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Design and Development of CPW fed 6-shaped antenna element for IoT applications

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This paper proposes the design of a compact Coplanar Waveguide (CPW) fed antenna for its utilization as an antenna element for IOT applications. The proposed CPW fed antenna element with inverted-Six shape and rounded corners is fabricated on a 1 mm thick FR4 substrate. Employing rounded corners improves the overall gain and also stabilizes the radiation pattern. In order to get efficient antenna parameters, our proposed antenna reduces interference from adjacent frequency bands by the use of overlapped symmetrical rectangular and circular slots. The CST simulator is used to simulate the antenna that is being proposed. It has been observed via iterative simulations that larger overlapped circular and rectangular slots are more effective in increasing antenna gain and the impedance bandwidth. Thus, this antenna will have a greater coverage range, excellent dependability, and a high data rate. The dimension of the design is 54mm×38mm with Cu metallization of 35 μm. An optimal design for good impedance matching is achieved and a step-by-step design procedure is also discussed. The antenna is fabricated specific dimensions in order to extract optimal efficiency and gain. Antenna performance is then verified with the measurements done using a calibrated Vector network analyzer system. The results of the antenna parameters, such as return loss and VSWR, are consistent when compared between the simulation and the measurement. This antenna element, which is crucial in communication devices, will cover the major bands of frequencies IEEE 802.15.4 covering 5G band of 3.4-3.69 GHz. The size of the proposed 6-shaped antenna is small enough for IoT applications like smart cities, smart grids, industrial internet etc.

Keywords : Antenna gain, Return loss, Coplanar Waveguide, Internet of Things, CST simulator, Vector network analyzer.