

BIOENGINEERING SUCCESS AT VENTURE CATALYST CHALLENGE 2017

By Kemi Aofolaju and Graham Peyton

The Venture Catalyst Challenge (VCC) is a 6-week deep science and technology pre-accelerator which helps engineers and scientists make an impact in the world of entrepreneurship. The finalists were selected from over 300 teams and put through an intensive process to test their markets and commercial viability. The aim of VCC is to ensure that all participants gain a strong foundation in building a venture, in order to take their world-changing innovations to the next level.

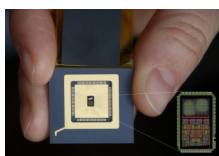
This year, Bioengineering student start-up Microsonix took home the £10,000 prize in March's final.



Microsonix team from L—R: Graham Peyton, Dr Robert Learney and Hamid Soleimani.

Founded by PhD students Graham Peyton and Hamid Soleimani, Microsonix are shrinking the components of ultrasound machines down to a single chip. The outcome is a low-cost, portable medical imaging device that can connect to tablets or smartphones.

Ultrasound imaging is an indispensable tool for diagnosing a range of diseases. However, in low-resource communities, there is a desperate scarcity of such technology because devices are either unwieldy, or too expensive and highly sophisticated. Seeing this problem, Graham Peyton began work on his PhD in 2014 under the supervision of Professors Manos Drakakis and Martyn Boutelle on developing a highly miniaturised ultrasound imaging device. His work focuses on integrating all the components of the system on a single chip, thereby pushing down the size of the system, as well as the power consumption and ultimately the price. His vision is to put the chip into a small hand-held scanner, the "SonoPen", and ultimately miniaturise the technology further into a swallowable endoscopic capsule for diagnosis of Crohn's disease.



The ultrasound chip designed by Graham Peyton will be placed in the "SonoPen", a diagnostic device which will undergo clinical trials in 2018.

Seeing the immense potential of the idea, Graham filed a patent for his work and formed a team, Microsonix, together with Hamid Soleimani and Dr Robert Learney, who are both part of the department of Bioengineering. The team is also supported by De Clercq Wentzel who is currently pursuing an MBA at UC Berkeley Haas. Microsonix applied to the Venture Catalyst Challenge (VCC). Their aim is to develop a commercial version of the "SonoPen" which will undergo clinical trials at Queen Charlotte's and Chelsea Hospital by 2018.

The event also saw fellow Bioengineering team *OpenSense* receive the £5000 runners up prize.

OpenSense presented their postage stamp-sized paper air sensor, which when placed on the back of a smartphone could help Londoners gather vital data in the fight against air pollution.

The *OpenSense* sensor has already garnered media attention having been featured in the [London Evening Standard](#) and a spin-out company has now been formed in order to commercialise the technology.

OpenSense founders Michael Kasimatis, Giandrin Barandun and Max Grell state that their device "delivers real-time pollution data to anyone, anywhere and the only thing they need is technology they already have, their smartphone."



The postage stamp-sized *OpenSense* paper air sensor could help Londoners gather data in the fight against air pollution.

Other Bioengineering students to take part in VCC 2017 are:

Accunea: Robert Learney and Jez Marston, PhD

Medbotics: Guillem Güell Garcia and Dan Terracina Barcas, MSc

NIMO-PD: Suraj Shankar MRes and Mohammed Khwaja MSc.

The Department would like to congratulate every student and member of staff involved in presenting such ground breaking and innovative products to this year's Venture Catalyst Challenge.

Imperial Bioengineer

Mar-May 2017

WELCOME TO THE DEPARTMENT

Welcome to new starters:

- **Saima Ahmed**, RA with Dr Niamh Nowlan
- **Silvia Ardila Kimenez**, RA with Professor Holger Krapp
- **Gerolamo Carboni**, RA with Professor Etienne Burdet
- **Josef Goding**, RA with Dr Rylie Green
- **Alejandro Adrian Granados Catsros**, RA with Dr Reiko Tanaka
- **Nicolas Kyllilis**, RA with Dr Guy-Bart Stan
- **Kaushik Mukherjee**, RA with Dr Niamh Nowlan
- **Professor Ralph Müller**, Visiting Professor
- **Georgios Pothoulakis**, RA with Dr Tom Ellis
- **Matthew James Rickman**, Research Technician with Dr Christina Warboys
- **Vivek Raj Senthivel**, RA with Dr Tom Ellis
- **Ivan Vujaklija**, RA with Professor Dario Farina
- **Katharina Wilmes**, RA with Dr Claudia Clopath

