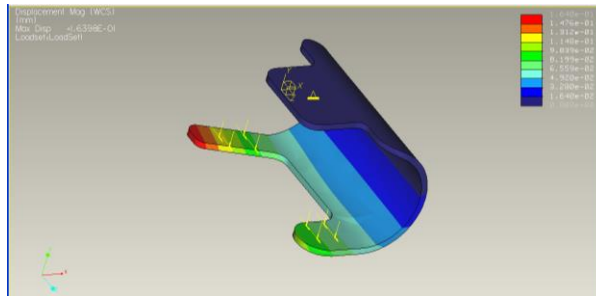
***Ms. Kathleen Hurley, Final Year Mechanical Engineering Degree Student
Cork Institute of Technology***

Project Title: " Fractured Finger Splint System Design and Development "

Industrial Partner: Mr. James Harty, Consultant Surgeon



Ulnar gutter splint



Finite Element Model by K.Hurley



Prototype "Finger Fit" Device by K.Hurley

The objective of this project is to research and design an improved support system for the treatment of a fractured fifth metacarpal (also known as a boxer's fracture) as an alternative to the current conventional treatment - the cumbersome Ulnar gutter splint encased in plaster paris. From Surgeon concept, an aluminium splint is designed to provide a three point pressure system to immobilise the fifth knuckle. The new fractured finger splint is developed in parallel with an innovative neoprene glove support system to prevent rotational deformity.

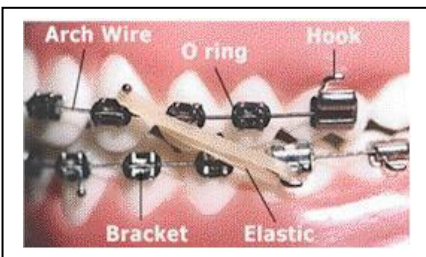
*CIT Mechanical Engineer Timmy O’Keeffe
declared Outright Winner of
- Best Medical Engineering Project
International Award London 2006*



*Mr. Timmy O’Keeffe, Final Year Mechanical Engineering Degree Student
Cork Institute of Technology*

Project Title: "Design, Development and Commissioning of an Orthodontic Thermal Cycler"

*The project was originated by and carried out in conjunction with Professor Declan Millett,
Professor of Orthodontics, University Dental School and Hospital, University College Cork.*



*Orthodontic brackets are used to reposition teeth in the mouth.
The thermal cycling (e.g. hot and cold drinks), experienced during
everyday eating and drinking, produces stress/ strain cycles in the
adhesive which bonds the bracket to the enamel.*

*Timmy’s project concerns the development of an
accelerated testing unit to simulate the thermal
cycling conditions experienced by the bracket
and adhesive assembly under oral condition.*



CIT Mechanical Engineer Brian Guilly wins
- ISEA International Sports Engineering Association
Silver Medal London 2006
- I.Mech.E. Frederic Barnes Waldron Award 2006



Mr. Brian Guilly, Final Year Mechanical Engineering Degree Student
Cork Institute of Technology
Project Title: " Equine Tendon Support Boot Testing "
Industrial Partner: Dalmar Ireland



Sports injuries of the tendons are common in race, show jumping and other performance horses.

On average over 150,000 horses are affected annually - resulting in a reduction in sporting appearances and often leading to retirement of the horses (to the big racecourse in the sky).

