# the journal for science, engineering and technology

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SPECIAL DIGITAL TECHNOLOGY EDITION

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# the journal for science, engineering and technology

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# advances



Guest Foreword Tom Kelly Welsh Government ICT Sector Panel



Contents

& Editorial

As Chair of the Welsh Government's ICT Sector Panel, I am delighted to introduce you to this special Digital edition of Advances launched in time for Digital 2014.

As the key event for the digital agenda in Wales, Digital 2014 at the Celtic Manor Hotel & Resort, Newport will provide a fantastic networking opportunity bringing together businesses, decision-makers and industry leaders from across the private and public sector. With daily developments in the world of digital, it can be a full-time job to stay ahead!

The Panel's vision is to establish Wales as a 'connected' economy with both a domestic and international reputation as a place to start, grow and sustain your business.

This issue's Special Feature focuses on Apps developed in Wales, with the help of bodies such as the Centre for Excellence in Mobile Applications and Services (CEMAS) at the University of South Wales, and these examples provide a visible demonstration of the thriving, close-knit relationships which academia and businesses enjoy in Wales.

Once again, Advances provides a showcase for many of Wales' companies and universities alike. Great research has led to many new and innovative technologies and products such as Sure Chill's revolutionary fridge (page 16), Moneypenny's answer to call handling (page 22) and a method of enabling secure transactions on unsecured electronic devices from myPinPad (page 18), as well as new discoveries from Cardiff and Swansea Universities with relation to schizophrenia and cancer (pages 26 and 27 respectively).

#### Lucinda Dargavel, Editor

**PHOTOGRAPHY** Sourced from organisations featured, their representatives and Shutterstock.

Advances Wales is a high-quality, quarterly 'transfer of technology' journal produced by the Welsh Government to showcase new developments in science, engineering and technology from Wales. Devoted to concise reports and commentary, it provides a broad overview of the current technology research and development scene in Wales. Advances raises the profile of the technologies and expertise available from Wales in order to facilitate collaborative relationships between organisations and individuals interested in new technologies and innovation.

#### Commissioning Editor Alyson Pasch.



Editorial Board: Luc Brown, Gareth Browning, Jeremy Creasey, Lyndsey Davies, Dr Hywel Edwards, Paul Gauci, Dr Richard Johnston, Jon Merrey, Alyson Pasch, Clive Thomas. For information on how to contribute features contact the editor, Lucinda Dargavel (tel +44 (0)29 20473456, email advances@tearnworksdesign.com). Advances Wales is designed and published on behalf of the Welsh Government by Tearnworks Design, 7 Schooner Way, Atlantic Wharf Cardiff CF10 4DZ. Opinions expressed in this magazine are not necessarily those of the Welsh Government or its employees. The Welsh Government is not responsible for third-party sources cited such as web sites or reports. ISSN 0968-7920. Printed in Wales by MWL Print Group, Pontypool. Crown Copyright.

# Swansea research helping to fight the rise of the app attackers

A computer scientist from Swansea University, South Wales, has received a share of £3 million funding from the Engineering and Physical Sciences Research Council (EPSRC) to counter cybercriminals who are using malicious apps which collude with each other to infect people's smartphones (known as malware attacks).

Swansea University researcher Associate Professor Markus Roggenbach, from the Department of Computer Science, College of Science, is part of two app research consortia to be awarded the funding. Malware attacks are rising year on year and over one million new Android malware attacks were identified in 2013 by McAfee, a division of Intel Security. These research consortia are partnering with McAfee which is providing the researchers with access to a library of safe apps and will also assist in analysing malware so the researchers can test their behaviours. Malicious apps can gain access to address books, GPS coordinates, passwords or pin numbers. They can redirect your data across the net, send you to phishing sites and also bypass the two-step authentication process used to access an ever-increasing number of online services such as banking or email. Criminals are able to monetise this information in a number of ways – by getting your phone to send messages to premium numbers, by remotely controlling



an infected phone, by tricking you into revealing passwords and by using your stolen data.

The latest cyber-threat to smartphones comes from apps working together or colluding. An example of collusion consists of one app permitted to access personal data, which passes the data to a second app allowed to transmit data over the network. This information can then be used maliciously.

Existing antivirus products are not designed to detect collusion and the Swansea research team aims to address the challenging question of how to prove the absence of collusion in a mathematically concise way.

Professor Roggenbach said, "Success in this project would mean a rare opportunity for the cyber-security community to stay ahead of an emerging threat, instead of reacting to a threat which is already prevalent."

www.swansea.ac.uk/science

# BioWales 2014 puts Wales on International stage

The life science sector is excitedly awaiting the launch of the muchanticipated Life Sciences Hub Wales which is set to become both a national and international focal point.

BioWales provided the perfect stage for Professor Chris McGuigan, Chair of Life Sciences Hub Wales to give an update ahead of its official launch in July, when the Hub will be poised to provide a vibrant eco-system for the sector in Wales.

BioWales 2014 proved to be the most successful event in its 12 year history- when delegate numbers have increased from 170 in 2002 to close to 600 in 2014. This flagship event for the life sciences sector in Wales took place at the impressive Wales Millennium Centre in Cardiff Bay and featured an international line-up of speakers, including Sir Andrew Dillon, Brock Reeve, The Rt Hon. Lord Hutton of Furness, & Professor Laurence Hurley. Delegates attended from 10 different countries and included a 15-strong delegation from Canton de Vaud in Switzerland. Topics covered included 'Design for Life'-which looked at the areas of regenerative medicines and diagnostics- and the challenge of translation from science to therapy and from there to successful commercialisation.

A record number of exhibitors enjoyed their new foyer location, and delegates networked during a Gala Dinner which took place on the Centre's stage and combined contributions from the Welsh National Opera, from the event's sponsor Renishaw, and from The



Apprentice winner and managing director of Hyper Recruitment Solutions, Ricky Martin.

Workshops at the event featured Johnson & Johnson Innovation, tenants of the soonto-open Life Sciences Hub Wales, and the Swiss Government, and a new 'Dragon's Den' style feature brought innovative new business ideas face to face with proven experts from the Arthurian Life Sciences Board, whose role is to look after the Wales Life Sciences Investment Fund.

Wales' life science sector is thriving and with turnover increasing to over £2 billion, this industry is proving to be extremely lucrative for the Welsh economy with much to look forward to over the coming year.

www.biowales.com

# Wikimedia Foundation collaborates with Bangor

A new collaboration has been announced between the Wikimedia Foundation and Bangor University in North Wales enabling both parties to share ideas and experiences from developing language technologies for multilingual situations. This collaboration will include integrating components of Bangor's new TranslateWales.com software with the software that powers Wikipedia.

TranslateWales.com is a new product for bilingual organisations, translation agencies and translators which has been especially developed for optimised technological assistance in translating between Welsh and English. It includes a workflow manager, translation memories, glossaries as well as the more advanced components such as Cysill – the spelling and grammar checker - and Bangor's own machine translation engines. TranslateWales.com enables professional translators to work more efficiently by providing machine translated text for correcting and final publication. This cuts down the work of human translators, whilst avoiding the pitfalls of pure machine translation.

David Chan, an expert on translation systems and a software engineer at Canolfan Bedwyr's Language Technologies Unit, said that the Wikimedia Foundation are developing a Content Translation tool for use by volunteer writers and editors and that Bangor's machine translation engine will be part of the Wikimedia offering. David explained: "Although TranslateWales. com looks very different from Wikimedia's multilingual environment, in reality much of our experience with it is useful in designing the Wikimedia tool, especially the way machine translation integrates into the translators' workflow. Translators are naturally worried that poor quality machine translation may be misused, but allowing the editor to view and edit the machine output overcomes that problem."

"We welcome the opportunity to share Bangor University's expertise in machine translation and lesser-resourced language technology."

Alolita Sharma, the Director of Language Engineering at Wikimedia



# Anglesey's standing stones take a leap into the digital age

#### Anglesey's standing stones are set to be the subject for an exciting new 3D visual information database thanks to a computer scientist at Bangor University.

Dr Jonathan Roberts, a leading expert in visualisation at the University's School of Computer Science has won a grant from the UK's Arts & Humanities Research Council to use 3D visualisation technology.

The project will involve computer scientists working with archaeologists at both the University's School of History, Welsh History and Archaeology, Gwynedd Archaeological Trust and academics at Aberystwyth and Manchester Metropolitan universities, to build up a visual resource of information about Anglesey's standing stones which will be accessible to all.

The project, 'Co-Production of alternative views of lost heritage' was competitively selected for the Arts & Humanities Research Council Award under Digital Transformations in Community research Co-Production in the Arts and Humanities. Using the latest technology there will



also be a role for members of the public as amateur archaeologists and photographers. The project's aim is to create an exciting high tech three dimensional information resource about Anglesey's renowned standing stones and other archaeological sites and monuments in North Wales. Digital images submitted by the public will be 'stitched' together using a new digital computer visualisation technique, called photogrammetry, to create three dimensional representations of the standing stones.