We will sadly be saying goodbye to a number of colleagues who are leaving. We wish them the best in their new roles:

- Alister Bates
- Atsushi Takagi
- Caroline Golden
- Chin-Hsuan Lin
- Franck Gonzalez
- Inaki Sainz de Murieta Fuentes
- Maximilian Wdowski
- Paolo Cardinu
- Susu Chen
- Tracey Glenister

UPCOMING EVENTS

Engineering Biology Showcase

06 Jun 2017 14:30 - 18:00 Imperial College Business School

Register through [Eventbrite](#)

Diversity in Engineering

13 Jun 2017 12:00 - 13:30 EE611

Open to all

The Bioengineering Lecture

22 Jun 2017 17:30 - 18:30 G16, SAF Building
[The Power of Miniaturization in Medicine](#)

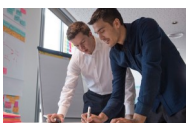
Professor Sangeeta Bhatia, Director, Laboratory for Multiscale Regenerative Technologies & Professor, MIT, Boston, USA
Open to all

Imperial Neuroscience Research Day (INeRD) 20 Sep 2017 12:00 - 18:30 Hammersmith Campus

Keynote talk, panel discussion, poster displays and networking. For more information, please email [Dr Katerina Kandylaki](#)
Open to Researchers

IN THE NEWS

Research Associates Dr Paul Rinne and Dr Michael Mace took part in the Dubai 100 day accelerator programme to develop the business behind 'gripAble', a portable hand-grip device designed to improve the rehabilitation of patients with upper-limb function difficulties.



Dr Paul Rinne and Dr Michael Mace

The accelerator programme was created for start-up companies with tech-driven solutions to global health challenges.

Paul describes the challenges experienced and lessons learned during the programme in an [interview published online by Vision](#).

Upon their return from Dubai, Paul and Michael have been keen to share their experience of the successful programme with Bioengineering staff and students and have since hosted the Dubai 100 team at Imperial for an information session. Students were given the opportunity to ask questions directly to the head of Dubai 100, Roland Daher, and find out more about what the accelerator has to offer potential entrepreneurs.

STAFF & STUDENT SUCCESS

Congratulations are due to:

- **Miroslav Gasperek** who has been awarded an Engineering Leaders Scholarship by the Royal Academy of Engineering.
- **Professor Colin Caro** who was recently made an Honorary Member of the British Microcirculation Society in recognition of his long-standing and distinguished contribution to science and the Society
- **Paschal Egan, Niraj Kanabar** and **Edit Toth** who were recognised by the Provost at an award ceremony this May for their contribution in Excellence in Health and Safety.
- **Andrea Laine** and **Dr Phyllis Quinn** for completing the Springboard Women's Development Programme here at Imperial College
- **Martin Holloway** who won the Imperial Student Choice Award for Best Tutor
- **Julia Sun** who won the Imperial Student Choice Award for Best Graduate Teaching Assistant for the second year in a row.
- **Dr Paul Chadderton, Dr Spyros Masouros, Dr Tobias Reichenbach** and **Dr Reiko Tanaka** on being promoted to Senior Lecturer.
- **Dr Claudia Clopath** on being promoted to Reader.
- **Dr Simon Schultz** on being promoted to Professor.

PUBLICATIONS

Be sure to check out the Department's recent publications, some of which are included here:

Esuabom Dijemeni, Gabriele D'Amone, Israel Gbati, *Is drug-induced sedation endoscopy surgical decision-making process objective and systematic?*, European Archives of Oto-Rhino-Laryngology (2017), [doi: 10.1007/s00405-017-4544-5](#)

Thomas E. Ouldrige, Pieter Rein ten Wolde, *Fundamental Costs in the Production and Destruction of Persistent Polymer Copies*, APS Physics (2017), [doi.org/10.1103/PhysRevLett.118.158103](#)

Thomas E. Ouldrige, Christopher C. Govern, and Pieter Rein ten Wolde, *Thermodynamics of Computational Copying in Biochemical Systems*, APS Physics (2017), [doi: 10.1103/PhysRevX.7.021004](#)

Katerina D. Kandykaki, Karen Henrich, Arne Nagels, Tilo Kircher, *Where Is the Beat? The Neural Correlates of Lexical Stress and Rhythmical Well-formedness in Auditory Story Comprehension*, Journal of Cognitive Neuroscience (2017), [doi: 10.1162/jocn.01122](#)