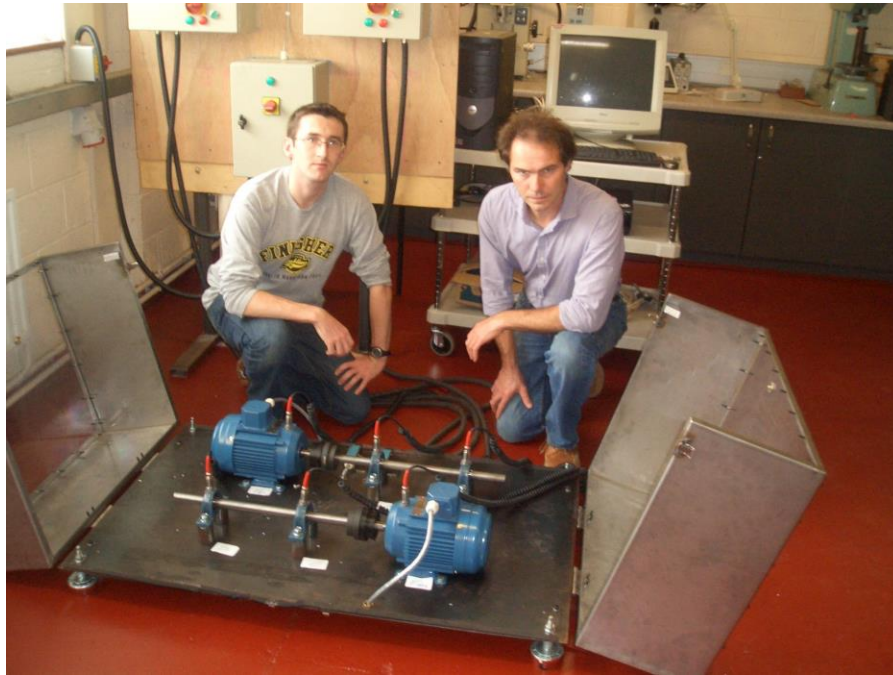


The equine sports medicine project was carried out in conjunction with Dalmar Ireland, a small but dynamic equine medicine company based in Glanmire, Co Cork, specializing in the design and manufacture of technologically advanced products for the effective prevention and treatment of lower leg injuries in horses.

This new boot will facilitate natural healing of the damaged tendons, and bring the horse back to full performance fitness. It is unique in that it allows movement of the fetlock joint whilst still supporting the tendons in a controlled manner over healing time.

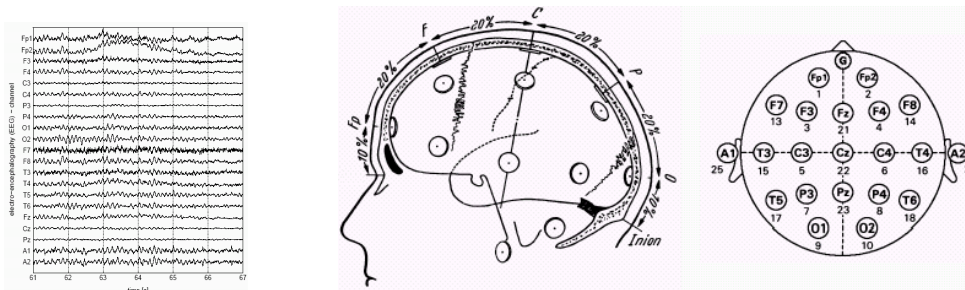


Brain Wave Pattern Analysis inspires CIT Mechanical Student to National Maintenance and Asset Management Award 2006



Cork Institute of Technology Master in Mechanical Engineering Degree student Martin O’Riordan has just been announced as the outright winner of the 2006 National MEETA Student Project Award for students undertaking a project in a maintenance, reliability or asset management area at Honours Degree/ Masters Degree level.

Martin’s project concerned “ Multiple Vibration Source Separation “ in conjunction with Cara Partners under the supervision of Dr. Michael J. O’Mahony



Solution Inspiration: Brain Wave Pattern (EEG) Analysis

Martin has just commenced work within the Johnson & Johnson (J&J) family of companies on a unique global operations leadership development (GOLD) programme.

