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Design of Square & Circular cut broad band Textile Antenna

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Abstract: ***The proposed wearable antenna is optimized on CST microwave studio 2011 for bigger transmission band. It has been discovered this novel antenna has exceptionally high impedance transfer speed in free space. This paper proposed a broad band textile antenna on a defected ground plane for remote on-body correspondence. In this antenna jeans have been utilized as a substrate which permittivity is 1.7 and patch has been made by copper tape. This anticipated antenna provides high transmission band of 5.543 GHz and directivity of 2.531 dBi at resonant frequency of 4.368 GHz***

Index Terms: Jeans, Flexible antenna, Gain, Radiation pattern, CST.

I. INTRODUCTION

As of late, there has been nonstop increment in material reception apparatus use for body driven interchanges, for example, telemedicine, GPS and putting out fires personals' correspondences [1, 2]. A flexible antenna is chosen for these territories due to its position of safety and simple connection into articles of clothing of an individual. The constantly developing scaling down of electronic gadgets alongside late advancements in wearable figuring innovation is prompting a making of an expansive scope of gadgets connected to our body clothes [3,4].The antenna requires a limited ground plane and works within the sight of the body, a condition which may bring about changing antenna attributes. Wearable textile antenna WBAN applications are one of the fascinating exploration points because of its ease, light weight, ease of creation, and practicability.

With the coming of pervasive registering, the requirement for ever littler, less expensive, and all the more dominant electronic gadgets has expanded altogether. Shrewd textures and intelligent materials offer extraordinary potential to build the usefulness in a wide extent of uses requiring little to no effort, both as far as cost and space. By utilizing reasonable materials, for example, (conductive) materials, leather, and 3D textures to acknowledge dynamic circuits and reception apparatuses, electronic frameworks can be unpretentiously incorporated into apparel, actualizing highlights that would some way or another require extra, regularly bulky, gadgets that must be conveyed [5-11].

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For salvage laborers, approaching administrations, for example, situating, injured individual restriction, fundamental signs observing, and ecological risk detecting can mean the distinction among life and demise. Supplanting the customary, inflexible, hand-held gadgets by hardware legitimately incorporated into the wearer's article of clothing, be that as it may, does not come without explicit plan difficulties. The position of the wearable frameworks within an article of clothing makes them helpless to impacts of the closeness of the body.

II. ANTENNA DESIGN PROCEDURE

A customized structure of circular slot reception apparatus with SMA feed is displayed in Fig. 1. The improved reception apparatus parameters are abridged in following Table 1. The feed structure utilized in this plan is line feed. This double band flexible reception apparatus is planned with wide space structure utilizing jeans as a substrate material having the thickness of 1.0 mm [12, 13]. The jeans substrate has permittivity of significant worth ε_r = 1.7 and tanδ = 0.025. The foreseen microstrip antenna is reenacted by utilizing the CST programming. The geometry of this anticipated radio wire is appeared in Figure 1. Transmitting component and ground is made of copper conductive tape with thickness 0.038 mm.

Table 1: Optimized Parameters of the anticipated antenna

S. No.	Antenna Parameters	Value (mm)
1	Substrate Dimension	50×50
2	Outer Circle Radius	14
3	Middle Circle Radius	10
4	Square Slot Dimension	10×10
5	Inner Circle Radius	4
6	Partial Ground	50×10
7	Line Feed Dimension	17×2

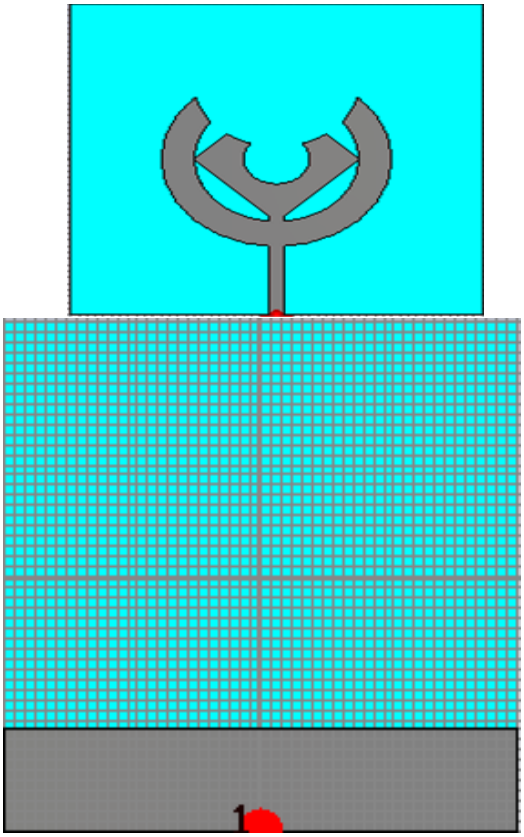

Fig.1. Structure of anticipated textile antenna

III. RESULTS AND DISCUSSIONS

S_{11} parameter, 3-D radiation pattern, 2-D radiation pattern and Smith chart has been presented and studied. The Return loss versus frequency graph has been shown in Fig.2 with a band at resonant frequency 4.368 GHz. The 3-D pattern is plotted in Fig.3 and it shows the measured directivity of 2.531 dBi at 4.368 GHz. Fig .4 shows the 2-D radiation pattern and Fig.5 shows the characteristics of Smith chart.