Mehrdad T. Kiani, Claire A. Higgins, Benjamin D. Almquist, *The Hair Follicle: An Underutilized Source of Cells and Materials for Regenerative Medicine*, ACS Biomaterials Science & Engineering (2017), [doi: 10.1021/acsbomaterials.7b00072](#)

Eunjung Kim, Limor Zwi-Dantsis, Natalie Reznikov, Catherine S. Hansel, Shweta Agarwal, Molly M. Stevens, *One-Pot Synthesis of Multiple Protein-Encapsulated DNA Flowers and Their Application in Intracellular Protein Delivery*, Advanced Materials (2017), [doi: 10.1002/adma.201701086](#)

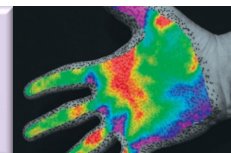
UPCOMING EVENTS

BSSM Postgraduate Experimental Mechanics (PGEM) Conference 16-17 Nov 2017 Imperial College London

The BSSM PGEM Conference aims to bring together PhD/MPhil postgraduate students and early career researchers involved in the field of Engineering measurement and experimental techniques in stress, strain and vibration analysis. The conference provides an excellent opportunity to share and discuss their current research in a low pressure and relatively informal environment, learn about research projects at other institutions, network amongst like-minded people and make contacts for the future. For more information, please contact [Dr Hari Arora](#).



PGEM
Postgraduate Experimental Mechanics
Conference 2017



SPOTLIGHT: IC HEALTH HACK

By Miroslav Gasperek, Imperial College London Bioengineering society

On 18-19 March, the Bioengineering Society, Department of Computing Society and MedTech Imperial organised the first Imperial College hackathon focused on the development of games and software to solve current healthcare issues.

Participants of IC Health Hack included students from Imperial, University College London and University of Oxford who were given two days to create software and hardware solutions. These solutions were then presented to a panel of judges which included Professor Etienne Burdet, Dr Ben Almquist (Bioengineering) and the founder of the IC Health Hack, Dr James Kinross (Dept. of Surgery & Cancer).



The winners of the Fizzyo Challenge, team [Phlegm Buster](#), aimed to create a modern AR/VR game, which would combine both software and hardware solutions for data collection and analysis. They focused on personalising the experience by providing 3D-printed designs of popular characters that could be attached to the Fizzyo device.

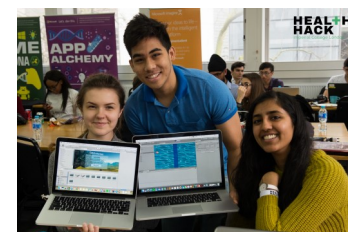
The overall winners of the IC Health Hack, [Turn Up](#), used data analytics to minimise the number of missed appointments with GPs. The Turn Up team were given the opportunity to receive direct mentoring by data analytics consultants from McKinsey & Company.

As organisers, we are pleased to have fulfilled the main objective of the event: to enable people from different backgrounds to look at health care problems from different perspectives and collaborate on meaningful projects that could be further developed. The first IC Health Hack was a success – and we believe that IC Health Hack 2018 will be greater and even more spectacular!

Participants could choose to solve self-defined problems or join the [Fizzyo Challenge](#) set by Microsoft, one of the sponsors of the event. Competitors in this category were tasked with developing a game that would enable children suffering from cystic fibrosis to use the Fizzyo device to remove excessive mucus from their airways. This would then allow for useful data collection and analysis.

Microsoft brought in a team of researchers, clinicians and software engineers who mentored participants and assisted during the competition.

The winners of this particular category were team [Tower Blocc](#), composed of second year bioengineers from Imperial and a fourth year Imperial medicine student. Members of the team then visited Great Ormond Street Hospital so that children suffering from cystic fibrosis could try their game.



To conclude, I would like to express my gratitude to all who assisted in organising the IC Health Hack, especially Tencho Tenev, second year Computing student, for his exceptional competency as the main organiser of the event. We would also like to acknowledge other sponsors, especially the Department of Bioengineering for the provision of hardware, and City and Guilds College Union (CGCU) for their financial support.