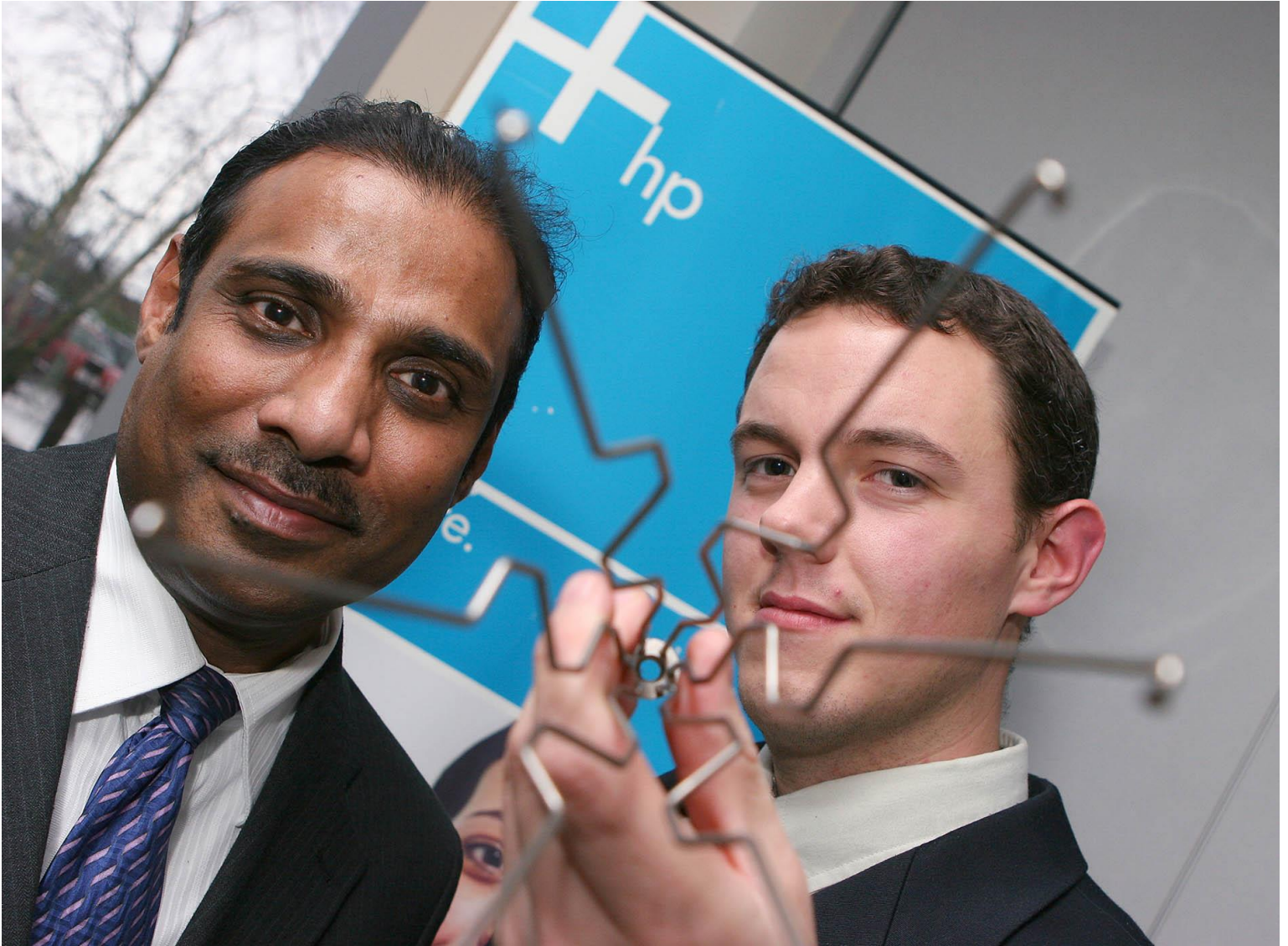
In this prestigious GOLD programme, Martin will be rotated through three work assignments, each lasting eight months, within the J&J family of companies in Europe.

Currently, he is working for the Global Supply Chain in DePuy, based in Cork.

DePuy are world leaders in the manufacture of orthopaedic implants.

