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Design of Microstrip Patch Antenna for Industrial Routers Applications

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Abstract
The proposed antenna has a simple structure comprising of two radiating strips and a coupling strip which serves to enhance the bandwidth at high frequency. The antenna has been designed to cover X bands (8-12GHz). The designed antenna only occupies a small area of 9×8.7 mm² on the system circuit board. Byadjusting the shape, location and size of the antenna, the return loss is effectively reduced, while the efficiency of the antenna is preserved. This antenna is helpful to incorporate into industrial routers for next generation wireless systems.

INTRODUCTION
In telecommunication, a microstrip antenna are most commonly used. An individual microstrip antenna consists of a patch of metal outwit of various shapes (a patch antenna) on the surface of a PCB, with a metal outwit ground plane on the other side of the board. Microstrip antennas exhibit attractive features for high frequency wireless applications .They have compact size, low profile, low cost, and compatibility with on-chip and in package devices

Mobile handsets are often used in the vicinity of the human head. The continuous growth of wireless mobile services has forced the universal mobile handset manufacturers to consider the mutual interactions between the mobile terminals and human body [1, 2]. On the one hand, part of the electromagnetic wave emitted by the antenna is absorbed by the human head. On the other hand, such as radiation pattern, radiation efficiency, bandwidth, and return loss, are altered due to the proximity of the human head.

ANTENNA STRUCTURE
The proposed antenna has a simple structure which serves to enhance the bandwidth at high frequency. The antenna has been designed to cover X bands (8-12GHz).The proposed antenna consist of total height 8.7mm and total width of about 9mm. In this paper, we present the design of a single-band mobile antenna for various application.

The antenna covers a small area of 9×8.7mm²is shown in figure1. A 1.6-mm thick FR4 substrate (relative permittivity εr = 4.6) is used to simulate the design using ADS software [3].

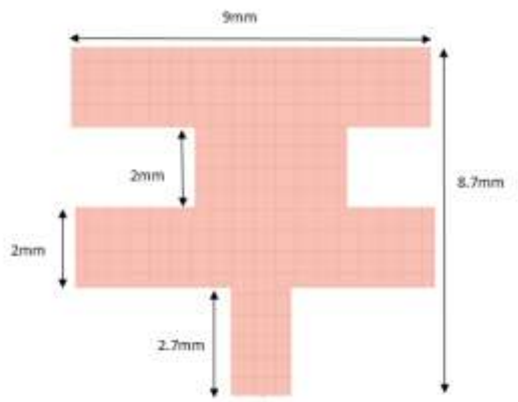


Fig 1.*Dimensions of the antenna layout design*

SUBSTRATE
In this antenna we use substrate called FR4

substrate should be 1.6 mm**,** we will get the required gain for the given substrate**.**

RETURN LOSS

Return loss is a measure of the effectiveness of power delivery from the microstrip antenna.

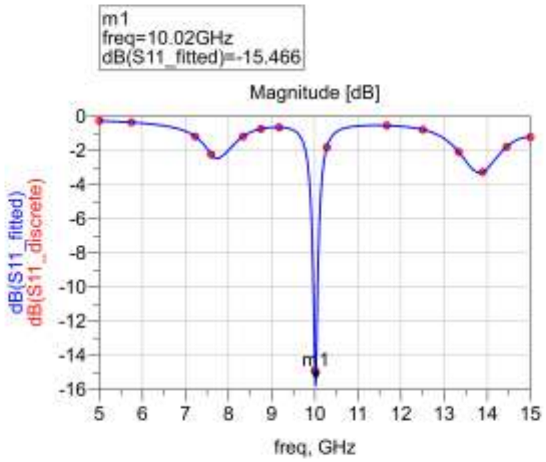


Fig 2. *Return Loss Measurement*

ANTENNA PARAMETERS

DIRECTIVITY

Directivity of an antenna is the ratio of the radiation power in a particular direction to the radiation intensity averaged over all directions.It measures the power density the antenna emits in the direction of its strongest emission, versus the power density emitted by an ideal isotropic radiator (which emits uniformly in all directions) radiating the same total power.The directivity of our designed antenna is 6.8db

GAIN& EFFICIENCY

The gain of an antenna in a given direction is the amount of energy radiated in that direction compared to the energy of an isotropic antenna would radiate in the same direction when driven with the same input power.The gain of the antenna is 2.25db [4, 5].

