

Digital DNA storage research from WIT wins Outstanding Academic Achievement Award

The eagerly awaited Technology Ireland Industry Awards took place on Friday 22nd November in the Mansion House, Dublin. Considered the most coveted awards ceremony within the Irish technology sector, Waterford Institute of Technology (WIT) research centres TSSG and PMBRC patiently waited to hear their project announced as winner of the 'Outstanding Academic Achievement Award in the field of Digital Technology'. Dr Sasitharan Balasubramaniam, Director of Research in TSSG and Dr Lee Coffey, Principal Investigator in Molecular Biology in the PMBRC and Adjunct Senior Research Fellow in TSSG, proudly accepted the award on Friday last.



Included are Dr Lee Coffey, Prof Willie Donnelly and Dr Sasitharan Balasubramaniam from Waterford Institute of Technology.

The project, titled 'Digital DNA Storage Infrastructure of the Future', involves an infrastructure that supports encoding of digital transformation in DNA, which will lead to a new form of data storage for the future. This research was featured on RTE News as well as MIT Tech Review and the future looks bright for this project.

Speaking after the win, Dr Sasitharan Balasubramaniam expressed his appreciation for being chosen as a winner "This project really demonstrates the cutting edge multi-disciplinary ICT research that is being conducted in TSSG, looking in particular to how ICT should look 10 or even 20 years from today. This also demonstrates how blue-sky research can lead to possible technologies that industry can use in the future"

"I am delighted to win this award and to receive the recognition alongside our colleagues in TSSG for this work," said Dr Lee Coffey. "The practical implementation of the TSSG-led DNA data storage concepts carried out in the PMBRC labs builds upon years of expertise in molecular biology research at the centre. The interface between the life sciences and data technology is an exciting space and we look forward to developing this research further with Huawei, our industry partner," Dr Coffey continued.

Also attending the prestigious ceremony was Prof Wille Donnelly, President of Waterford Institute of Technology and founder of TSSG. The president congratulated both Dr Balasubramaniam and Dr Coffey on winning this accolade. Prof Donnelly stated that "It's a fantastic achievement and recognition of the institute's international leadership in research excellence." This follows the PBMRC Research and Development award at the Pharma Industry awards 2019 for the second year running.

The project, funded by Huawei, has the capability to store the resonant equivalent of 70 billion copies of books into a single gram of DNA, and this technique is set to revolutionize the field of data storage. The practical applications are endless for example, in the coming years humans will be able to store their own and their ancestral medical history in their own DNA; food supplies can carry traceability information in the food itself; and energy burning data centres will become a thing of the past. The benefits lie in an architecture that can allow libraries of information to be created (e.g. music and movie files, and this data could be for long-term archive systems). This can benefit cloud infrastructure providers who are continuously expanding their data centres who are energy hungry, to select alternative systems that can potentially store large quantity of data and use low quantity energy, which will result in a significant reduction of carbon footprint.

This could mean that future data centres will have a combination of silicon technology that are found in the current system, combined with a biological infrastructure that stores information for long-term archives. The research is also developing anti-malware system to create future solutions for cyber security software industry to protect infrastructures for DNA storage. Kevin Doolin, Director of Innovation in TSSG comments on the win "We are very proud of this research, and while this seems like science fiction, the practical applications of this breakthrough technology are everywhere. Imagine a future where you, and your ancestors' entire medical history is stored in your body, or where a piece of steak contains un-hackable traceability information."

The next step in this project is to develop various types of practical applications for DNA storage, and in particular for creating libraries that can store various types of files, and to be able to read as well as write to the storage infrastructure. Both research centres are part of the Enterprise Ireland Technology Gateway Network Programme which funds interactions between local and national industry and institutes of technology and aims to increase the levels of interaction between the IoTs and industry in Ireland.