

## DESIGN AND PERFORMANCE ANALYSIS OF A SIX-ELEMENT MIMO ANTENNA FOR UWB PORTABLE APPLICATIONS

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### ABSTRACT

A 6×6 multiple-input-multiple-output (MIMO) antenna is proposed for Ultra-Wide Band (UWB) wireless applications. The proposed MIMO antenna is the combination of six single element antennas. The single antenna consists of three slots (one sword-shaped and two rectangular shaped). The slot is inserted to improve the reflection coefficient. The large bandwidth is achieved by designing a defected ground structure. The six single antenna elements are placed symmetrically for the MIMO arrangement. The MIMO antenna has a promising reflection coefficient result and 10 dB-impedance bandwidths (greater than 6.5 GHz). The diversity performances of the MIMO antenna are evaluated by the envelope correlation coefficient and diversity gain. Satisfactory outcomes are attained. Finally, the various results analysis of the MIMO antenna in the vicinity of the human phantom hand are studied. These performances of the MIMO antenna make the antenna more attractive for UWB portable applications.

**Keywords:** UWB, MIMO, Portable applications, ECC, User impact.

### INTRODUCTION

Multiple-input-multiple-output (MIMO) antenna are getting more popular because of their capability to enhance multipath fading reduction (Zhang S *et al.*, 2012). The MIMO antenna increases the channel capacity by using a lot of antennas for transmitting and receiving data. Hence higher data rates are attained in the MIMO antenna. Various MIMO antennas are available in the present world for different applications.

Ultra-wideband (UWB) systems are alluring more devotion due to higher data rates and low power levels for operation. Besides, the feature of the low power permits frequency reuse, as it does not cause significant interference in neighboring devices. At present, there are lots of UWB antennas for various applications like wireless, biomedical applications. A UWB antenna is proposed for biomedical applications in (Chakraborty S, *et al.*, 2018). The antenna consists of three different shaped slots and a defected ground plane. The antenna works in three mode: off-body, on-body, and in-body mode. The smaller size (17 mm×14 mm×1 mm) of the antenna makes it useable for different applications. The free space or off-body operating frequency of the antenna is 4.0–10.5 GHz. A monopole UWB antenna for the internet of things applications is projected in (Bekasiewicz A *et al.*, 2016). A compact circular ring antenna has been proposed in (Liu L *et al.*, 2011) for UWB application. In this paper, the antenna is used to design a six-element UWB MIMO antenna.

A lot of UWB MIMO antennas are proposed at present for different applications. A two-element closely packed MIMO antenna has been reported in (Zhang S *et al.*, 2012) for UWB dongle applications. The operating band of the antenna is 3.1–5.15 GHz. A slot is designed between the monopole and the ground plane enhanced the isolation at lower band and increases bandwidth. In (Ren J *et al.*, 2014), a compact size MIMO antenna is proposed for UWB applications. There are two single

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