After this rotation, Martin will spend an assignment in an engineering role in the pharmaceutical industry in mainland Europe and an operational role in the medical devices and diagnostics industry in the United Kingdom

2005 Awards



HONOURS LEVEL 8

MECHANICAL ENGINEERING DEGREE

CAO Code CR108

**PULMONARY EMBOLISM
BLOOD CLOT FILTER DESIGN PROJECT
WINS HP INVENT €7,500 AWARD 2005
AND INTERNATIONAL MEDICAL ENGINEERING AWARD
FOR CIT MECHANICAL DEGREE STUDENT**



John Geary's highly acclaimed Final Year Mechanical Engineering Project on

***"Vena Cava Blood Clot Prototype Filter Hook
Design Analysis and Testing "***

carried out in conjunction with Boston Scientific Cork, was awarded the

***Hewlett Packard INVENT €7,500 Award 2005 for
Best Honours Degree Project in
Science, I.T. and Engineering in Ireland***

and the

***Institution of Mechanical Engineers
International Best Medical Engineering Award 2005***

*John Geary graduated with a
First Class Honours Mechanical Engineering Degree
at the Cork Institute of Technology in October 2004.*

*Since graduation, John has been working with
Queensland University of Technology in Australia
on the related topic of the development of
Titanium Scaffolds for Bone Tissue Growth.*



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

Vena Cava Blood Clot Filter Hook Design, Analysis and Testing

John Geary



The prototype medical device consists of a six legged titanium filter structure, which is inserted, utilising minimally invasive surgery techniques, into the Vena Cava main vein, connecting the heart to the lungs. The device works by filtering the blood passing through the vein and capturing any travelling blood clots (emboli), preventing a pulmonary embolism.

At the end of each leg of the filter, a specially shaped hook is formed. These hooks are critical to the efficient performance of the medical device. The hooks firmly attach the filter to the vein wall and stabilise the orientation of the device relative to the blood flow, while preventing excessive penetration and hence damage to the Vena Cava wall during operation.

This project involves optimisation of the hooks formation for a prototype filter design. The new design concentrates on reducing the overall dimensions of the filter hooks to reduce the size of the filter deployment cartridge required, hence reducing patient stress during insertion.



Vena cava filter

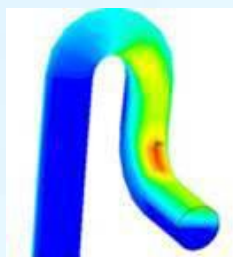


Scale of hook

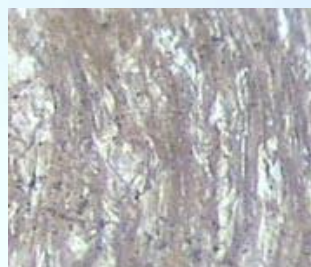
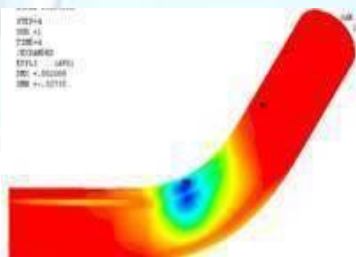
Material property variation and structure behaviour during the forming processes are investigated. Finite Element Analysis and Experimental Testing/Validation has been undertaken to yield an improved formed hook design, enabling efficient manufacture and increased structural strength during operation. This outcome has been achieved through manipulation of the hook microstructure and use of optimised forming operations

The undertaken research work has discovered and introduced knowledge and technologies, which will aid more stable filter production, shorter Lead In Time for new products and development of superior filters including Miniaturization for Minimal Invasive Surgery.

The major project benefits are to reduce patient Trauma and Stress and to optimise a Life Saving Device.



3D Elastic-Plastic FE Analysis by J.Geary



Microstructure Analysis by J.Geary



2005 International Sports Engineering Award for Brendan's Hurling Helmet Testing Project

***CIT Mechanical Engineering Degree Student Brendan Quirke
has won the 2005 ISEA Top International Sports Engineering Award for his
Hurling Helmet Testing Project.***



***The International Sports Engineering Association Competition
to determine Best International Sports Engineering Degree Project
2004/5 took place in late June 2005
at Birdcage Walk, London.***

First Place was achieved by Mr. Brendan Quirke, Cork Institute of Technology,
for his project on

“ Hurling Helmet Impact Testing ”

carried out in conjunction with MycroSports Ltd. Of Ballincollig,

The **Runner-up** Shortlisted Sports Engineering Finalists were:

Pavel Sztetek , Queen Mary, University of London

"Finite Element Analysis of Adaptable Bobsleigh Structure for British Olympics Team"

Eleanor van der Heijden - University of Bath.

