

Wearable Corduroy Textile Antenna

Bivas Roy

Electronics & Instrumentation Engineering Department, JIS College of Engineering
Kalyani ,Nadia, West Bengal ,Pin-741235,India
bivasroyjis@gmail.com

Abstract— In this paper the design ,fabrication and measurement of a wearable textile (Corduroy) patch antenna is presented. The substrate of the designed antenna was made by corduroy textile material while the radiating element and ground plane was made by thin film copper foil. The copper foil was pasted by using synthetic resin adhesive on the Textile (corduroy) material.

Keywords— Micro strip wearable textile antenna, corduroy based substrate , radiation pattern.

I. INTRODUCTION

The demand for flexible textile antenna has recently increased tremendously ,due to the requirements for protective garments [1,2].The integration of electronics into textile starts a new era for the apparel industry. The garments of the future will not only protect the human body against the extremes of nature but also provide information about the wearer's state of health and environment[3]. Garments have the ability to monitor bio-signals and communicate with the environment . It can, for example , provide continuous information about a person's state of health . These data can be valuable medical input, but also in emergency operations such as fire extinguishing , it can be a tool to decide on the operation of the fire fighter. However , wireless communication with the environment require textile antennas. When preserving textile properties such as flexibility and comfort is an issue, antennas should be made fully integratable into garments[4] and ,thus, manufactured by textile material .Textile material is environment friendly material which allows easy disposal of massive number Textile antenna. Micro strip antenna is a suitable candidate for design and fabrication of wearable smart protective electro textile antenna. The advantage of microstrip antenna are (1)Light weight (2) Easy to design (3) inexpensive to manufacture (4)mechanically robust , etc.In this paper ,we describe the design , manufacture, and performance of rectangular microstrip antenna on corduroy textile substrate .

II ATENNA DESIGN PROCEDURE

The first step in the design of textile antenna consists of choosing appropriate material for the antenna substrate and the conducting part.

II.1. CHOICE OF SUBSTRATE

Selection of most suitable substrate of micro strip antenna is a matter of prime importance. Here we choose corduroy textile material as a substrate.



Fig 1 Textile corduroy Substrate.

II.2. CHOICE OF GROUND PLANE AND PATCH:

For the conducting part we choose thin copper foil because of its low surface resistivity and its large temperature range which enable us to solder the connector without burning holes in the electro textile.



Fig:2- Copper foil for Ground plane and Patch

III. ANTENNA DESIGN:

Here we design a rectangular micro strip antenna on corduroy textile substrate. For antenna design purpose we cut the copper foil whose width is 43mm and length is 34 mm. The feeding position was $X=0$, $Y= -7.5$. This rectangular copper foil was pasted on corduroy substrate. Another Copper foil whose dimension 120mm X 120mm was pasted on the other side of the substrate which act as a ground plane. The adhesive used was synthetic resin adhesive. We made the design antenna substrate thickness was 3 mm. In order to achieve the desired thickness(3 mm) we made the substrate using a stack of textile material. The textile materials were pasted using synthetic resin adhesive.

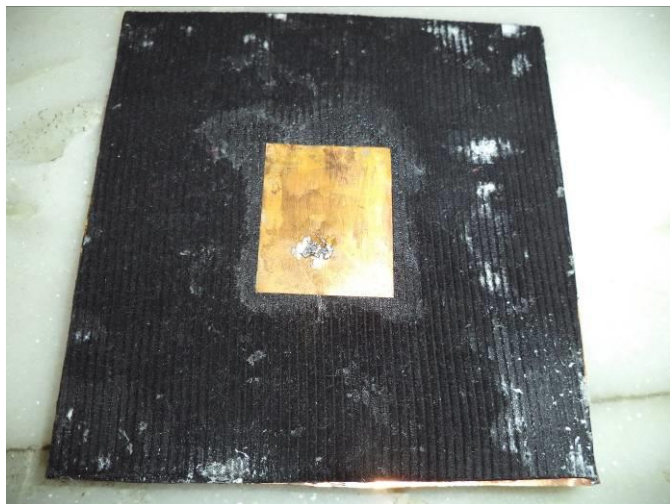


Fig 3:- Textile Corduroy antenna.

IV . ANTENNA PERFORMANCE.

The corduroy antenna shows unlicensed ISM band (5.8 GHz). The impedance properties of the antenna was measured by agilent E5071B vector network analyser and the result is shown in figure :-4

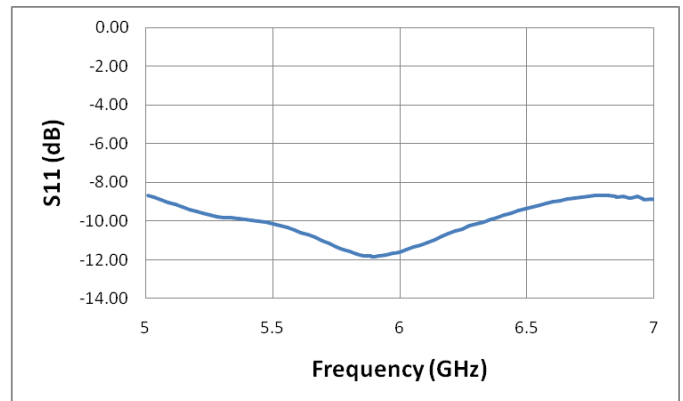


Fig 4:-Measured S_{11} curve of the Corduroy textile antenna .

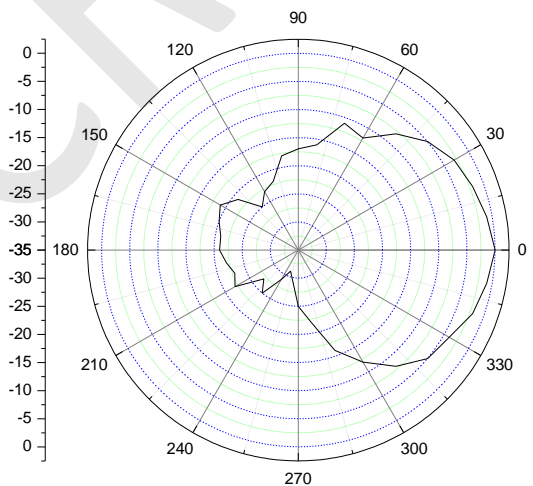


Fig:-5 Measured E-plane radiation pattern of corduroy textile antenna at 5.5 GHz.

V CONCLUSIONS

In this paper corduroy textile rectangular patch antennas have been designed, fabricated and tested in order to get their impedance and radiation characteristics.

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BIOGRAPHIE



Mr. Bivas Roy obtained his M.Tech from University Of Calcutta in the year 2008. He earned his B.E degree in Electronics and Instrumentation Engineering from The University of Burdwan in the year 2004. He is presently working as Asst. Professor at the Dept. of Electronics and Instrumentation Engineering, JIS College of Engineering Kalyani. His area of interest includes, Microstrip Antenna, Frequency Selective Surfaces and Instrumentation.