A selection of these three dimensional representations, made by digitally combining between 3-20 images of the same standing stone, will then be 3D printed. The models will enable users to interact with a special touch surface table which will call up and display all the relevant information about that standing stone.

"This is a great way of involving people in archaeology at a very accessible level. It will allow people to become much more actively involved in the management of their heritage, and make their own choices about what is important to them."

Raimund Karl, Professor of Archaeology & Heritage, Bangor University

www.bangor.ac.uk/cs/

# Sêr Cymru appoints new director

#### Director appointed to the Welsh Government's Sêr Cymru National Research Network for Low Carbon, Energy and Environment

Professor David Thomas, who holds the Chair in Marine Biology at Bangor University, has been appointed to lead a new national research network which has been established to nurture and build on the high quality research in the environmental and natural sciences in Wales.

This network will focus on working at the interface between the environmental and biological science agendas and will deliver a coherent national focus for these sciences in Wales. It will build on the internationally renowned research which is already in the research community in Wales and will deliver and build on that excellence to position Wales as a world-leader in its approach to natural resource management.

The network is funded from the Welsh Government's Sêr Cymru programme and is being jointly led by the Universities of Bangor and Aberystwyth under the auspices of their Strategic Alliance. Sêr Cymru supports the establishment of a collaborative National Research Network in each of the three Grand Challenge research areas identified in the 'Science for Wales' strategy: advanced engineering and materials; life sciences and health; low carbon, energy and environment.

In addition to enhancing research capacity, this programme aims to build excellence in the Universities in Wales and in key partner research organisations: NERC's Centre for Ecology and Hydrology, the Met Office and the British Geological Survey.

Talking about his appointment Professor David Thomas said, "The network will focus the Welsh research effort in water, food and energy resources - a crucial area identified by government chief scientists and the research community. The vision is to develop a new systems-based approach to natural resource management. closely linked to societal needs and directly feeding into policy development and implementation. The scientific outputs of the network should increase commercial opportunities for businesses in Wales and will provide critical information for policy makers and government at a local and national level"

# Welsh clean up for Indian water

#### Technologies and products developed in Wales will provide a source of clean water for communities across India

Llangennech-based Hydro Industries has entered into a collaboration with Intelligent Energy to support the commercialisation of its water purification technology across India.

Hydro Industries, focuses on the design, manufacture and operation of electrobased water treatment products and this partnership, could result in Hydro's technology being powered by Intelligent Energy and deployed at thousands of sites over the next five years. It follows the announcement that Intelligent Energy, through its wholly owned Indian operating business, Essential Energy, will deliver power management solutions for telecom towers across India using its proprietary fuel cell systems during the country's frequent power outages.

The collaboration will see Hydro's technology powered by Essential Energy's power portfolio, offering Essential Energy an additional customer for its power. Hydro's proprietary technology uses electricity to



treat water, removing the need for bulk liquid chemicals or large volumes of biomass. With no moving parts and adaptive software, system maintenance is straightforward and supervisory control can be carried out remotely.

India has one of the world's fastest growing economies and its rapid urbanisation is expected to lead to a 40% increase in domestic demand for water over the next decade. It is estimated that around 720 million of India's 1.25 billion population lack access to clean drinking water. Around 100,000 people die of water-related illnesses annually and, according to UNICEF, waterborne diseases cost the Indian economy \$600m in lost production and medical treatment.

"This is an extremely significant relationship for our company, further enhancing Hydro's global reputation to deliver resourceful, innovative products to regions in real need of accessible, clean drinking water.

"The positive humanitarian impact is of vast importance to us, and we are delighted that technologies and products developed in Wales will provide a source of clean water for communities across India, improving their quality of life and giving them access to what is an essential requisite for a healthy life: clean water."

Wayne Preece, CEO, Hydro Industries



www.hydro-industries.co.uk

NEWS

# OpenIQE initiative boosts regional supply chains

IQE plc, the leading global supplier of advanced semiconductor wafer products and services, has launched its Open Innovation programme "OpenIQE," aimed at establishing partnerships to support the development of a broad range of Key Enabling Technologies (KETs).

The first major project under the new programme, supported by the Welsh Government and European Structural Funds, is the IQE Open Technology Challenge. The aim of the challenge is to engage with small and medium enterprises (SMEs), larger businesses and academic institutes, initially focusing primarily on the Welsh region, to develop new and enhance existing supply chains. The project will focus on technology areas termed the Three Grand Challenges identified in the 'Science for Wales' strategy and other major International programs, including the EU Horizon2020 Program. The three areas are life sciences and health; low carbon, energy and environment; and advanced engineering and materials.

Technology will play an increasingly important role in addressing a range of societal challenges. IQE's Open Technology Challenge is aimed at establishing partnerships along an end-to-end supply chain to develop and commercialise products that will meet real needs within the areas defined by the Three Grand Challenges.

Dr Drew Nelson, President and CEO of IQE Group, commented, "IQE has more than twentyfive years' experience of working closely with partners and customers worldwide to meet demanding technical specifications. We are delighted to be contributing our experience of collaborative innovation in the form of our new Open Innovation programme.

"We are confident that the Open Technology Challenge has the potential to become a key stepping stone towards the establishment of a major technology cluster in the region, as well as building stronger links to the global technology community."



www.openiqe.com

# Exploring influences on the development of Alzheimer's



#### Vast Welsh-led study explores the combined influence of genetics and lifestyle in the development of Alzheimer's

Following on from Advances 70, a global study involving more than one million people worldwide will explore the relationship between genetics and lifestyle in the development of Alzheimer's disease. Led by scientists from Cardiff University the £6M project will combine the power of multiple epidemiological studies from around the world to produce the most comprehensive understanding of the disease's risk to date.

"For too long scientists studying Alzheimer's have been working in silos, engaged in a single-minded 'race' to try and beat the disease. That's simply not going to happen unless we pull together"

Principal Investigator Professor Julie Williams Head of Neurodegeneration at Cardiff University School of Medicine's Medical Research Council (MRC) Centre for Neuropsychiatric Genetics and Genomics The aim of the study is to harmonise the research of scientists studying the genetic risk of Alzheimer's with the work of those studying the lifestyle influences, with the ultimate goal to creating more personalised treatments for the disease - and, better yet, treatments that offset it altogether. Put simply, this is a study large enough to get answers.

Based on the genetic data of more than a million people aged 65+ - and some younger - from Europe, US, Australia and Asia, researchers will be able to paint a picture of the genetic architecture underpinning Alzheimer's. The size of the study is significant, as a larger sample of data allows for more accuracy and a stronger basis for analysis. New biomarker data gathered from the study will help scientists understand what triggers the disease, enabling them to identify new genetic and lifestyle risk factors, as well as the factors that mitigate risk, leading to a better management of the condition for future generations. In the future, GPs may be able run a simple test to analyse a patient's risk of developing Alzheimer's and a combination of gene therapy, drugs and lifestyle changes could then be prescribed to reduce that risk.



www.medicine.cf.ac.uk

#### Wales' use of research inputs is highly productive and efficient, outranking most comparator countries of a similar size, according to an independent report.

Commissioned by the Welsh Government, Higher Education Funding Council for Wales and Welsh universities, the 'International Comparative Performance of the Welsh Research Base 2013', carried out by Elsevier, examined the research base of universities, research institutes, industry and the NHS in Wales. The study compared their publication rates and impacts with competitor countries in order to demonstrate the benefits and return of public investment in university research.

As the first comprehensive evidence-based analysis of Wales' research activity and relative research impact in the devolution era, the report makes for heartening reading for the sector in Wales. Using a range of input and output research indices, the study found that in terms of productivity and efficiency, Wales performs above the UK average and is one of the most efficient countries in the world when compared with countries of a similar size.



Wales' field-weighted citation impact

Furthermore, although Wales publishes a relatively small volume of publications, it has increased its field-weighted citation impact – which is 58% above the world average – and is extremely efficient in translating its relative low levels of research income into high impact research.

Other findings include the fact that Wales' inflow of researchers produced the highest field-weighted citation impact at over 80% above the world average, suggesting that Wales is an increasingly attractive region for high quality researchers to relocate to. The findings of the Elsevier report provide a compelling evidence-based summary of Wales' research activity since devolution and its valuable contribution to the UK's world leading research base. Over the past decade, Wales has taken a place within the top research countries of its size in the world and the report's findings confirm the quality of research from Welsh universities ranks highly by national and international standards.

"The report provides a useful snapshot of Wales's research activity. The results highlight the importance of continued public investment in our universities and demonstrate Wales' attractiveness as a research destination. Our universities continue to be central to the nation's development, powering the economy through world class research, job creation and ground breaking innovation."

Professor Colin Riordan Chair of Higher Education Wales

# James Bond studio secures licence to thrill in Cardiff

The studio behind James Bond has struck a deal with the Welsh Government to launch a major film and TV production centre in the country's capital, Cardiff.

