

# DESIGN OF COMPOSITE NANO INK BASED WEARABLE ANTENNA FOR E-TEXTILE APPLICATIONS

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## ABSTRACT

This paper presents a design of composite nano ink based wearable antenna for e-textile applications. Wearable antenna is designed to function while being worn. It is commonly used in wearable wireless communication and biomedical systems. For this study we are using HFSS (High Frequency Structure Simulator) software tool cotton is as substrate with permittivity and loss tangent 1.6mm and 0.02 respectively. For improvement of high gain and low SAR(Specific Absorption Rate) we are using EBG(Electromagnetic Bandgap) & VIA techniques.

Key Words: Wearable, Patch Antenna, VSWR, GAIN, EBG, VIA

## I. INTRODUCTION

Wearable antennas are designed to characteristic even as being worn. These antennas are normally utilized in wearable wi-fi conversation and biomedical RF systems. Specific Absorption Rate (SAR) is the rate at which electricity is absorbed in keeping with unit mass through a human body, even when exposed to a radio frequency (RF) electromagnetic field. It can also tested with absorption of various varieties of electricity through tissue, alongside ultrasound. It is defined due to the fact the electricity absorbed in keeping with mass of tissue and has gadgets of watts in keeping with kilogram (W/kg). SAR is generally averaged each over the entire body, or over a small sample amount (normally 1 g or 10 g of tissue). The charge stated is then the maximum degree measured with inside the body detail studied over the stated amount or mass.

$$SAR = \sigma |E|^2 / \rho [W/Kg] \quad \dots (1)$$

$$SAR = d/dt [dW/dm] \Rightarrow d/dt [dW/\rho(dV)] \quad \dots (2)$$

$$SAR = 1/\rho [dW/dt] \quad \dots (3)$$

Electromagnetic band-gap (EBG) shape is that creates a forestall band to dam electromagnetic waves of positive frequency bands through forming a fine, periodic sample of small steel patches on dielectric substrates. EBG refers to any such forestall band in addition to substances (medium to transmit electromagnetic waves) which have any such shape. Applications of the EBG shape encompass additives of digital gadgets to suppress electromagnetic noise[1].

In the present work we propose a design of an antenna which is designed and simulated using the High-Frequency Structure Simulator (HFSS). The suggested antenna is a microstrip patch antenna and hence its design in HFSS needs some geometrical and simulation parameters. Various parameters like substrate material parameters, antenna design ,SAR field parameters are discussed in detail in this paper