Beamforming Design of the Wireless Power Transfer System into Multiple IoT Sensors

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***Abstract*—Recently, wireless power transfer (WPT) to the IoT sensors wirelessly over the far distance has been attracted too much and this WPT system is based on the radio frequency (RF) antenna technology. In this paper, we propose a wireless power transfer (WPT) to multiple IoT sensor system using an electronically steerable parasitic array radiator (ESPAR) antenna based on microstrip patches. An ESPAR antenna design method and evaluation results for the WPT system are also presented. The WPT system is characterized by very low power transmission efficiency due to path loss of the RF signal. Therefore, the WPT system mainly utilizes a beamforming technique using multiple antennas to improve this characteristic. A phased array antenna is generally used for beamforming. However, there is a disadvantage in that the network configuration for beamforming is complicated. The ESPAR antenna has the advantage of being able to perform beamforming without such a complicated circuit configuration. When the ESPAR antenna is applied to an WPT system, a low-complexity and high-efficient WPT system can be designed. Through the simulations, it is confirmed that the ESPAR antenna can support a wide range forward through 3D beamforming.**

***Keyword*—beamforming, ESPAR antenna, microstrip patch, reactance, WPT**

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