Pinewood Studios Wales will occupy a large 180,000 sq ft site for an initial period of 5 years at the former Energy Centre building at Wentloog. Under the terms of the agreement, the Welsh Government will acquire and fit out the building, creating a facility with four separate filming areas.

Pinewood has also signed an exclusive agreement with the Welsh Government to advise on its new £30m TV and film investment fund and will be responsible for promoting and marketing the Welsh Media Fund.

First Minister Carwyn Jones said, "This high-profile investment is of significant economic value to Wales while the partnership between the Welsh Government and Pinewood offers a priceless opportunity to promote Wales as a world-class location for film and television production."

"The new fund together with the new facility will do much to boost the Welsh film and television sector."

Ivan Dunleavy, Chief Executive Officer at Pinewood Shepperton

Buckinghamshire-based Pinewood Studios, where most of the James Bond films were shot, is arguably the UK's best known studio. However, Wales has become increasingly recognised for its TV and film work in recent years. The 170,000 sq ft BBC Roath Lock studios in Cardiff Bay is home to Doctor Who, Sherlock and Casualty, while films such as Robin Hood, Harry Potter, Snow White and Clash of the Titans were also shot on location in Wales.

OATE

www.pinewoodgroup.com

Welsh actor Michael Sheen said: "This appears to be great news for Wales and a logical next step building upon the huge success of the revitalised Welsh entertainment industry."

MERANA

# Pioneering 3D printing reshapes patient's face in Wales

Stephen Power, a survivor of a serious motorbike accident, has had pioneering surgery to reconstruct his face using a series of 3D printed parts. He is thought to be one of the first trauma patients in the world to have 3D printing used at every stage of the procedure.

The project was the work of the Centre for Applied Reconstructive Technologies in Surgery, a partnership between Morriston Hospital's Maxillofacial Unit and the National Centre for Product Design and Development Research (PDR) at Cardiff Metropolitan University.

The team used scanned 3D images of Mr Power's face to design guides to cut and position the bones, as well as plates to hold the bones in place. All the models – along with the finished guides and medical-grade titanium implants – were produced by 3D printing. "Stephen had a very complex injury and correcting it involved bones having to be re-cut into several fragments. Being able to do that and to put them back in the right position was a complex three dimensional exercise. It made sense to plan it in three dimensions and that is why 3D printing came in, and, successive 3D printing, as at every different stage we had a model."

Adrian Sugar Maxillofacial surgeon

Adrian Sugar says the 3D printing took away the guesswork that can be problematic in reconstructive work. "I think it's incomparable - the results are in a different league from anything we've done before," he said. The procedure took eight hours to complete, with the team first having to refracture the cheekbones with the cutting guides before remodelling the face. A medical-grade titanium implant, printed in Belgium, was then used to hold the bones in their new shape.

Design engineer Sean Peel has said the latest advances should encourage greater use of 3D printing in the NHS. "It tends to be used for individual really complicated cases as it stands, in quite a convoluted, long-winded design process," he said.

"The next victory will be to get this process and technique used more widely as the costs fall and as the design tools improve."

Mr Power's operation is currently being featured in an exhibition at the Science Museum in London, called 3D Printing: The Future.



# £47k to develop Welsh athletes

Sport Psychologists at the University of South Wales have secured funding worth £47,000 to develop and tailor biofeedback equipment and training to enhance the performance of elite athletes and ensure the maximum performance of Welsh athletes at high profile sports events such as this year's Commonwealth Games in Glasqow and future Olympic and Paralympic Games.

Dr David Shearer, who is leading the project said: "Biofeedback is an arousal awareness intervention used in health, clinical and performance settings, to help users develop control of their emotional states, by providing immediate visual feedback of their physiological status."

### Concrete Canvas secures Queen's Award

Concrete Canvas from Pontypridd has won the Queen's Award for Innovation.

The company has been recognised for developing a concrete-impregnated fabric, also called Concrete Canvas, which sets rapidly to create durable concrete surfaces. Described by its maker as 'concrete on a roll', the product has been used on major construction projects in a variety of extreme environments, including deserts and underwater. As featured in Advances 58.

### Marine technology sails in to Cardiff

SRT Marine Technology, a global market leader in the provision of maritime technologies and systems, has opened new offices at Regents Court in Cardiff.

This follows the acquisition of a Cardiff-based company GeoVS with ground-breaking 3D virtual reality visualisation technology.

Simon Tucker, chief executive officer of SRT said: "We acquired GeoVS only recently and have already signed a number of significant commercial deals for licensing and customisation. This technology is the first of its kind in the world."

### Collaboration agreement signed with GE Healthcare

Swansea University has signed an agreement with GE Healthcare to collaborate on science research and development projects.

The partnership will provide opportunities for Swansea's staff and students to undertake placements at GE to work on the development of new medical technologies such as human identification and diagnostics, whilst GE will benefit from the multi-disciplinary research expertise the University can offer.

### Venturefest Wales to boost technology sector

Venturefest Wales 2014 will bring over 800 technology developers and investors together to build high growth businesses in Wales.

This free event will be held on July 9th at Cardiff City Hall and will comprise a unique mix of interactive workshops and debates, inspirational speakers including Henry Engelhardt, Chief Executive of the Admiral Group plc, and one-to-one sessions with experts and mentors.

www.venturefestwales.co.uk

# Swansea hosts EuroVis 2014

EuroVis 2014, hosted by Swansea University in the UK, takes place from 9-13th June. This will be the 16th annual visualisation gathering organised by the Eurographics Working Group on Data Visualization and it is supported by the IEEE Visualization and Graphics Technical Committee (IEEE VGTC). EuroVis is held in Europe annually and takes place in the UK approximately every 10 years.

The exciting and vibrant field of visualisation is an increasingly important research area due to its wide range of applications in many disciplines. In general, our ability to collect, store, and archive data vastly exceeds our ability to derive useful knowledge and insight from it. The objective of EuroVis is to foster greater exchange between visualisation researchers and practitioners, and to draw more researchers and industry partners in Europe to enter this rapidly growing area of research. EuroVis has an expanded scope to include all areas of visualisation, and a steadily more wide-spread visibility that achieves a more wide-spread impact.

EuroVis papers are published as a special issue of Computer Graphics Forum, (CGF) the International Journal of the Eurographics Association, using a two-stage review process. In 2014, for the first time, EuroVis also features a survey paper track (also known as State-ofthe-Art Report, STAR) which aims to foster an overview presentation of a particular sub-field of data visualisation. STAR papers will be electronically archived and are fully citeable publications which will undergo a one-stage peer-review process by an international programme committee. A selection of STAR submissions will be invited for a subsequent submission to the CGF journal.



www.eurovis.swansea.ac.uk

## £7.5m fund for Wales

The Wales Technology Seed Fund is a new £7.5m equity seed fund backing technology start-ups and IP rich university spin-out firms in Wales

Managed by Finance Wales, its aim over the next five years is to invest in up to 50 start-up ventures by supporting firms' commercialisation of their innovative products and technologies.

Business Minister Edwina Hart said, "This new fund will provide structured investment to technology startups and university spin-outs that are currently failing to secure support to commercialise their respective intellectual property.

"We want to increase the number and growth of successful, IP rich, technology-based businesses in Wales."

# ICE launches crowd funding

The Welsh Innovation Centre for Enterprise (ICE) is working with a group of entrepreneurs led by Virgin founder Sir Richard Branson to launch a crowd funding platform.

E2Exchange, the voice of UK entrepreneurs, is collaborating with the Welsh ICE in Caerphilly to launch the FCA-authorised Ice Dragons crowd-funding platform across Europe. The platform, which has already been launched in the UK, will focus on connecting experienced investors and high-net worth individuals with entrepreneurs, including E2Exchange members and Welsh ICE affiliates, seeking funding for their start-ups and early stage businesses.

# Alert Logic secures South Wales base

US computer security company, Alert Logic, is to take space at the Welsh Government's Capital Quarter development in Cardiff, and at part of a data centre in Newport.

Alert Logic, which is based in Houston, Texas, hopes to recruit 130 staff in Wales over the next few years. Alert Logic chief executive Gray Hall said the company had been attracted to Cardiff in part for its skills, its university links and the wider business community.

### Prestigious prize for Ultravision

Asalus Medical Instruments' revolutionary new product Ultravision (featured in Advances 71) has won the prestigious Cutlers' Surgical Prize.

The product is a highly innovative means of handling the surgical smoke that is created by cutting instruments created during laparoscopic surgery.

Dominic Griffiths, Managing Director of Asalus, said, "the Cutlers' Surgical Prize is one of the most prestigious annual prizes for surgical innovation so we are thrilled and honoured that Ultravision has been awarded this prize. It is always good to get external recognition."

# **BEACON** wins top European award

A prestigious European Commission RegioStars Award 2014 has been won by the BEACON Biorefining Centre of Excellence, an innovative Welsh research partnership dedicated to developing industrial products from plants to reduce reliance on fossil-based resources such as coal and gas. Its researchers also work with industry to develop modified and new environmental and economically sustainable processes.

