**PhD Project Proposal**

School of Electronics, Electrical Engineering and Computer Science

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| **Proposed Project Title: Robust high-dimensional filters for 5G+ wireless communications** |
| **Principal Supervisor: Dr. David Morales Second Supervisor: Dr. Simon Cotton** |
| **Project Description:** A key technological challenge in the realization of future (5G and beyond, 5G+) wireless networks will be the design of robust adaptive filters which can accommodate the increasingly complex and high-dimensional nature of the received signals. Current solutions fail remarkably, as they are based on low-dimensional signals satisfying certain stationarity and independence assumptions which will be heavily violated in practice. Based on the theories of large random matrices and robust statistics, in this PhD project we will investigate a new class of adaptive filters suited to the large dimensions and impairments of future networks, aiming at delivering enhanced multi-antenna receivers with improved connectivity.  The proposed filtering technology will be based on a new class of robust covariance estimators, which have the potential to be applied to other fields beyond wireless communications. An interesting example is the optimization of large financial portfolios, where improved solutions will also be explored.  This project is best suited to a student with an interest in random matrix theory and wireless communications. Advanced concepts of statistics and probability will be required, and the student should be confident in the use of MATLAB (or similar) simulation platforms to test and validate the theoretical findings. |
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