"Downhill Soapbox Racer"



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

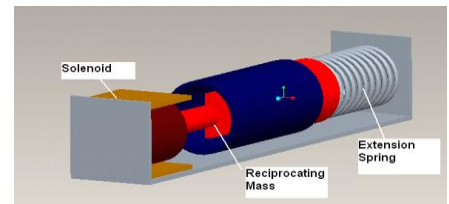
FIRST PLACED ENGINEERING DEGREE PROJECT IN IRELAND 2005



Colm McLaughlin, a Final Year Mechanical Engineering Degree student at Cork Institute of Technology, has achieved First Place in both the Siemens IEI 2005 Innovative Engineer of the Year Competition and the Institution of Mechanical Engineers 2005 National "Speak Out for Engineering" Competition Finals



Colm's Enclosure Design



Colm's Recoil Device Design

***The title of Colm's Award Winning project Is
" Infrared based Engagement
System for Wargaming & Military Training "***



**HONOURS LEVEL 8
MECHANICAL ENGINEERING DEGREE
CA0 Code CR108**

2004 Awards



*Queen's Silver Jubilee Award
for Best Engineering Degree Project
in Ireland and Britain 2004*

*CIT Mechanical Engineering Degree Student Niamh Thompson
has won the 2004 Top National and International Engineering Awards for her
Total Hip Replacement Project.*



*The Queens Silver Jubilee Institution of Mechanical Engineers Competition
to determine best Engineering Degree Project
in Ireland and Britain 2003/2004 took place on Thursday, 4th March, 2004,
at Birdcage Walk, London.*

*First Place was achieved by Ms. Niamh Thompson, Cork Institute of Technology,
for her project on*

**"Influence Of Surgical Solutions on the Fatigue
Properties of Total Hip Replacement Bone Cement"**

*carried out in conjunction with Orthopaedic Surgeons at
Cork University Hospital and St. Mary's Orthopaedic Hospital, Cork.*

Niamh had previously won the National award in Dublin in January 2004.



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE

CA0 Code CR108

***Total Hip Replacement Project wins 2004 Siemens IEI National Award
for CIT Mechanical Engineering Degree Student Niamh Thompson***



The Finals of the Siemens IEI National Competition for best Engineering Degree Project in Ireland took place on Monday 21st June, 2004, in the Lecture Theatre at the Institution of Engineers of Ireland's Headquarters, Clyde Road, Ballsbridge, Dublin 4.