BEACON is a Welsh Government EU-funded collaboration between Aberystwyth, Bangor and Swansea universities. The BEACON team received their award at an awards ceremony in Brussels on March 31st.

# Digital thinking

Mobile application development is the process by which application software is developed to run on smartphones, tablet computers and other mobile devices. With various support streams and projects available to help businesses get connected, Wales is playing its part in this digital age with the development of several novel apps spanning a range of areas from education to tourism.

#### CEMAS

The Centre of Excellence in Mobile Applications and Services (CEMAS) is established at the University of South Wales and is part funded by the European Regional Development Fund (ERDF).

CEMAS supports SME's by helping them to develop, test and find a route to market for their mobile application products. CEMAS is able to minimise the initial risks to businesses that are normally associated with developing a mobile application through the fully funded app development programme available to eligible SMEs in Wales.

The CEMAS team helps Welsh SMEs and start-up companies develop their app ideas on a number of platforms including iOS, Android, Blackberry and Windows Phone.

CEMAS has also set up the Mobile Innovation Network (MINe) which offers like-minded companies the opportunity to network, to foster new ideas and find commercial opportunities through mutual collaboration.

"CEMAS has been an important vehicle for raising the awareness of mobile apps in Wales. The innovative business support programme has lifted the barriers to entering the mobile era for many businesses in Wales. To date, more than 70 companies have been assisted and 40 apps developed, of which many are 'world first' such as the examples listed."

Professor Khalid Al-Begain, Director of CEMAS www.cemas.mobi

# **()**

#### **Software Alliance Wales**

Software Alliance Wales is a joint HEI initiative led by Swansea University in partnership with the Universities of Bangor, South Wales, Aberystwyth and the University of Wales Trinity St David (SAW Consortium).

Technology is rapidly changing the face of business in Wales – thanks to pioneering IT companies drawing on home-grown talent, and businesses across the board finding smart new ways of working. Software Alliance Wales is supporting the next phase of technical growth, by addressing a cross-section of needs inside and outside the IT sector. http://softwarealliancewales.com/

#### Some of CEMAS' projects:

#### **Cauldron Caters**

CEMAS and Taste Wales, a Rhondda Cynon Taff based SME, have collaborated to develop 'Cauldron Caters' an app aimed at educating children on the importance of healthy eating. It has two initial elements, a gardening game whereby children are taught about the seasons, crops and how fruit and vegetables grow and a second stage of meal preparation. When healthy meals are prepared the full recipe is unlocked allowing the children to then make the meals at home with their parents. There is also an encyclopaedia to educate children about good and bad foods.

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Taste Wales, the company behind the app, runs a fruit and vegetable business whose long-term aim is to get more people eating healthy, thinking about the importance of healthy food and in turn buying their produce locally from Taste Wales www.tastewales.co.uk

"

Without CEMAS I would never have gotten the project off the ground due to financial constraints. Now with this phase being completed, I can turn to investors to fully develop my project.

Nicola Knight, Director, Taste Wales

1

#### HorseRATION and FarmGRAZE

CEMAS and Arkuris, a Ceredigion-based SME have collaborated and released two apps 'horseRATION' and 'farmGRAZE.'

horseRATION allows the user to accurately calculate the amount of feed to give a horse – avoiding problems with obesity and the associated health risks. The app allows the user to work out the amount of feed that the horse requires depending on the level and type of exercise, the season and the horse's body condition. horseRATION won the British Equine Trade Association Award for Innovation in 2013

Using farmGRAZE, the user can measure, record and manage a grazing platform this helps the user to save money on unnecessary feed and fertilizer and save time on the farm. Grass is the cheapest feed for livestock, and using farmGRAZE regularly means that you can improve the grazing platform for dairy cows, beef cattle and sheep.

farmGRAZE is an app built for the agriculture sector by experts in their field and has been listed among 16 essential farming apps for 2014 by Farmers Weekly.

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Arkuris has a number of clients as a result of the CEMAS collaboration. The apps coded by CEMAS for us have raised the profile of the company.

**Rhian Hayward, Director Arkuris** 

#### Archwilio Mobile App

Dyfed Archaeological Trust, in partnership with the Clwyd-Powys, Glamorgan-Gwent, and Gwynedd Archaeological Trusts, has worked with CEMAS to develop a new app called the Archwilio Mobile App. Offering people a unique opportunity to investigate the history and heritage of Wales, this innovative application allows users to access information on over one hundred thousand archaeological sites from the Historic Environment Records managed by the four Trusts.

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The new Archwilio phone app puts the heritage of Wales on the map.

John Griffiths AM, Minister for Culture and Sport

#### The Digital Tourism Business Framework Programme (DTBF)

The Vision of the DTBF is that by the end of 2014 Wales' tourism industry will have moved from relative e-business immaturity firmly into the digital age and these are some of the projects which have delivered working tourism products through app technology:



#### **Discover Margam App**

This app provides an interactive guide to the sights, sounds, secrets and surprises of Margam Country Park, enabling visitors that use it to experience the park as they never have before. They can discover Dr Who's filming locations, rare deer breeds, fairytale cottages, castle ghosts and much more. The app displays interesting locations on a map, based on user interests, and alerts users when they are close by. Users can also complete challenges and earn badges to work their way up a leader board (pitting their wits against other trainee Rangers using the app) to achieve the ultimate award of 'Margam Country Park Ranger'! Augmented Reality also allows users of the app in the park to place themselves 'in the picture' with stars who have filmed there.



#### Dylan's Birthday Walk

This app was created as part of the DT100 Digital Hub which is supporting the forthcoming DT100 programme of events based around Dylan Thomas and his connections in Wales. Dylan's Birthday Walk is an app which has been developed to provide visitors or walkers on the Dylan Thomas walk in Laugharne, Carmarthenshire, with rich data in the form of anecdotes, picture, video and audio as they relate to each key point of interest or landmarks.

#### Scarlets Rugby Stadium Tour Trail

This project has created a digital trail which tells the story of rugby in Llanelli. This trail is used to promote awareness of the link between local history and Llanelli Rugby Club in the form of a timeline spanning 140 years of rugby, industrial, local and national history. These stories are told through the use of innovative digital technology including an app incorporating audio, visual and interactive software, as well as the use of QR codes and augmented reality.

Geovation is an Ordnance Survey innovation initiative which fuses innovation and geography to address social issues and is delivered in conjunction with a range of partners.

One of the GeoVation Challenges called for innovative ideas using geography and technology which would help connect communities and visitors along the Wales Coast Path, benefiting those who live and work along the route, and beyond.

GeoVation Wales Coast Path Challenge winners, Helen and Nicola Steer, have launched their iPhone app, Real Food Wales, which maps over 150 of the best food businesses in Pembrokeshire and helps visitors to the area discover local, sustainable and delicious food.

The core feature of Real Food Wales is its interactive map. The app's unique feature is that it stores an offline map of Pembrokeshire onto your device enabling users to access all of the information even without a mobile signal.

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Real Food Wales is an ideal app for anyone looking for a special meal at a restaurant, a bite to eat in a quirky café, the best sausage in town for your campfire or a food experience you'll never forget. The map really highlights what an exceptional range of local food businesses are operating in this area.

Helen Steer Real Food Wales

Another winner of this challenge developed ap Ogam which is a bilingual (Welsh / English) smartphone app using GPS positioned augmented reality to overlay the phone's live camera view with place names from the coast path. These markers link with site-specific audiovisual storytelling from the local communities to bring to life that sense of place that lies beyond a map.

Its aim is to bring visitors and local communities together to share their stories, and through sharing them, reinforce their connection to the path and to each other.

Snout Wales is a digital community project, which was founded on the back of the Geovation project. The resulting 'Snout Wales' apps such as MY Tour Talk have recently been completed by the same company and cover communities along the Wales Coast Path, such as Cardiff, Llandudno, and Aberystwyth. Using audio tours, these apps guide visitors to the sights, heights, places and people that can be discovered in Wales.

#### Apple takes Flitlits international

Retired health care professional Eiry Rees Thomas has just seen Apple launch three new apps, based on the adventures of her fantasy creations The Flitlits /Y Sbridion, to help young readers improve their literacy skills.

The interactive apps incorporate Welsh, English and U.S. English versions of the text and narration for the home and international markets and the stories detail the escapades of the surreal characters that inhabit the mystical land of Fussbut, Seldom See.

The interactive teaching aids are structured to satisfy a need for material that spans the divide between picture books and early chapter novels and the apps are supported by bilingual interactive websites for use by children, parents, teachers and librarians which are supplemented by educational games and puzzles.

Having developed the resources for schools and the commercial and home tuition markets for first language purposes, Eiry is already planning complementary second language versions for release later this year.

