Design Synthesis and Miniaturization of Multiband and Reconfigurable Microstrip Antenna for Future Wireless Applications

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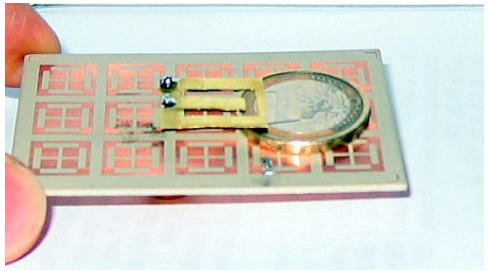

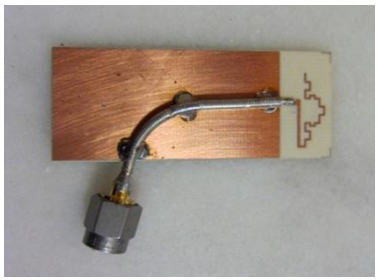

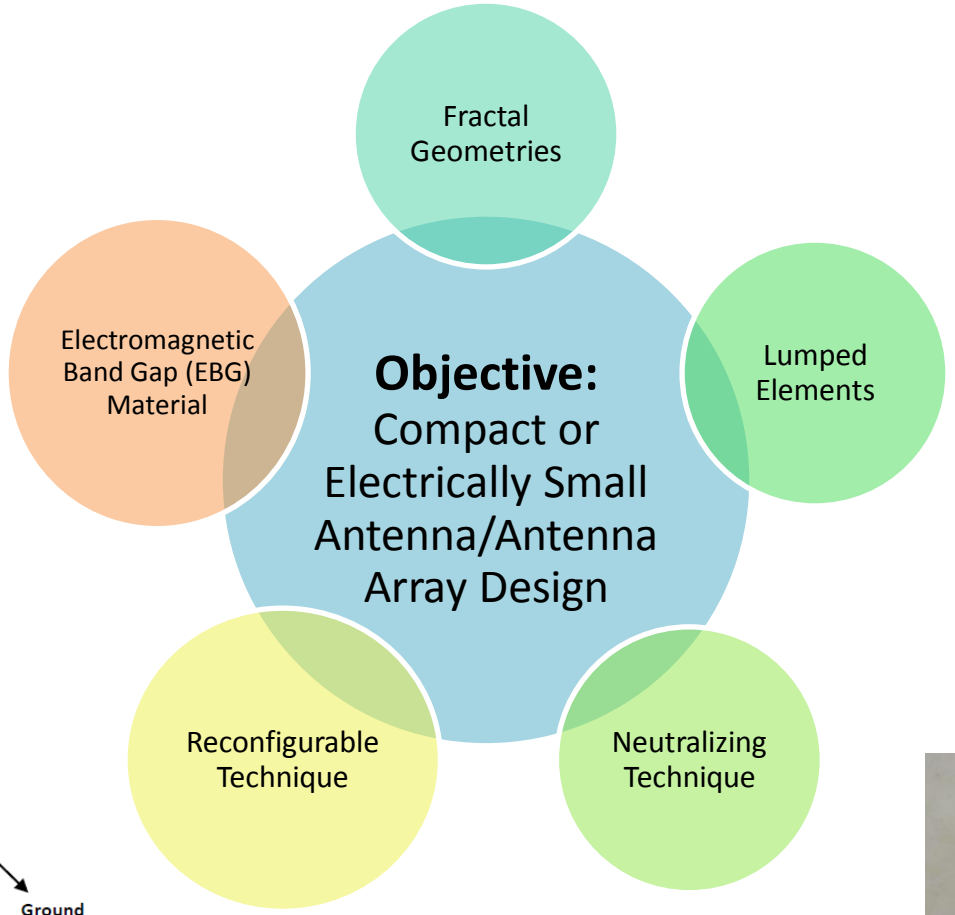

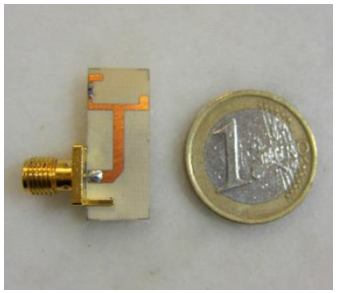

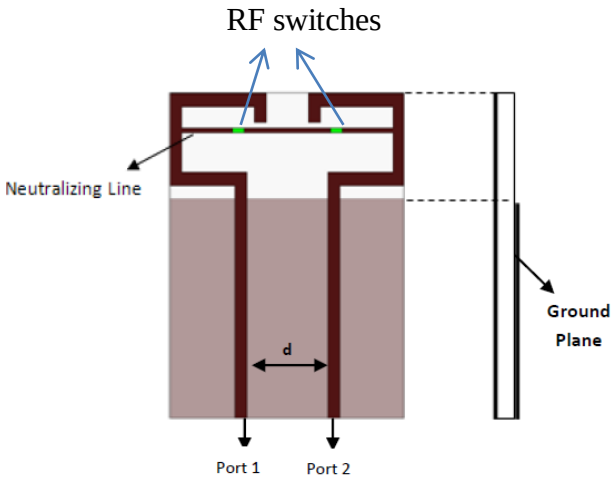

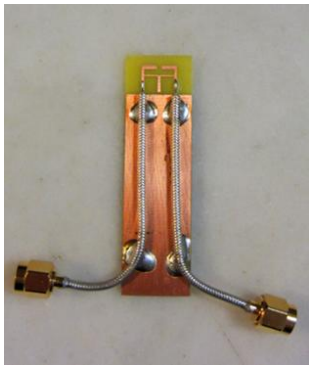

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The objective of this research work is to design compact multiband antennas and antenna arrays for future wireless applications.

The existence of a wide number of wireless standards means that today and future wireless communications demand devices equipped with antenna(s) that can operate at multiple frequency bands whilst having a compact size. The downside is that a reduction in size of an antenna has an impact on its radiation performance. Hence, methodologies for the design of compact size antennas with promising radiation characteristics are required. This topic is addressed in this work by employing novel techniques for antenna miniaturization based on fractal geometries or by introducing lumped elements to the printed monopole antenna design.

Another topic involved in this research work is to design compact multiband antenna arrays that contain closely spaced antennas. The motivation of this work lies on the fact that there is increasing need to equip Multiple Input Multiple Output (MIMO) antenna array on the wireless devices because significant improvements on the transmission rate can be achieved by employing MIMO techniques. This has been addressed in the recent released standards such as IEEE 802.11n and Long Term Evolution (LTE). The methodologies used in this work are to apply the neutralizing and reconfigurable techniques on the design of printed monopole antenna arrays.

The antennas proposed in this work have been implemented and characterized. The numerical simulations conducted in the Finite Element Method (FEM) based electromagnetic simulation software package, Ansoft HFSS, are shown to match well with experimental results which proves the adequacy of the techniques devised.