GRANTS

Dr Tom Ouldrige awarded The Royal Society grant for his project called "Engineering artificial push-pull networks from DNA". (£111,092)

Dr Reiko Tanaka awarded The Royal Society grant for her project entitled "Development of predictive models for disease progression of atopic dermatitis using machine learning methods". (£15,000)

Dr Claudia Clopath awarded a Biotechnology & Biological Sciences Research Council grant for her project called "Dopamine induced hippocampo plasticity: synaptic model of foraging in mice". (£179,506)

Professor Anthony Bull awarded an Engineering & Physical Sciences Research Council grant for his project called "Osteoarthritis Technology NetworkPlus (OATech+): a multidisciplinary approach to the prevention and treatment of osteoarthritis". (£41,050)

Professor Anthony Bull awarded a Royal British Legion grant for the Centre for Blast Injury Studies (CBIS). (£5mil)

Dr Mengxing Tang awarded a British Heart Foundation grant. (£50,000)

Dr James Choi, Dr Magdalena Sastre and Dr Simon Schultz awarded an Alzheimer's Research UK grant for their project entitled "Ultrasound delivery of BACE1 inhibitors across the blood-brain barrier in a model of Alzheimer's disease". (£249,203)

Dr Nicolas Newell, Dr Spencer Barnes and Dr Deborah Adkins awarded a Dame Julia Higgins Engineering Postdoc Collaborative Research Fund grant for their project called "Additive manufacture of a spine surrogate for assessing injury risk during under vehicle explosions". (£3,000)

Professor James Moore Jnr awarded a Wellcome Trust grant for his project called "Integrative Transport Phenomena in Chemokine Gradient Establishment". (£2mil)

NEW ACADEMIC STAFF



The Department of Bioengineering would like to welcome **Dr Huai-Ti Lin** who joined us as a lecturer in May.

Dr Li writes:

"I am fascinated by how animals move and how they guide their movements. This interest has led me to study locomotion, neurobiology, bio-inspired robotics, and animal flight. My early training as a physicist shapes how I ask questions. Specifically, I am interested in how neural information is coupled to the physical bodies to produce highly sophisticated biological motor control and intelligent behaviours. I enjoy working with animals on the organismic level both in the lab and in the field. I have found insects excellent in providing neuromechanics topics for my research.

In the past few years, I have been refining techniques to enable insect-scale motion capture using the dragonfly as a model system. This will allow us to interrogate insect behaviours using robots in closed-loop. I have also been pushing the application of ultra-light wireless neural recording system which will be the centrepiece of my lab at Imperial.

The dynamic interaction between biomechanics and neural circuits has some of the most direct implications to bio-inspired technologies (e.g. robotics). Besides developing new technologies for neuromechanics research, I will also be engaged in translating what we learn from insect sensors, behavioural strategies, and control mechanisms into robotic applications (flying or not flying). After 6+ years of postdoctoral research, I came to define my research domain and found an appropriate place to plant it. It is my upmost pleasure to join the Department of Bioengineering."

OUT AND ABOUT

Dr Christina Warboys presented a talk at the 12th International Symposium on Biomechanics in Vascular Biology and Cardiovascular Disease in Rotterdam. The talk was entitled 'Inhibition of β -catenin-dependent transcription alters responses to disturbed flow in human aortic endothelial cells'.



Professor James Moore Jnr gave a seminar regarding his research on the role of biomechanics in cardiovascular diseases at the Devices for Cardiovascular Disease AHSC Seminar Series at the Royal Brompton Hospital.

Professor Colin Caro attended the Imperial Long-Servers Dinner on the 15 May at the Queens Gate. Prior to the dinner, College President Professor Alice Gast gave a presentation and each long server (including Professor Caro who has been at Imperial for over 50 years) received a gift.

Professor Etienne Burdet will be giving a keynote lecture on "Haptic communication between humans and with robots" during the ISIR ten year celebration Colloquium taking place on June 15 at Universite Pierre et Marie Curie Paris VI.

DEPARTMENTAL AWAY DAY



The Department of Bioengineering academic and support staff away day was held on the 28th April. Organised by our head of department, Professor Anthony Bull and department operations manager, Graeme Rae.

The first part of the day took place in the new Bioengineering space, which is situated in Bessemer Levels 1 & 2. It was a day of

discussion and sharing ideas in mixed teams with a fantastic time being had by all.



NOTICES



As part of the Department of Bioengineering's Core Facilities Upgrade, certain labs within Bessemer Level 6 will be moving to our new space in The Incubator, Bessemer Level 1. This will allow for the co-localisation of facilities, increased optimisation and space for growth.

If you have any questions or concerns, please contact a member of the technical team.

CONTACT

Send news for the next issue to:

Kemi Aofolaju
Departmental Secretary