The cross-curricular, multi-modal components have been extensively researched in partnership with literacy coordinator Melody Jones, experienced educators and the target audience: the children. The apps contain 17 stories which are linked to generic curricula and are supported by three comprehensive educational guides. These include social and emotional development structures which offer both teachers and pupils maximum benefit from the material.

With assistance from the Welsh Government's Digital Development Fund Eiry commissioned Swansea-based games developers, Chaos Trend Ltd., to create the apps, and award-winning illustrator, James Field, to bring the Flitlits /Y Sbridion to life. Professional Welsh, English and American narrators and a creative web designer were also employed. Eiry will retain the intellectual property rights to the concept.



With an eye on the international market, Eiry opted for the iPad platform and is delighted that the apps meet Apple's strict criteria. Eiry has been selected as a featured app creator in an influential U.S. publication devoted to promoting the Flitlit apps in the States and beyond and in addition to this, she has been offered an educational publishing deal from CATT Educational to create print and e-books to support the apps in all three language versions.

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#### Welsh Apps Showcase 2014

In its 4th year, The Welsh Apps Showcase is an opportunity for Welsh SMEs to promote their apps and mobile related products for free to a wide audience and includes exhibitors from around Wales. SMEs, Freelancers and potential new start-ups can also take advantage of the wide variety of support available to them throughout Wales and attend free informative seminars relating to the benefits of Mobile Apps in Business. The showcase will take place at the Cardiff City stadium on 17th September 2014.



# New Solar Cell Technology taking off in North Wales

Meeting the emerging demands of new space-based energy applications

rofessor Stuart Irvine's team at Glyndŵr University in North Wales is leading an exciting new research project aimed at developing a new solar cell technology for use in Space.

Funded by the UK Engineering and Physical Sciences Research Council, this project is a collaboration between the Centre for Solar Energy Research (CSER) Glyndŵr University, the University of Surrey and industrial partners Qioptiq Space Technology Ltd. (QST) and Surrey Satellite Technology Ltd. It is targeted at finding a lightweight, flexible and low-cost energy

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This is an exciting project that builds on unique capability of the CSER team to deposit solar cell materials using chemical vapour deposition. We have a very strong partnership that I am sure will deliver new solar energy technology for the rapidly growing space market.

Professor Stuart Irvine Glyndŵr University solution to meet the emerging demands of new space applications such as spacebased power and solar electric propulsion.

In the first year of this 36-month project, the research team has successfully demonstrated a working thin film solar cell directly deposited onto cerium-doped cover glass which is just 1/10th of a millimetre thick and is manufactured by the industrial partner QST, located in Bodelwyddan, North Wales. This cover glass is a space qualified product, designed to withstand the intense radiation environment and is the standard protective cover on solar panels for satellites. QST are the world's sole supplier of this product and any solar cell destined for extraterrestrial use must have this cover glass bonded to its illuminated surface. QST's unique product is able to absorb the high intensity radiation which would darken any standard glass and also cause damage to the semiconductor layers making-up the solar cells.

By using CSER's expertise in semiconductor thin films and depositing the thin films of the solar cell directly onto the cover glass there is a saving on the weight and cost of a normal substrate. Due to its reduced thickness the cover glass is flexible allowing it to be "rolled up" before and after the solar cell is applied to it and this in turn means that a cost-reducing roll-to-roll manufacturing process can be employed which also yields flexibility for stowage and deployment of the solar cell itself. The expertise of the University of Surrey and the industrial partners involved in this study provides the essential understanding of the radiation stability of the device structure to survive the space environment. This research project aims to demonstrate a ground breaking power to weight ratio and radiation hard solar cell module targeting a flight on a Technology Demonstrator Satellite towards the end of the 3-year project.

Advanced solar electric propulsion technologies are essential to future missions into deep space. Credit: NASA/ Analytical Mechanics Associates artist's concept With excellent triple junction solar cell technology already well-established for extra-terrestrial applications the question asked is why is there the need to develop a light-weight and low-cost alternative. The reason is that the although triple junction solar cells are very efficient at converting sunlight into electricity and, as with the QST cover glass product, are radiation hard alternative solar cell technologies need to be developed to meet the needs of future advances in space exploration and energy harvesting. These up and coming applications will require much larger electricity generation than is currently in operation and will require careful management of the launch weight to avoid making these missions too costly. Some of these predicted advances include; fixed lunar/Martian bases, solar electric propulsion (SEP) and Space-based Solar Power (SBSP). SBSP is a method of collecting solar power in space for use on Earth. This application of solar cells exploits the exposure to higher (than terrestrial) solar irradiance, and near 24 hour-a-day operation with no climatic interference. SEP is a propulsion technique that's really "taking off" as a replacement for the more conventional chemical propulsion systems. Instead of requiring a

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heavy supply of fuel, SEP uses electricity which can be continuously generated by a large area of solar cells, to ionize and accelerate gases such as Xenon in one direction thus producing momentum in the opposing direction and saving weight.

The project team hopes that this new low-weight and low-cost technology will allow the UK to take the lead in building a manufacturing and supply chain just as the demand for this type of product begins to gain momentum.

#### Profile

#### **Product** Lightweight and flexible space-qualified solar cells

Applications Low-cost and large scale electricity generation in space.

#### Contact

Dr Dan Lamb Centre for Solar Energy Research, OpTIC Glyndwr, St. Asaph Business Park, St.Asaph LL17 0JD. UK T: +44 (0)1745 535238 E: D.lamb@glyndwr.ac.uk W: www.cser.org.uk ENGINEERING

# Welsh fridge keeps its cool

#### North Wales company provides revolutionary refrigeration system

he Sure Chill Company based in Gwynedd, North Wales has developed a revolutionary new form of refrigeration technology which is currently being used for vaccine storage. Formerly known as True Energy, the company first featured in Advances 66.

The cooling technology is the brainchild of British inventor Ian Tansley who, with the help of UK Business Angel of the year 2012 Peter Saunders OBE, has created a system which remains cold for ten days or more without power. Peter explained, "Ian is an expert in alternative technologies and green energy and I decided to build a business around him."

A refrigerator with Sure Chill technology works like no other. Water surrounds a Sure Chill refrigeration compartment and when it has access to power, ice forms above the compartment leaving only water at 4°C cooling the contents beneath. Sure Chill technology is based on the scientific principle that water is at its heaviest at 4°C. The technology harnesses this natural phenomenon to create a constantly chilled environment within the refrigeration unit - whether there is power or not. This is achieved through the movement of dense water at 4°C, generated as the system's ice bank interacts with warmer water circulating within the unit. Once power has been used to generate the ice bank in the first instance, the Sure Chill technology channels the supply of naturally generated 4°C water to the refrigeration compartment without the need for any further power. This process can continue until the ice bank, the ultimate generator of the dense water, finally melts and needs to be refrozen.

Sure Chill is a unique cooling system that is life-changing and life-saving. Due to the fact that the system is based on a law of nature and does not require a constant power source, appliances using it are reliable even in the harshest of environments. A refrigerator fitted with Sure Chill technology is designed to work without power for many days and this means that it can store life-saving medicines in perfect condition in remote communities. The majority of vaccines must be stored between +2°C and +8°C, and currently 75-100% percent of vaccines shipments are compromised each year due to failures in the cold chain. The technology is also Smart Grid ready, which means that in places with advanced power networks it can be powered whenever energy is cheapest, saving money for consumers as well as saving resources for the planet.

This revolutionary refrigeration technology has been used by UNICEF to store lifesaving vaccines during its relief efforts in the Philippines. The charity used 200 of the company's vaccine refrigerators as part of its programme to help those affected by Typhoon Haiyan. In 2013, the business was awarded a grant by the Bill and Melinda Gates Foundation to develop a scientific model with a cool life of over a month in the tropics.

The Sure Chill Company spent almost a decade developing the technology and its vaccine refrigerators are now used in more than 30 countries around the world with patent coverage in 89 countries. The turning point for the company came when it was recognised by the World Health Organisation and climate scientist Sir John Houghton, who was Chair of the Nobel Prize winning Scientific Assessment Group for

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We are following the Intel model. We want Sure Chill technology to be in every refrigerator. Peter Saunders OBE Chairman, The Sure Chill Company

the Intergovernmental Panel on Climate Change, proclaimed that, "Sure Chill has the potential to improve the living conditions and healthcare of populations in some of the poorest countries and to lessen the impact of global warming on mankind. There can be no greater purpose."

Sir Richard Feachem, Professor of Global Health at both the University of California, San Francisco and the University of California, Berkeley has also claimed "Sure Chill technologies will become a mainstay of expanded child immunisation programmes, especially in the rural, remote and deprived communities."

The company has recently trialled a device which can maintain its temperature for over a month and is in talks with a number of beverage companies about rolling out its technology in markets where the electricity supply is sporadic. The company has also signed a licensing agreement with Godrej, a white goods manufacturer in India, to start mass producing its medical refrigerators.





