

Electronic Steerable Phased Array Antenna Design for Wireless Charging Application

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A 2.4 GHz ISM band electronic steerable antenna was designed, simulated, and characterized for applications in various industries including wireless power delivery and remote sensing systems such as RADAR. Directed microwave energy has been a staple of RADAR systems since the early days of remote sensing. Using the same mature beam steering techniques used in these systems energy can be efficiently directed to and extracted by a tuned receiver. Compact antenna arrays can be fabricated on easily available PCB laminate materials for use in frequency ranges below 3.0 GHz. Challenges exist in the layout and development of the beam forming networks and phase shifting components as well as the algorithmic development for later processing.

Applications of this technology are great as an example, cell phones and other mobile devices are beginning to operating at the speed and efficiency of desktop systems, pushing the power budget of battery technologies including Li-ION. Wirelessly charging these devices has been a challenge as the power densities required can be hard to direct and obtain at the receiver reliably. Most wireless charging systems rely on an inductive loop and a special battery insert to transfer. This results in a very short range charging system. Beam steering techniques used in RADAR systems, are capable of providing energy at much farther distances from the source. Phased array beam forming is investigated as a means to provide the necessary power delivery to a receiving station.