

Advanced signal processing algorithms for future wireless transmitters' linearisation

Wireless transmitters account for most of the energy consumption of communication systems. The power amplifier (PA) is the most energy hungry component and operating it in an efficient manner is highly desirable. Unfortunately, highly efficient PA architectures are strongly nonlinear. This results in intolerable signal degradation and QoS. Several linearisation techniques are used to cancel the nonlinear behaviour of PAs. The most used one is digital Pre-distortion (DPD). All DPD methods rely on constantly monitoring the output signal of a PA in order to identify its nonlinear behaviour. This comes at a cost of an additional energy consumption that could offset the benefit of the PA efficient architecture. The additional DPD energy consumption is due to the use of high speed analogue-to-digital-converters (ADCs) as well as the signal digital processing (DSP) required.

This PhD aims to investigate DSP algorithms that are energy efficient. The approach consists of identifying which nonlinear components are more relevant to cancel in the presence of future wireless standards signal waveforms. Additionally, new monitoring architecture based on low speed ADCs to avoid the unaffordable energy consumption of fast ADCs. Techniques such as under-sampled vector signal analysis will be investigated, and a theoretical framework will be developed to propose a step by step guide to how to implement a robust and efficient DPD.

The outcome of this PhD can be applied to current, very near and long-term future wireless communication systems.

The PhD supervising team has a proven track record in PA characterisation, design and linearisation. As part of the Communication Systems and Networks group, the RF research team is maintaining a heavy research and development activity in this domain.

More Details and Contact:

For informal enquiries please email [Dr Souheil Ben Smida](#) and [Dr Kevin Morris](#).

How To Apply:

Please submit a PhD application using the University's online application system: <http://www.bristol.ac.uk/study/postgraduate/apply/>. In the application form mention the project title above and list [Dr Souheil Ben Smida](#) under "Proposed supervisor(1)" and [Dr Kevin Morris](#) under "Proposed supervisor(2)".