# Green Light for greener packaging

Welsh company creates reusable bio-degradable air cushion packaging

 ollowing the world-wide
 drive to cut down on packaging made from polystyrene and other plastics, Green Light
 Products based in Cardiff,
 South Wales has developed an environmentally friendly alternative which can be recycled without having to be disposed of in landfill sites.

The unique Opus Air Cushion System is the only air cushion packaging system designed to operate specifically with biodegradable and recycled films and the Opus Bio biodegradable cushions can be reused, recycled in the appropriate waste stream, or recycled through composting.

Designed and manufactured in Wales, the Opus Air Cushion System inflates and seals the film to create an air cushion to be used to package products for protection. This Opus Bio film is made of High Density Polyethylene (HDPE) and uses a special additive which causes the film to completely break down as measured by ASTM D6954-04 which is the Standard Guide for Exposing and Testing Plastics that Degrade in the Environment by a Combination of Oxidation and Biodegradation. Opus Bio completely biodegrades in 12 to 24 months when in the presence of moisture, micro-organisms and oxygen, leaving no toxic or heavy metal residues and is suitable for top fill, void fill, lining and wrapping to ensure smooth transit of products.

Green Light Products' Opus Air Cushion System - operates at a market-leading



throughput of 11 cubic metres per hour, at speeds of up to 17 metres per minute or 86 cushions per minute . The machine is designed to run 35 different sizes of film whereas other similar systems are only able to run a couple of sizes or sometimes even only one which means that it is more economical for the customer.

The system can also be easily modified to use with ancillary products such as the company's Mini Hopper System which is a pioneering "plug in and go" cushion storage and supply application and its Air Cushion Bin.

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Not only are our products environmentally friendly – they are also cost effective – and our international orders are growing all over the world.

Bruce Yeo Sales Director, Green Light Products



#### Profile

#### Product

Opus Air Cushion System environmentally friendly packaging machine

**Applications** Packaging fill for a range of products

#### Contact

Karl Yeo, Managing Director Green Light Products Ltd Capital Business Park, Parkway Cardiff, CF3 2PX. UK T: +44 (0)29 2079 0880 E: kyeo@greenlightproducts.co.uk W: www.greenlightproducts.co.uk

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# Paying it safe with myPinPad

myPinPad introduces safer PIN input across all major payment platforms

ased in Cardiff, South Wales, myPinPad offers a transformational cloudbased authentication service. Its software can help authorise a number of different transactions or data access and the company's current focus is on providing a global software payment solution.

The payments industry is undergoing unprecedented change and is currently very dynamic. It has attracted huge investment in recent years and has been successfully innovating as consumers and merchants increasingly adopt mobile technologies.

This solution enables the secure processing of both mag-stripe and chip cards. It addresses the challenges of securely authorising card payments using the cardholder PIN on mobile devices such as phones and tablets. Through its highly-scalable cloud based service which presents the cardholder with a one-



time virtual PIN pad – it effectively moves the security elements of the transaction from the device and into the cloud. Via myPinPad, the cardholder can enter his/her PIN securely on touch-screen payment terminals, smart phones, tablets and online. All data relating to the transaction authorisation is effectively invisible and secured until it is checked and authorised by the card issuer.

My PinPad partners with two leading payment systems providers to develop the solution. The first, Alaric, a global supplier of fraud prevention and payments solutions, which was recently acquired by NCR, has announced that it is now offering the innovative myPinPad product along with its

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The solution is of significant benefit to the entire payments ecosystem:

- Improving risk and fraud protection
- Converting card not present (CNP) to card present with PIN transactions, with the consequence of reducing fees and the possibility of chargebacks to merchants and PSPs
- Reducing terminal costs for card acceptance, as standard smart phones or tablets are used
- Enabling acquirers and PSPs to expand the number of merchants who can accept card payments





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The integration of myPinPad will offer benefits to all participants in the payments ecosystem and those who aspire to enter it, no matter whether it is in support of existing debit and credit card payments, or new generation technologies such as wallets or P2P payments. The reductions in fraud, chargebacks and reduced risk are clearly attractive.

David Muxworthy CEO, myPinPad

switching capability. This combination of myPinPad and Alaric's Authentic solution for transaction processing delivers an end-to-end platform for mobile and online payments, with EMV-level security.

MyPinPad's second partnership is with leading data security specialist Thales, who provide the Hardware Security Module (HSM) which effectively translates the encrypted data upon arrival at the secure data centre. Thales HSM's are widely deployed within the global online payment industry.

The integrated Authentic and myPinPad solution seamlessly enables the processing of the entire transaction as a traditional card present payment, irrespective of where it originated. For acquirers and issuers, no system changes are required and transactions will continue to be processed the same as any other card transaction. A key differentiator with this solution is that the PIN is verified online with the issuing bank, as opposed to offline via the card and terminal.

In countries where online PIN is not supported at the point of sale, myPinPad provides an alternative solution for banks and processors, utilising current banking systems/protocols. This online architecture is required by banks payment stakeholders to deliver next generation mobile based wallet payment options.

David Muxworthy, CEO of myPinPad outlined the alternative, "Our aim is to improve security, provide an alternative to complex verification systems which are deterring customers, and deliver enhanced convenience and trust for the customer. More broadly, our ability to be able to facilitate online PIN and EMV level security off a mag stripe has generated significant interest, particularly in the US. Using the myPinPad solution can also enable banks to provide PIN numbers when customers apply for a new credit or debit card. More and more consumers are applying for new cards via their mobile phones. Using myPinPad means that the bank can offer their customer their preferred PIN number on acceptance rather than via a post based mailer. This has several key benefits. Firstly when the card arrives it is ready

to use with the customers preferred and already known PIN number. Second the process is cheaper than the postal alternative. Thirdly it's more secure than the postal method as the mailers can be intercepted by fraudsters. PIN Services and management can be integrated with the banks mobile banking applications adding convenience and a high level of service for customers.

As the payments world moves away from plastic cards and towards the mobile based wallet, authentication of the customer – without a card being present will be the key issue affecting liability and risk– myPinPad provides the solution.

#### Profile

MY PINPAD

Please enter your

PIN number

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#### Product

Global payments authentication platform.
Applications

Enables secure authentication of transactions through direct PIN entry

#### Contact

David Muxworthy Chief Executive myPinPad Ltd 3 Assembly Square, Britannia Quay Cardiff CF10 4PL\_UK T: +44 (0)29 2067 4437 E: davidm@mypinpad.com W: www.mypinpad.com

# **Edukey key to success**

Pembrokeshire's Class Charts are a class act in the classroom

dukey Education based in Pembrokeshire, West Wales, has developed a number of innovative software products in the educational field.

Edukey's latest creation- Class Chartsaims to help save teachers their time and effort through using data rich seating charts, behaviour management, attendance and Q&A assessment.

Duncan Wilson, one of the company's founders, was a former teacher who used seating charts in all of his classes, from years 7-13 and he found that this made a real difference to the learning environment. The seating charts enable teachers to organise students into appropriate learning groups, minimise behaviour issues and assert their authority before the lesson even begins. Class Charts expands on this by allowing the user to create data rich seating plans with options to include and display key data about each pupil, such as any special needs or reading age. This can then be used to intelligently position the pupils in the classroom to maximise peer-topeer learning as pupils can be grouped according to their ability to either work together or support each other's learning. Research from the Montana State University looked at the impact of seating charts on student results in Montana State's Criterion Reference Tests (CRTs). In terms of pupil attainment there is always a concern that the lower ability students have a negative impact on the attainment of the high ability students but the research carried out clearly shows a huge attainment increase for the lower ability students with no detrimental impact on the results of the high ability students

The seating plans created in Class Charts can also be utilised as a behaviour management tool which can be used collaboratively with colleagues to track and analyse student behaviour over time. Class Charts went live in January





2013 and now has over 60,000 teachers and 2 million students on board from all around the world.

Following on from this success, Edukey has announced the launch of a unique Artificial Intelligence Engine which uses student behaviour profiles to automatically create seating charts which are optimised to minimise negative behaviour and disruption. This engine is all part of the new Class Charts Whole School solution which is available in 14 different languages and has been launched worldwide. This solution is able to synchronise with School Information Management Systems (SIMS) by seamlessly combining a school's SIMS (or other type of SIS) with the seating charts and its integrated Artificial Intelligence



analytics feature is unique and shows student behaviour trends as well as identifies those situations which are in need of intervention. The system is even able to identify how students interact with each other based on their relative position in the classroom and the behaviour points recorded. The real-time behaviour tracking gives a clear insight into the behaviour patterns in a school or other environment.

The system clearly visualises the data so that everything a teacher needs can be seen at a glance. Edukey's co-founder, Duncan Wilson says "there is nothing else like it out there."

"In the long-term we plan to continue updating Class Charts with even more amazing features – based upon the feedback of our users. Over the past year, each new feature has originated directly from suggestions sent in by users of Class Charts. We are very lucky to have such a dedicated community that frequently interact with our team, provide suggestions and feedback. With this feedback we have been able to improve Class Charts over and over again to ensure the software delivers a useful and reliable tool for teachers to use in their classrooms."