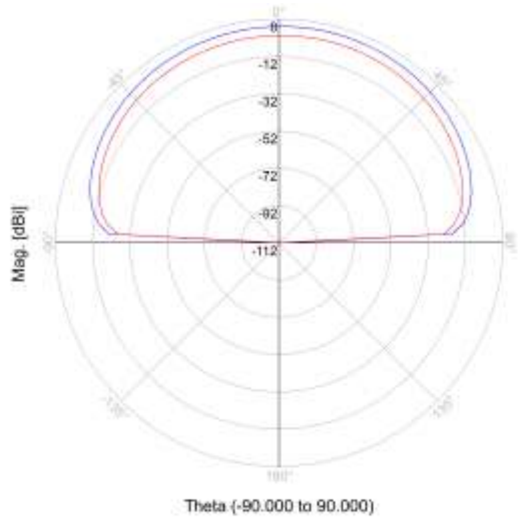
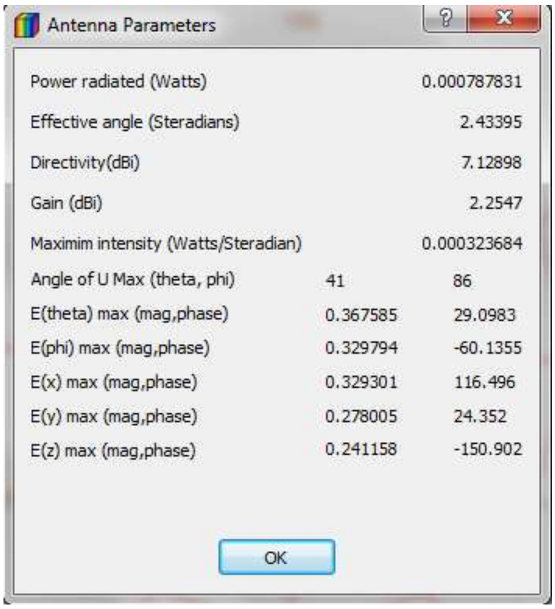


Fig 3. *Antenna efficiency*

Antenna efficiency is defined as the ratio of the aperture effective area to its actual physical area. It defines the percentage of the physical aperture area which actually captures radio frequency (RF) energy.



Antenna Parameters

Power radiated (Watts)		0.000787831
Effective angle (Steradians)		2.43395
Directivity(dBi)		7.12898
Gain (dBi)		2.2547
Maximim intensity (Watts/Steradian)		0.000323684
Angle of U Max (theta, phi)	41	86
E(theta) max (mag,phase)	0.367585	29.0983
E(phi) max (mag,phase)	0.329794	-60.1355
E(x) max (mag,phase)	0.329301	116.496
E(y) max (mag,phase)	0.278005	24.352
E(z) max (mag,phase)	0.241158	-150.902

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Fig 4. *Antenna parameters for 10Ghz*

CIRCULAR POLARISATION AND AXIAL RATIO

In electrodynamics, circular polarization of an electromagneticwave is a separation in which the electric field of the passing wave does not change strength but only changes direction in a rotary mode.

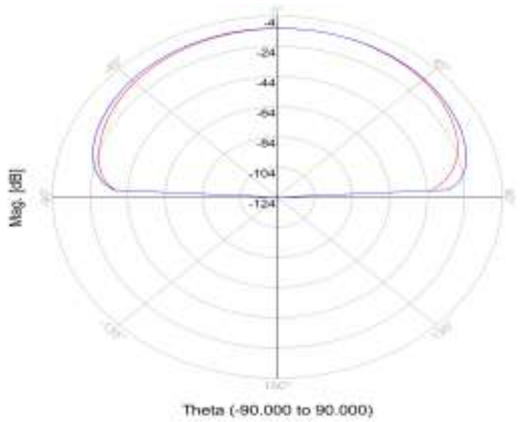

Fig 5.*Circular polarisation*

The Axial Ratio (AR) is defined as the ratio between the minor and major axis of the polarization ellipse. If the ellipse has an equal minor and major axis it alters into a circle, and we say that the antenna is circularly polarized. In that case the axial ratio is equal to unity.

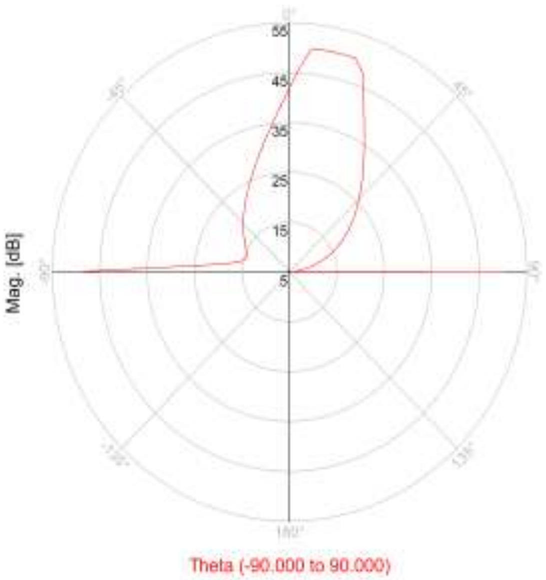

Fig 6. *Axial ratio*

CONCLUSION

A microstrip antenna is designed and simulated. Aantenna has been proposed and its optimized design has been 6.

presented. The design has been simulated for the frequency range of 10GHz. Farfield analysis has been done. The gain is found to be equal to 2.25dBi. The performance of this antenna can further be improved using a frequency selective surface. Thus, this design may find application for mobile phones, radio or microwave applications.

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