A Novel Energy Harvesting Antenna Design for Battery-less IoT devices

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ABSTRACT

Energy harvesting is a process in which small amounts of energy are captured from radiative radio frequencies (RF) that would otherwise be lost as heat, light, sound, or movement. The captured energy allows improving the efficiency of wireless communications, where it enables new technologies such as battery-less devices or power internet of things (IoT) devices without the need for batteries. This paper presents a novel antenna design, called an icosahedron-Sierpiński fractal monopole antenna, where the advantage of such a geometry is in its ability to capture a wide range of frequencies due to its multi-band characteristic and three-dimensional characteristics. The performance of the antenna has been evaluated by numerical simulations and compared with the already existing research. The proposed antenna geometry has been designed using AUTOCAD2020 and simulated on COMOSOL 5.4 to operate at frequencies between 0.84GHz, 1GHz, 1.6 GHz, 2.4GHz, and 3GHz.

INDEX TERMS: Energy Harvesting, Fractals, Icosahedron, IoT, Platonic Solids, Radio Frequencies, Sierpiński.

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