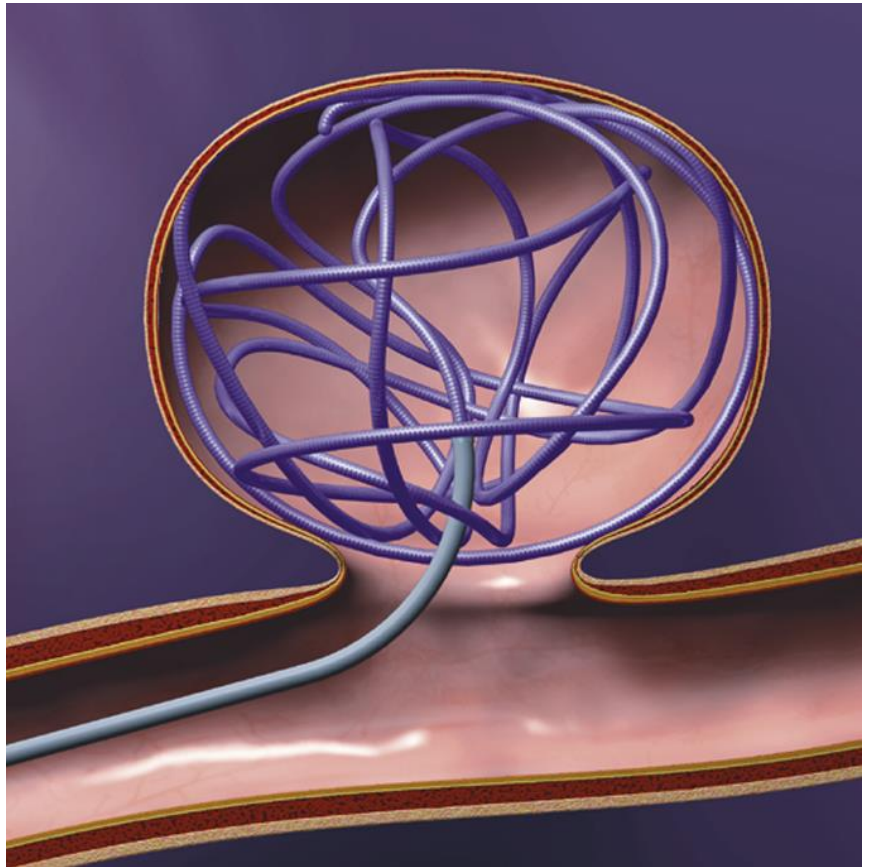
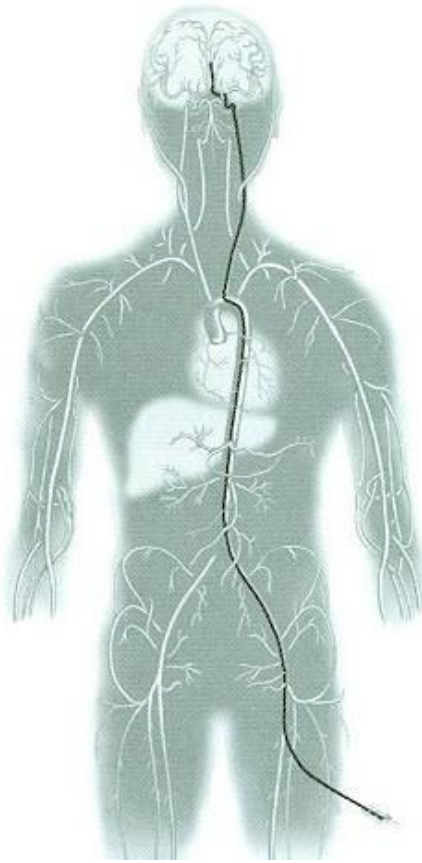
Finalists from all disciplines of Engineering, representing Trinity College Dublin, Dublin Institute of Technology, University of Limerick, National University of Ireland - Galway, Institute of Technology Tallaght, University College Dublin and Cork Institute of Technology, presented to an expert panel of judges.

***2004 Siemens IEI National Award
for CIT Mechanical Engineering Degree Student Niamh Thompson***



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE -- CA0 Code CR108

2003 Awards



BRAIN ANEURYSM TREATMENT

Charles Daly's highly acclaimed Final Year Mechanical Engineering Project on

"Precision Inspection, using Diffraction techniques, of Platinum Coils used in Minimally Invasive Surgery for the Treatment of Brain Aneurysms"



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE -- CA0 Code CR108

CIT YOUNG ENGINEER OF THE YEAR WINS NATIONAL AND INTERNATIONAL AWARDS FOR BRAIN ANEURYSM TREATMENT PROJECT



Charles Daly's highly acclaimed Final Year Mechanical Engineering Project on

*"Precision Inspection, using Diffraction techniques, of Platinum Coils
used in Minimally Invasive Surgery for the Treatment of Brain Aneurysms"*

carried out in conjunction with Boston Scientific Cork, was awarded

*(1) the Siemens Institution of Engineers of Ireland Prize for Best
Undergraduate Engineering Degree Project in Ireland*

*(2) the Society of Manufacturing Engineers Prize for Best Published
and Presented Paper (of 56 International Undergraduate, Postgraduate
and PhD Entries) at the 20th International Manufacturing Conference.
This award is an unprecedented achievement for an undergraduate student.*