#### Profile

Product Edukey Class Charts Applications Classroom organisation software Contact Duncan Wilson, Edukey Education Ltd 1 High Street, St Davids Pembrokeshire, SA62 6SA. UK T: +44 (0)845 0946427 E: support@edukey.co.uk W: www.classcharts.com

# Dezrez's desirable software

#### Property management software housed by Welsh company

South-Wales company from Swansea, which was originally created as a property portal but now provides technically advanced software for estate agents and legal conveyancing, has developed a suite of unique packages.

Written on web-based technology and developed in-house, Dezrez's software was revolutionary as the first 'Cloud' solution for estate agents because storing customer data in the 'Cloud' meant that the agent no longer needed to purchase expensive hardware. Dezrez was the first Application Service Provider (ASP) of its kind and providing and supporting software online is a model now followed by many large multi-national organisations.

The company's 'Sales and Lettings' software is a unique tool which allows estate agents to run their offices effectively. It provides full client, property and staff reporting and includes features such as automated property matching. This cloud-based software also incorporates a fully integrated marketing solution as once data is entered it can be used for a variety of applications, such as the creation of marketing materials, as well as being automatically uploaded to key property portals, to the agent's own website and to social media platforms

Supported by Welsh Government funding, the company has also developed its latest 'DezrezPM' system which enables agents to manage properties, deal with accounts and handle property maintenance requests. This unique management system, designed to fill the needs identified by estate agents, was developed in the cloud by in-house developers and runs on the Microsoft Azure platform. Users can securely access all cloud resources and agents are able to look after their stock, landlords and tenants. DezrezPM allows users to manage external accounts and an innovative accounting module allows them to reconcile their end of month, quarterly and yearly accounts. A maintenance module is included to make the process of repairs controllable and ensure that contractors are managed. This management tool ensures that tenants and landlords are looked after professionally and compliantly throughout the rental process.

All of the systems are totally integrated, developed in-house and are used by over 20,000 estate agents in 1,500 branches in the UK and abroad.

To complement its software and keep up with the demands of technology, Dezrez has created an iphone, ipad and android app for estate agents in collaboration with the Centre of Excellence in Mobile Applications and Services (CEMAS). Properties are



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The app has been a success in two ways. Firstly the sales guys love it as it acts as an effective USP when introducing Dezrez to potential customers.

Secondly, we have found that our existing users like the product, really increasing feelings of goodwill towards us. The fact that the app makes them look good in front of vendors and landlords has won us many fans.

Richard Wilson Technical Director, Dezrez

automatically added to the app and vendors have access to their vendor login area. The app has key features including full property search, near me, vendor login, push notifications, fully integrated CMS, share and social networks and more.

Ross Liddell, Operations Director explained "We have always been at the forefront of technology for estate agents and have strived to bring new functionality and tools to the market before anyone else. This has been done by continually developing the product in house with our own development team."

#### Profile

Product Dezrez's estate agent and property management software Applications Office management software Contact Ross Liddell Operations Director Dezrez Services Ltd. Ethos, Kings Road Swansea SA1 8AS. UK T: +44 (0)845 4652222 E: ross.liddell@dezrez.com W: www.dezrez.com

# Moneypenny calls on Penelope

North Wales company answers the calls of businesses and busy professionals

orth Wales based telephone answering specialist, Moneypenny, has developed the UK's first complete call handling solution which is transforming the way small businesses and busy professionals on the go handle their calls.

Designed in-house by the Moneypenny IT and Development Team over a two year period, Penelope is essentially a complete phone system in your pocket with the technology behind it usually the preserve of corporate business.

Moneypenny and Penelope together handle in excess of 8.2 million calls for over 6,500 UK businesses of all shapes and sizes, from sole traders to multi-national corporations.

Penelope was born from the recognition that there are more than 3.6 million micro businesses in the UK potentially struggling to stay in control of their calls (546,000 new small businesses were started in the UK in 2013 alone) but feeling they cannot afford a good quality receptionist or reliable answering service.

Via an app, users can determine what location they want their calls to ring - mobile, landline, home, office, in any configured order or all simultaneously. Users can then answer all calls themselves, wherever they are, or callers are met with a professional welcome greeting. Penelope's Digital Receptionist then filters calls by

prompting callers to say or select who they wish to speak to using patented voice recognition. Calls are then distributed to the right person or department every time. Using this technology, smaller businesses have the advantage of instantly appearing larger than they are. John Wilson

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There are more than 3.6 million micro businesses in the UK potentially struggling to stay in control of their calls If users are unable to take their calls they can direct them to a colleague, voicemail or choose to send all calls, or just those unanswered, to Moneypenny where a Moneypenny PA will answer in their company name, then forward messages on.

Penelope is simple and it is designed to be so for the end user, however, underneath that simplicity lies some really clever technology. Penelope is made up of four key components; an SQL database (where all data and settings are stored); an IVR platform (the telephony); web services (connectivity) and a user Interface (app and portal). All of these components interact efficiently to successfully deliver the service.

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Penelope is the direct result of customer feedback and we have worked tirelessly on its development. We know from Moneypenny that professional and well organised call management is critical for business success. That is why we have built a bespoke solution for growing businesses. Every missed call means missed business; so with Penelope they can fast-track their success.

Glenn Jackson Managing Director Moneypenny



The set-up process is integrated with the largest telecom providers which means that any business can use this service either by keeping their existing number, or choosing a new one from any UK region. Callers are then able to dial this number and, via their smartphone app or the web portal, Penelope's users will have already determined what happens next. At this point voice recognition is critical.

As Moneypenny and Penelope MD Glenn Jackson explains, "most voice recognition systems can be a bit irritating. 'I'm sorry I didn't quite get that' or 'did you say Bob Smith?' when you had actually asked for Rob Penrith. This is where Penelope is different." With Penelope's system what the caller says is checked against two voice recognition engines. One of these looks for words, the other conversations. If they both agree on the outcome then the call is transferred to that person. If they do not agree, then the call is presented to one of Moneypenny's PAs instantly without the caller actually knowing. The PA is then presented with a list of all of the employees who work for that company whilst being played a recording of the caller's actual request. The human ear and brain then matches these together, allowing for the caller to be connected perfectly.

Penelope lives in the cloud therefore all of its servers are situated at data centres connected to the internet. Penelope has three data centres so if there ever is a problem at one, the system is able to use another of these to efficiently deliver the service.

Moneypenny made national and international headlines in 2013 with news of its office in Auckland, New Zealand, where teams of staff from Wrexham spend six months at a time answering nighttime calls for UK businesses during their daytime.

#### Profile

Product Penelope call handling solution Applications For small businesses and busy professionals on the go Contact Lisa Gough Sales Manager, Moneypenny Ltd

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# **Usable clinical data in a CliX**

Welsh company turns medical notes data into simple clinical information

linithink based in Bridgend, South Wales, was founded in 2009 by two physicians with 20 years' of combined healthcare IT and Electronic Medical Records (EMR) experience who understood what was possible if you could unlock the unstructured clinical data within an EMR and return that data as structured. usable clinical information.

Their pioneering work led to the development of CLiX, Clinithink's innovative CNLP (Clinical Natural Language Processing) solution. This patent-pending clinical languageindexing engine takes the benefits of natural language processing a significant step further, delivering a true understanding of clinical language by unlocking unstructured healthcare data and converting it into fully coded, actionable information. Information organisations, such as healthcare providers and insurers and the healthcare technology suppliers that support them, can use CLiX to markedly improve patient care and enhance operational workflows.

Clinithink's CLiX Platform complies with healthcare interoperability standards to produce clinically meaningful, accurate, actionable data from unstructured clinical narrative

Using innovative Clinical Natural Language Processing (CNLP) technology based on proprietary algorithms, Clinithink's CLiX Platform exposes and analyses unstructured clinical data to deliver rich, structured, actionable and meaningful content.

CLiX accesses data stored inside textual, English-language medical notes (clinical narrative), reports, web pages, transcribed output, EMR databases/applications and any other electronic source of free text created by physicians and other care providers.

By outputting the data in a structured form (as encoded SNOMED CT, ICD-9, ICD-10, RxNorm, XML and many other standard



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Our technology adds meaning and structure to that raw material so that it can become usable. computable and actionable data. In turn, that facilitates all kinds of value-added support for the healthcare process in terms of coding, decision-support and big datatype analytics.

Chris Tackaberry, Co-founder and CEO of Clinithink

formats), the user is able to unlock the meaning "trapped" within the free text. Interrogation of unstructured data in healthcare is usually manually processed an error-prone, costly and time-consuming practice. Technology-enabled approaches which allow these unstructured data sources to be leveraged and incorporated into a wider data strategy will be vital to the success of the new care and re-imbursement models as well as for point-of-care decision support, computer-assisted coding, clinical trial candidate identification and epidemiology. Automating the interrogation of unstructured healthcare data brings efficiency, speed and scalability.

