**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

& ECIT Global Research Institute

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| **Proposed Project Title: Advancing mm-wave communications and imaging through novel radiating interfaces**  |
| **Principal Supervisor: Dr. Dmitry Zelenchuk Second Supervisor: Prof. Vincent Fusco** |
| **Project Description:** Millimetre wave systems provide broad opportunities for both high-data-rate communications and high-resolution imaging. The applications of mm-wave imaging vary from security scanners to touchless interaction sensors and high-performance antenna solutions are in great demand. The same can be said about mm-wave communications where a dedicated antenna is sought to compensate for a path loss and enable fruitful exploitation of huge bandwidth available for very high data rates. This research project aims to go one step beyond the traditional directional antenna approach and investigate future radiating interfaces based on novel concepts that enable minimising the number of measurements and maximising the amount of information physically transmitted through the system. Those interfaces will be a synergy between regular antenna aperture and artificial materials and complex beamforming structures and will be aiming to exploit multiple polarisations and non-trivial spatial distribution of electromagnetic fields to enhance operating capabilities as well as security aspects of the modern systems. Pioneering design and manufacturing strategies are hoped to be advanced in order to develop integrated solution compliant with the state-of-the-art integrated transceivers. The proposed project utilises CST Microwave Studio to simulate prospective designs and experimentation to investigate applicability for the industry. The candidate will become proficient in electromagnetic theory, mm-wave antenna design and test as well as modern manufacturing techniques.Students with a 2.1 or first class degree in electronic engineering or physics are welcome to apply. The research will require the understanding of fundamentals of electromagnetic theory and will involve electromagnetic simulations and laboratory measurements. |
| **Contact details**Supervisor Name: Dr. Dmitry Zelenchuk Tel: +44 (0)28 9097 1761QUB Address:  ECIT InstituteQueens University BelfastQueens RoadBelfast BT3 9DT Email: d.zelenchuk@qub.ac.uk |