*Charles' paper was published in the Institution of
Engineers of Ireland Journal, the Irish Medical Times and has been the subject of many press articles.*

*Charles Daly graduated with a **First Class Honours Mechanical Engineering Degree**
at the **Cork Institute of Technology** .*



HONOURS LEVEL 8 MECHANICAL ENGINEERING DEGREE - CA0 Code CR108

CIT Mechanical Engineering

CAO Code CR108

CIT Biomedical Engineering

CAO Code CR520

CIT Engineering Innovation and Entrepreneurship



MEETA - Asset Managers Association
National Finals Engineers Ireland HQ Ballsbridge Dublin
Student Certificate Award of Excellence 2015



Michael Harrington Mechanical Engineering CIT
"Design and Development of a Fast Scan System in conjunction with EMC"



A Happy and Proud Harrington Family



Fast Scan System

Engineers Ireland Excellence Awards
"Best in Class" Engineering
Education Excellence Award 2015



Cork Institute of Technology
30 Years A Growing
Cork Mechanical, Manufacturing and
Biomedical Engineering Exhibition
Ireland and Europe's Largest
Educational Engineering Event



CORK INSTITUTE OF TECHNOLOGY
30 Years A Growing
Cork Mechanical, Manufacturing and Biomedical Engineering Exhibition
Friday 24th April 2015 - 1.00pm - 5.30pm
Exhibition Theme 2015
30 Years A Growing!
CIT Engineering Innovation and Entrepreneurship
Engineers on the move
Opening Time
Thursday 23rd April
2.00pm to 8.30pm
Nexus Courtyard - CIT
Admission Free
Public Welcome &
Free Refreshments

Engineering in Medicine and Health Division
Westminster London 2015

The Healthcare Technologies Student and Early Career Awards 2015
International Medical Engineering Finals
Wednesday 25th February 2015

First Place - Vicon Prize for
Best Undergraduate Medical Engineering Project 2015



First Place: James Fogarty - Cork Institute of Technology
"Design and Development of an Assistive Technology Music System for Sufferers of Cerebral Palsy"



Engineering in Medicine and Health Division

innovact European Student Innovation Awards
Innovact 2014 Reims France
European Campus Student Innovator of the Year 2014
First Place and Outright Winner
<http://www.innovact.com>



First Place European Campus Student Laureate of Innovation 2014
John Roberts PyraAid™ "Wheelchair Enablement Device"
Cork Institute of Technology Ireland

It has been announced on Wednesday 2nd April 2014 before a packed auditorium at the European Innovation Finals Innovact 2014 Reims, France, that First Place and Outright Winner of European Campus Student Innovator of the Year 2014, from hundreds of international entries and 20 shortlisted international finalists is John Roberts of Cork Institute of Technology.

John would like to pay particular tribute to his third year Multidisciplinary Engineering and Business student colleagues: Siobhan Healy, Alan O'Reilly, Laura Hanson, Sandra Hayes, Thomas Thornton and Stephen O'Brien, who were central and crucial in the early inception and development of the enablement project and whose support and encouragement persuaded John to continue on the project as a most challenging and rewarding final year aerospace mechanical engineering project.



Engineers Ireland Innovative Student
Engineer of the Year 2014

SIEMENS sponsored by Siemens



First Place €1,500 National Award
Winner: James King
Mechanical Engineering Cork Institute of Technology

"Drone Compatible Medical Transportation Pod
Design, Development and Testing"



ENTERPRISE IRELAND



Invest Northern Ireland

2013 Think Outside the Box Finals Galway

First Place and
Student Entrepreneur of the Year 2013 - €10,000



Company AH Technology Product Mastech
Cork Institute of Technology
Animal Healthcare Device Design and Development

CIT Multi-Discipline Start-Up Innovation Team
Nicola O'Mahony, Donal Carey, Kenneth Barry, Damien McAuliffe, Claran Malone
Owen Mc Donagh, James Cahill