The CLiX Platform is able to be integrated into any server-based or cloud-based application and is considered as the engine within all of Clinithink's solutions.

CLiX has been designed specifically to meet the needs of the healthcare sector and developed and implemented by an experienced team of healthcare specialists. Providing benefits beyond other technologies, the system can be used at the point- of-care in real time and is highly scalable with a cost-effective infrastructure delivering outstanding throughput. CLiX has proved itself to be extremely accurate, easy to integrate and guick to deploy.

Clinithink partners with healthcare technology vendors around the world to deliver its solutions.

#### Profile



# **Operators set to get faster networks**

#### Welsh technology supports faster data speeds for mobile networks

ollowing successful research, the University of South Wales and Cardiffbased company Keima Ltd have collaborated to commercialise a novel Metrocell 3D Radio Frequency (RF) Planning technology.

This innovative, mobile and metrocell planning and design tool is integrated within a 3D electromagnetic (EM) simulation platform for microwave, RF and telecommunication applications and addresses a critical problem for the next generation of mobile networks. The use of smart phones and tablets and the increasing demand for high data speeds and fast, reliable connections is putting unprecedented pressure on mobile network infrastructures.

Mobile network operators require a cost effective way to handle this ever-growing demand and support the adoption of next generation mobile phone systems. Part of the problem is that the conventional outdoor macrocell network which provides coverage from large, high-power base stations is struggling to meet the demands of increased mobile subscribers. To avoid a continuing divergence between data growth and revenue, network operators need a new solution and this is driving intense mobile carrier interest in deploying urban small cells, known as metrocells. Metrocells are compact and discrete mobile phone basestations, unobstrusively located in urban areas. They can be mounted on lampposts, positioned on the sides of buildings

or found indoors in stadiums, transport hubs and other public areas. Many operators identify HetNets, a complex interoperation between macrocells, metrocells and Wi-Fi network elements, as a cost effective and technically efficient solution, for improving mobile networks' capacity and coverage.

These metrocells offer mobile network operators a cost effective solution but they also require careful planning. All of the existing planning tools are based on the conventional macrocell network and are unsuitable and inaccurate when applied to metrocell networks.

In response to this problem, Dr Al-Daher at the University's Wireless & Optoelectronic Research & Innovation Centre has developed a lab-based, computationally efficient, highly accurate RF radio planning analytical model. This unique tool enables more efficient planning and design of point-to-point and point-to-multipoint high speed radio links using high resolution Lidar data of the urban area. The technique traces the signals as they travel through the environment. The system developed by the University of South Wales automatically processes the Lidar data to yield an indexed mesh of the propagation geometry comprising of triangular surfaces. The size of the geometry is rationalised and reduced after coupling with the transmitter antenna position and bandwidth. The raytracing tool employs a variety of sophisticated techniques enabling an adaptive, non-uniform grid of receiver positions. These include full 3D antenna radiation patterns which the rav-tracing tool utilises for devolving smart criteria in field calculations. The propagation analyses deployed

by the tool are comprehensive and based on reflection, double reflection, diffraction, diffraction reflection and penetration. The ray-tracing tool also includes MIMO (Multiple Input Multiple Output) capabilities and capacity calculations.

A technical and commercial work plan has been carried out which demonstrates how the planning tool meets industry requirements and this has produced a series of 3D network designs for locations in both South Wales and England. The collaboration with Keima Wireless, a Welshbased supplier of RF planning solutions for mobile and wireless broadband network design enables the tool to be validated in a commercial environment and offer a potential route to market.

This development is a strong example of collaboration, having received funding from Welsh Government and supported by Nokia Siemens Networks and LCC, both market leaders in the field of wireless broadband communications. Cardiff, Newport and Cambridgeshire county councils have also offered to support the project with real-world data and trial the tool in order to develop case studies.

Dr Al-Daher said "Our aim now is to develop a stand-alone 'plug-in' software module which can be integrated into existing RF planning software solutions. We are targeting radio planning software developers as potential licensees to receive demonstrations."

The University will also explore wider potential applications of the technology including WiFi networks, Smart Cities and cellular backhauls.



#### Profile

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# New genetic mutations shed light on schizophrenia

Genetic mutations open new windows into the disorder

enetic mutations in people with schizophrenia cluster in specific proteins offering a 'new window' into the disorder, according to a team of scientists.

In the largest genetic study of its kind, which has been published in the journal Nature, an international team led by Cardiff University examined the occurrence of new genetic mutations in people with schizophrenia.

Working alongside teams from leading research institutions, including the Icahn School of Medicine at Mount Sinai, New York, the Broad Institute of the Massachusetts Institute of Technology (MIT), Harvard, and Cambridge Universities, they examined DNA blood samples from 623 sufferers and their parents.

The study showed that "de novo" mutations, which are found in affected individuals but not in their parents, play a role in triggering the disorder but more importantly that they preferentially disrupt the specific sets of proteins which have related functions in the brain.

These pathways are involved in modulating the strength of connections between nerve cells and they play important roles in brain development, learning, memory and cognition.

"We already had evidence from previous work in Cardiff supporting the importance of these pathways but the new findings, together with those from another study published in the same issue of Nature, confirm the importance of these and related sets of proteins,"



according to Professor Mike Owen from Cardiff University's MRC Centre for Neuropsychiatric Genetics and Genomics, who co-led the research.

"This degree of convergence from several studies is unprecedented in schizophrenia genetics and tells us that for the first time we have a handle on one of the core brain processes that is disrupted in the disorder," he adds. Professor Owen's previous work on the pathways was highlighted in Advances 60.

As well as identifying how genetic mutations impact on brain function the findings also indicate an overlap with the causes of other neurodevelopmental disorders including autism and intellectual disability.

Professor Mick O'Donovan from Cardiff University's MRC Centre, who jointly led the research added, "The fact we've been able to identify a degree of overlap between the underlying causes of schizophrenia and those in autism and intellectual disability suggests that these disorders might share

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Understanding how our genetic code contributes to Schizophrenia is crucial if we are to develop better, safer treatments. This study adds a body of rapidly emerging research being funded by the Medical Research Council on the role of the genome in mental illness. Such advances in developmental biology will help us to unravel the complexity of emotional and behavioural disturbances.

Professor Hugh Perry, Chair of the MRC Neurosciences and Mental Health Board

some common mechanisms and lends further weight to calls for research that integrates findings across multiple disorders.

"We need research that takes into account genetics, cognitive science, imaging and other sources of information rather than relying solely on clinical definitions for psychiatric disorders."

#### Profile

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#### MEDICINE

# Swansea research findings may help the fight against cancer

Pathways hold hope of drug to block the paths of cancer genes

major piece of Swansea University-led research led by Professor Steven Conlan and Dr Deyarina Gonzalez from the University's College of Medicine, has unravelled a complex molecular mechanism controlling the regulation of genes.

The research has been published in top ranked journal "The Proceedings of the National Academy of Science" of the United States of America, better known as PNAS. The work, which was funded in part by a Cancer Research UK grant to Professor Conlan, has unravelled a complex biochemical mechanism involving 'Mediator' a 'molecular switchboard' found in organisms from yeast to man.

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Made up of over 20 proteins, Mediator is an evolutionary conserved large multisubunit protein complex involved in gene regulation which is structurally conserved between species with a central role in regulating RNA polymerase II– transcribed genes.

It serves as a 'molecular switchboard' by bridging the general transcription machinery and function-specific DNA binding proteins and playing a dynamic role in regulating a wide range of processes, involving, for example, thyroid and vitamin D receptors. The role of Mediator appears to be in the fine tuning of the activation and repression of gene expression in many organisms, yet the underlying mechanisms of how its own function is regulated remains to be unravelled.

The Swansea team have found one of the ways the 'switchboard' can turn off its own function and therefore shut down the expression of genes. This study demonstrates how a cascade of molecular events enables Mediator components to dynamically regulate the function of the Mediator complex, and in turn to control large sets of genes.

Put simply, now that the team understand the molecular mechanism controlling the regulation of genes and have found out the very distinctive steps along the pathway, they can focus on whether they can develop a drug that can target or "block" the steps in the mechanism they have uncovered, which may ultimately lead to the prevention of further development of cancer in patients.

The work was undertaken in collaboration with groups at the University Medical Centre in Utrecht, The Netherlands, and the European Molecular Biology Laboratory (EMBL) in Germany.

Professor Steve Conlan said: "We are still in the very early stages of this research, but these findings are an encouraging start and open the way for developing targeted interventions (or drugs) to control gene expression in human diseases.

"In particular, Dr Gonzalez and I, together with our colleague Dr Lewis Francis, who co-lead Reproductive Biology and Gynaecological Oncology research in Swansea's College of Medicine, will now take these findings and apply them to our research into endometrial (uterine) and ovarian cancer, which will have the ultimate aim of preventing the further development of cancer in patients."

#### Profile

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