European Research Council

Established by the European Commission

Brussels, 15 December 2014

- Examples of ERC Starting Grant projects 2014 -

3D printing wearable thermoelectric textiles

Our body heat is one of the most plentiful energy sources available, but it is often wasted. With the support of an ERC Starting Grant, Dr Christian Müller hopes to develop wearable materials able to generate electricity by capturing our body heat. These thermoelectric textiles could power many of the devices that need to be used over an extended period of time without requiring repair or battery replacement or additional maintenance – off-the-shelf medical monitors of blood pressure, for example, or the mobile devices envisaged to make up tomorrow's 'Internet of Things'. The textiles developed in Dr Müller's research could also even replace micro-batteries. For the first time, these thermoelectric textiles would be non-toxic, light-weight and inexpensive. The ThermoTex project proposes use of polymer semiconductors as a promising alternative to the metal alloys currently used for thermoelectric generators. Furthermore, the research team expects to demonstrate feasibility and practicality of both weaving and 3D-printing these wearable thermoelectric textiles.

ERC grantee: Dr Christian Müller
Host institution: Chalmers University of Technology, Göteborg, Sweden
ERC project: Woven and 3D-Printed Thermoelectric Textiles (ThermoTex)
ERC funding: €1.5 million

Improving user interface designs

How could computers be easier to use? What is the recipe for the best user experience? What is the best possible interface for a given task? Dr Antti Oulasvirta has been awarded an ERC Starting Grant to research how user interfaces can be optimised. The design process behind the interfaces we encounter on a daily basis is often inefficient and expensive, and does not guarantee an optimal, or even provably good, user experience. Dr Oulasvirta's research will establish a general methodology to identify optimal user interface designs. The interdisciplinary research team, comprising computer scientists, cognitive scientists, and designers, aims to improve user interfaces in terms of productivity, ergonomics, safety and satisfaction. The team will consider how the computer keyboard could be optimised for speed and comfort, for example. They will also demonstrate how a car dashboard might be best designed to accommodate safe user interaction and the challenge of multitasking. The research project will contribute significantly to the design process of user interfaces encountered by billions of people every day.

ERC grantee: Dr Antti Oulasvirta
Host institution: Aalto University, Finland
ERC project: Computational User Interface Design (Computed)
ERC funding: €1.5 million

European Research Council

Established by the European Commission

How nose sensors are being used to fight antimicrobial resistance

Antimicrobial resistant bacteria are a global threat to the effective prevention and treatment of an ever-increasing range of infections, causing over 25,000 deaths annually in the EU and costing over €1.5 billion a year. At present, microbial detection and identification takes between 24 and 36 hours, but for slow-growing bacteria, such as those causing tuberculosis, it can take more than a week. With the support of an ERC Starting Grant, Dr Ana Cecília Roque and her team will develop the urgently needed tools for rapid identification of bacterial infections. Unusual human odours have been recognised as disease indicators since Hippocrates. Now, Dr Roque will develop bioinspired nose sensors as a fast and needle-free method of microbial detection. The team will research how new types of stimulus-responsive materials will be able to detect and identify bacteria, in particular those most prevalent in human infections and associated with antibiotic resistance. The research will reduce detection times to a matter of seconds, and the research team hopes that by identifying bacterial infections so much sooner, lives will be saved, antibiotic abuse restrained, and the spread of infection better controlled.

ERC grantee: Dr Ana Cecília Roque
Host institution: Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa
ERC project: Hybrid Gels for Rapid Microbial Detection (SCENT)
ERC funding: €1.5 million

Understanding chronic inflammation in cancer

Cancer related inflammation (CRI) is a long established hallmark of cancer. Dr Nadine Laguette's ERC-funded research aims to decipher the molecular basis underlying chronic inflammation in cancer. It has already been demonstrated that SLX4 – a protein involved in DNA repair – suppresses the inflammation associated with HIV and therefore has a role in controlling immune responses to inflammation. This research will consider how a deficiency in SLX4 might lead to cancer tumour-promoting chronic inflammation. Dr Laguette will investigate the relationship between repression of inflammation by SLX4, DNA damage, and cancer related inflammation. Findings made using SLX4 deficiency as a model cancer susceptibility syndrome will be extended to additional DNA repair proteins defects. With an ERC Starting Grant, Dr Laguette and her team will do this by identifying the determinants engaged in the absence of SLX4. A better understanding of the molecular process of cancer related inflammation will open unforeseen perspectives in the treatment of cancer patients.

ERC grantee: Dr Nadine Laguette
Host institution: CNRS, France
ERC project: Molecular basis of the cross-talk between chronic inflammation and cancer (CrIC)
ERC funding: €1.5 million

European Research Council

Established by the European Commission

'Toxic Expertise' and Environmental Justice

Disadvantaged communities around the world are disproportionately burdened by environmental health hazards, and the affected residents have struggled with the challenges of scientific proof demonstrating the risks to health. What are the forces that underpin these inequalities? With an ERC Starting Grant, urban sociologist Dr Alice Mah will lead an interdisciplinary study into so-called 'toxic expertise': scientific expertise about the effects of toxic pollution, and the 'toxic' way in which this expertise is (mis)used to justify a lack of corporate social responsibility by the petrochemical industry. The project will examine the claims, debates, and actions within the petrochemical industry to gain an insight into the uneven global politics of oil and energy. The research will form the basis of a new resource to address the problem of 'information poverty' with regard to environmental health hazards. This will comprise an interactive web platform about how best to measure and report the health impacts of toxic pollution, in addition to online, crowd-sourced pollution 'big data'.

ERC grantee: Dr Alice Mah
Host institution: University of Warwick, UK
ERC project: Environmental Justice and the Global Petrochemical Industry (ToxicExpertise)
ERC funding: €1.5 million

The building blocks of the human mind

Have you ever stopped to think about where your ability to reason comes from? Is it something that is learnt over time? Or is it something innate that we are born with?
Dr Ernő Téglás has been awarded an ERC Starting Grant to research the nature and origins of human rationality. He will test the hypothesis that before children can speak, they possess a core set of logical operations that empower them with sophisticated skills to develop rational expectations. The research team will first identify the process that enables infants to form logical representations and then test how these representations predicate rational inferences. Dr Téglás will consider, for example, how preverbal infants conceptualise quantifiers (such as 'some', 'all' and 'many'), and how they can exploit their reasoning abilities when using tools or solving certain problems – during play, for example. Informed by neuropsychological evidence, this research will give a crucial insight into the basic building blocks of the human mind, and represents a unique opportunity to contribute to our understanding of the nature and origin of logical reasoning.

ERC grantee: Dr Ernő Téglás
Host institution: Central European University, Budapest, Hungary
ERC project: Precursors of logical reasoning in human infants (PreLog)
ERC funding: €1.5 million