



European Research Council

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- Examples of ERC Proof-of-Concept Grant projects 2013 -

Physical Sciences and Engineering

How technology can help to rescue skiers caught in avalanches

Avalanche accidents kill people every winter. The survival rate is 90% if the victims are rescued within 15 minutes, but this figure drastically decreases after 45 minutes. With his PoC grant, Prof. Björn Ottersten is looking at ways to speed up the response time of rescuers, and in doing so save lives. While various electronic devices exist to locate skiers, they are not easy to use. The introduction of smartphones has revolutionised the use of mobile services. This ERC-funded project aims to develop a smartphone app which would be able to locate the injured skier just by using the signals emitted by the other skiers' devices. This new technology is revolutionary, as it does not require consumers to purchase any extra equipment. By wirelessly connecting various clusters of smartphones in the same vicinity, it would transform them into free, independent positioning devices. The idea derives from the research conducted by Prof. Ottersten in electrical engineering, and in particular from his ERC Advanced Grant's work on the analysis and design of multi-dimensional transmitters and receivers used in wireless communications.

ERC Grantee: **Prof. Björn Ottersten**

Host institution: Kungliga Tekniska Högskolan, Sweden

ERC Projects:

Cooperative Infrastructure Redundant Positioning by Consumer Devices (COREPOS)

Agile MIMO Systems for Communications, Biomedicine and Defense (AMIMOS)

ERC Funding: Advanced Grant 2008 (AMIMOS) € 1.8 million for five years and PoC Grant 2013 (COREPOS) € 150,000 for one year.

Measuring 'rogue waves' in extreme sea conditions

Recently, a new type of wave buoy reportedly measured a record wave height of 23.4 metres off the Northwestern coast of Ireland. Prof. Dias, an applied mathematician working in Ireland, aims to produce finely-attuned sensors for a similar buoy specially designed to measure such 'rogue waves' in extreme sea conditions. During his previous ERC project he studied the fundamental mechanisms underlying the physics of rogue waves – large coherent structures which emerge from a turbulent background. However, testing his theories about these structures proved more difficult, given the low reliability of conventional buoy measurements, especially in extreme conditions. So Dias has now secured a Proof-of-Concept grant to test his own measurement system, combining his research on the physics of extreme waves with the recent developments in buoy design, in order to optimise the new technology for waves of high amplitude and steepness. Commercial applications, if successful, would include marine renewable energies, shipping, marine forecasting, and ocean observation.

ERC Grantee: **Prof. Frederic Dias**

Host Institution: University College Dublin, National University of Ireland

ERC Projects:

Multidisciplinary Studies of Extreme Nonlinear and Rogue Wave Phenomena (MULTIWAVE)

Calibration of extreme wave measurement on the ocean surface (WAVEMEASUREMENT)

ERC Funding: Advanced Grant 2011 (MULTIWAVE) € 1.8 million for five years and PoC Grant 2013 (WAVEMEASUREMENT) € 150,000 for one year.



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Life sciences

Developing better treatments for psychiatric disorders

Dr Binder's research examines the molecular mechanisms which determine our long-term stress responses. Her ERC Starting Grant (GxE-molmech) explores the risk factors and triggers that predispose patients towards depression and anxiety disorders, such as Post Traumatic Stress Disorder (PTSD). The aim is to better determine the biology of these illnesses so that more appropriate treatments can be identified. Dr Binder and her team have isolated a molecular trigger (known as FKBP5) which is commonly accepted as a risk factor in the development of depressive illnesses and PTSD. Her "Proof of Concept" Grant aims to build upon these discoveries by undertaking an analysis of both the technical feasibility and the economic market for developing drug therapies which target FKBP5. This preparation is necessary in order to amass the weight of pre-clinical data needed to establish such drugs as a viable prospect. Her earlier grant has enabled her to identify a group of patients who would benefit from such personalised treatments. The challenge now is to move towards clinical validation of these new therapeutic tools by developing a pharmacological basis that meets industry standards, and an IP portfolio to match.

ERC Grantee: **Dr Elisabeth Binder**

Host Institution: Max-Planck-Institut für Psychiatrie, Munich, Germany

ERC Projects:

Development of FKBP51-Inhibitors to treat stress-related disorders: assessment of feasibility (FKBP2Drug); Gene x environment interactions on affective disorders – elucidating molecular mechanisms (GxE-molmech)

ERC Funding: Starting Grant 2011 (GxE-molmech) €1.25 million for five years and PoC Grant 2013 (FKBP2Drug) €150,000 for one year.

The role of genetic inversions in inherited diseases

Dr Cáceres' ERC Starting Grant (INVVEST) examines the functional and evolutionary consequences of one particular type of structural variations in the human genome: inversions. Drawing on both empirical data and bioinformatics, Dr Cáceres and his team are exploring the association between genetic structural variations and the inheritance of particular diseases and traits. With his "Proof of Concept" funding, this research will be taken forward. The aim is to conduct a feasibility study for the development of a diagnostic kit that could genotype inversions. This background work, including a market analysis and Intellectual Property protection, is necessary in order to test the robustness of this tool for diagnostics and research applications before reaching out to an industrial partner. The contention driving this project is that new techniques are required for genomic inversions because they typically do not alter the amount of DNA, and so are not susceptible to existing forms of analysis. Inversions play a role in the development of inherited diseases such as haemophilia and Hunter's syndrome. Thus, a thorough study is required before bringing to the market tools which could identify personal genetic information in these cases: a breakthrough which could lead to new diagnostic methods and treatments.

ERC Grantee: **Dr Mario Cáceres**

Host Institution: Institució Catalana de Recerca i Estudis Avançats (ICREA) and Institut de Biotecnologia i de Biomedicina (IBB), Universitat Autònoma de Barcelona, Spain

ERC Projects:

A novel high-throughput tool to genotype human genome inversions for personalised medicine (INGENIHUS); Evolutionary and functional analysis of polymorphic inversions in the human genome (INVVEST)

ERC Funding: Starting Grant 2009 (INVVEST) €1.48 million for five years and PoC Grant 2013 (INGENIHUS) €150,000 for one year.



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Social Sciences and Humanities

The commercial value of a good listener

Is the 'a' in *bath* like *bar* or like *bat*? A small difference, but in reality every person pronounces every word differently, even when they repeat themselves. Most Automated Speech Recognition systems (i.e. computer systems you can talk to) require extensive training from thousands of recorded speakers just to master the variation within one dialect. Prof. Lahiri plans to solve this problem by adapting her linguistic model of the human cognitive representation of words to create a new system, called Flexible Speech Recognition (FlexSR). Lahiri's theoretical model claims that humans store a very basic acoustic representation of each word, accepting wide variation in the sounds themselves and recognising words by their general pattern. This method will be applied to FlexSR, so that the system can identify words across a wide range of speakers and dialects by extracting approximate sounds and matching these patterns with its internal word list. Without the need for extensive training, the new system is easily adaptable to other languages. So far, plans for FlexSR extend only to single word recognition. However, Lahiri hopes to use it as a demonstration system to attract speech technology companies, who may want to develop the method further and use it in commercial applications.

ERC grantee: **Prof. Aditi Lahiri**

Host institution: University of Oxford, UK

ERC projects:

Words: Asymmetry, change and processing in phonological mental representation (WORDS)

Flexible Speech Recognition System (FlexSR)

ERC Funding: Advanced Grant 2010 (WORDS) € 2.4 million for five years and PoC Grant 2013 (FlexSR) € 148,000 for one year.