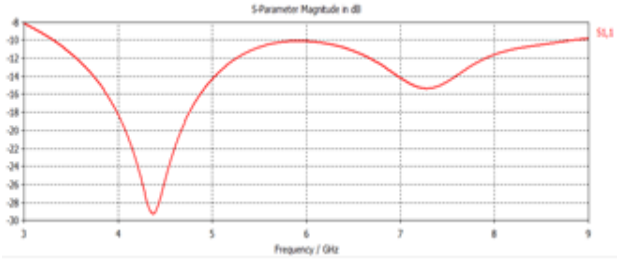

Fig 2. S_{11} parameter of proposed textile antenna

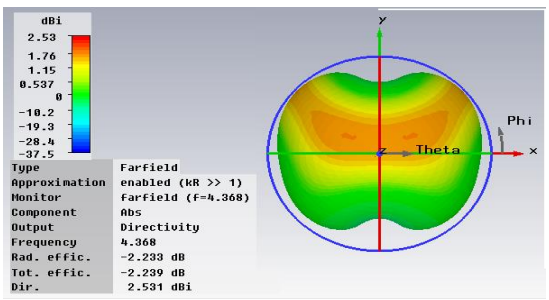

Fig.3. 3-D Radiation pattern at 4.368 GHz

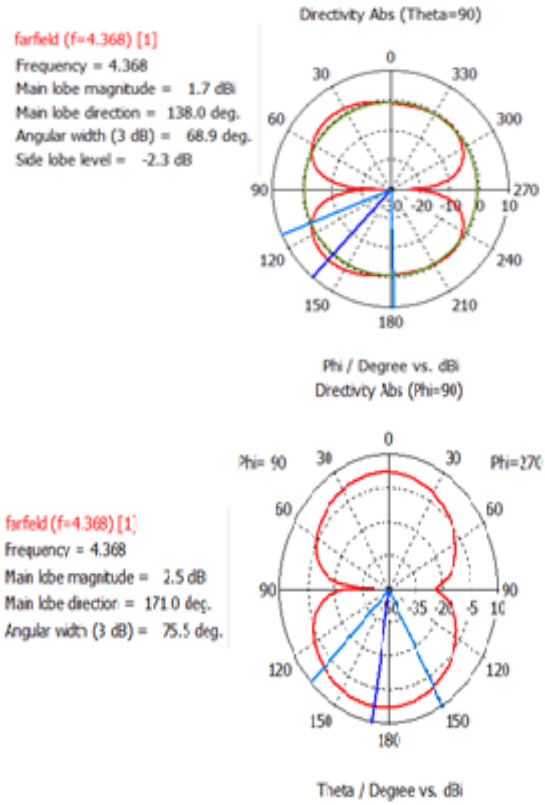

Fig.4. Polar plot of radiation pattern at 4.368 GHz

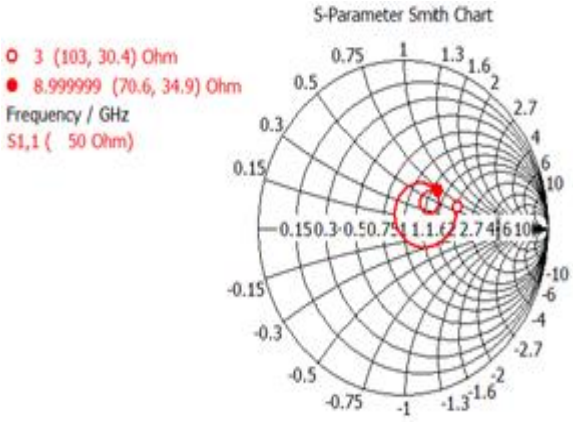

Fig.5. Smith chart of the proposed textile antenna

IV. CONCLUSION

The proposed wide band reception apparatus is an appropriate contender for its utilization in wearable systems for WiMax/Hiper LAN and so on. In any case, for future works and advancements, it is smarter to create improved and standard structuring and manufacture method for flexible systems that can coordinate with standard PCB planning procedure. This anticipated antenna provides the bandwidth 91.21% and directivity of 2.531 dBi at 4.368 GHz. The proposed design is flexible, light weight, cost effective, thin, and easy to fabricate; therefore it is best suitable for wearable applications.

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