US-Ireland R&D Programme project details:

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| Project title and award details | Lay abstract  |
| **Title**: Discriminative Adversarial Networks that are Generic, Efficient, and Robust for IoT Malware Detection (DANGER-IoT)**Lead applicant**: Utz Roedig**Co-applicants**: Niall McLaughlin & Matthew Wright**Lead RoI institution**: University College Cork**Value of award:**RoI: €447,567NI: £278232US: $600,000**Partner Institutions**: Queen’s University Belfast & Rochester Institute of Technology | This project is focused on detecting malware on ‘internet of things’ (IoT) devices (e.g. sensors, actuators, appliances and machines). Malware detection on traditional PCs, servers and mobile devices is relatively mature, with solutions based on machine learning having become industry standard. These solutions cannot be directly applied to IoT devices due to the devices being very heterogeneous in type and having low power requirements, among other reasons. Existing malware models are also vulnerable to adversarial evasion attacks – where carefully crafted inputs are fed in that can confuse/fool even state of the art malware models. Discriminative Adversarial Networks that are General, Efficient, and Robust for IoT Malware Detection (DANGER-IoT) will build upon the success of previous work by the researchers to create the first generation of malware detection models that are practical and effective for IoT systems. |
| **Title**: Fungibility in Mobile Networks for Resilient 6G**Lead applicant**: Indrakshi Dey**Co-applicants**: Michalis Matthaiou & Joao Santos**Lead RoI institution**: South East Technological University**Value of award:**RoI: €451,814NI: £299,876US: $552.893**Partner Institutions:** Queens University Belfast & Virginia tech | This proposal is focused on transforming resilience in the next generation (6G) of mobile networks. It addresses the concept of ‘fungibility’ - where networks are capable of reallocating internal resources in response to changes, such as the loss of function of one part of the network (e.g. due to a cyberattack). The research is focused on three main areas: fungibility of algorithms and resources/components within networks, security of future radio access technologies (which are the underlying physical connection methods for any given communications network), and on the ‘topology’ of mobile networks – their ability to reconfigure or adapt their physical or logical structure without significant disruption in function or performance. |
| **Title**: Effects of Maternal Exercise on Fetal Akinesia-Impaired Bone and Joint Development**Lead applicant:** Niamh Nowlan**Co-applicants:** Gareth Davison & Joel Boerckel**Lead RoI institution:** University College Dublin**Value of award:**RoI: €907,950NI: £523064US: $513183**Partner Institutions:** Ulster University & University of Pennsylvania | Mechanical forces exerted by foetal movement during development influence skeletal morphogenesis. Fetal akinesia (insufficient movement), caused by low amniotic fluid volume, breech position or impaired muscle development, can cause skeletal disorders such as hip dysplasia, arthrogryposis, and impaired bone development. The latest findings by this group of applicants suggest that maternal exercise could serve as a therapeutic intervention. To accomplish this, there is a need to understand when and how maternal exercise rescues akinesia-impaired bone and joint development. The aims of this proposal are to determine the cells that respond to timed maternal exercise during akinesia-impaired limb development and to define the underlying signalling mechanisms. This will provide new insights into fetal akinesia and potentially identify maternal exercise as a therapeutic intervention. |
| **Title**: MAEVE: Microbiota mediated flavonoid metabolites for cognitive health**Lead applicant:** Catherine Stanton**Co-applicants:** Chris Gill & Arpana Gupta**Lead RoI institution:** Teagasc**Value of award:**RoI: €908,996NI: £459,256US: $1,563,756**Partner Institutions:** Ulster University & University of California Los Angeles | The proposal aims to test the hypothesis that a high dietary intake of polyphenols (PPs) by elderly subjects with enhanced Alzheimer’s disease risk would maintain healthier brain and cognitive functions as well as having beneficial gut microbiota effects. The potential impact of dietary PPs is proposed to be assessed using multiple approaches such as animal models, imaging, assessment of cognitive function and inflammatory status as well as profiling of the gut microbiome and its metabolites.  |