

Smart receiver system of green hybrid antennas

Abstract

A hybrid of multiformities receiver system is proposed in this article. The system is developed through a combination of reconfigurable beam-steering antenna, reconfigurable beam-shaping antenna, and data acquisition (DAQ) boards. The combination of beam-steering antenna with beam-shaping antenna formed a hybrid four-layer structure with fabricated element plank of rice husk placed between the beam-shaping antenna's feed line and beam-steering antenna's radiating element. This four-layer hybrid and element plank are held together by 5 mm PCB supports at every edge of the antennas forming a stack configuration. The PIN diode switches of both antennas are connected with DAQs to adaptively control the degree angle and beamwidth of the radiation patterns. The activation of either beam-steering antenna or beam-shaping antenna depends on the DAQs' Beam Manager memory and the weakest level of received signal strength. When the transmitted signal is coming from the angle of $0^\circ/360^\circ$, 90° , 180° , and 270° , its range and angles' location will automatically be detected by the first DAQ that is connected to the beam-steering antenna. Meanwhile, the beam-shaping antennas are activated by the second DAQ, to receive the transmitted signal for a longer range at four different gains: 3.6 dB, 7.2 dB, 9.9 dB, and 14.64 dB. Hence, this hybrid receiver system collectively contributes to the well-developed eight-multiformity radiation patterns that can be inter-changed within only 0.01 ms. Furthermore, signal reliability is paramount since the system could self-elucidate the mutual coupling effects with the aid of rice husk element plank, which acts as a RF absorber.

Keywords

Green hybrid antenna; Rice husk; Smart receiver