Device heralds big technology changes

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A passive microwave device developed at The University of Queensland is expected to bring revolutionary changes for the medical and telecommunications industries.

Researcher Dr Amin Abbosh said the Ultra Wideband (UWB) coupler would be used in different parts of many radio frequency systems — including in mixers, amplifiers and antenna beam-forming arrays — for radio frequency power division and power combining.

This technological advancement means that many functions now could be integrated into a single, compact device, such as a mobile handset.

“This new Ultra Wideband Coupler model presents a simple, compact, low-cost and highly efficient solution which is expected to be widely used in telecommunications and UWB imaging systems,” Dr Abbosh said.

Since the invention of the UWB coupler in the 1950s, microstrip couplers had only been used in narrowband systems, such as simple voice data transmission and low resolution single-tone imaging), with bandwidths below 20 per cent, he said.

However, recent developments meant wideband microwave devices were being used in many more devices.

A common use in recent years was for wideband medical imaging systems to be used to detect diseases, such as breast cancer.

This new breakthrough in the design of the microstrip device has been achieved by utilising a combination of the traditional microstrip lines, manipulated ground structure and wideband chip elements.

This ground-breaking method is validated through a compact, low cost, and efficient device that is fully compatible with the current and future-generation systems.

The device was built and tested at UQ's electronic workshop with the help of Mr Denis Bill.

“Without the support of UQ, this research would not have been possible,” Dr Abbosh said.

“I am eager to see where this new technological model can lead us and how it can be further developed to improve the world as we know it.”

Provided by University of Queensland