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# GAIN ENHANCEMENT OF V-SLOTTED TRIANGULAR SHAPE MICROSTRIP PATCH ANTENNA FOR WIMAX APPLICATIONS

**V.Ratna Bhargavi,P.Poorna Priya,K.Pavan Kumar,Dr.Habibulla Khan**
Department of ECE, K L University, Guntur DT, AP, India

**ABSTRACT:**
***A V-slotted triangular shape microstrip patch antenna is presented in this paper with enhanced gain for wimax applications. The microstrip patch antenna becomes very popular day by day because of its ease of analysis low cost, light weight, easy to feed and their attractive characteristics.. The return loss is below −10dB from 3.54 GHz to 3.75 GHz with impedance bandwidth 210MHz.The antenna is thin and compact which makes it easily portable. A maximum gain of 7.29dB achieved at 3.66GHz frequency. The VSWR parameter was found to be less than 2 within the operating frequency range. The antenna parameters of with v-slot and without v-slot of triangular shape patch are compared. The substrate*** **material of** ***RT-duriod-5880 with relative permittivity 2.2 and loss tangent of 0.009 is used in this proposed antenna. The total simulation done on Ansoft HFSS software.***

## INTRODUCTION:

The IEEE 802.16 Working Group has established a new standard known as WiMAX (Worldwide Interoperability for Microwave Access) this WiMAX can reach a theoretical up to 30-mile radius coverage, Moreover the data rate concerned for the WiMAX bands is 70 Mbps. Nowadays researches focusing on how to design an antenna for WiMAX technology. Basically WiMAX has three allocated frequency bands called low band, middle band and high band. The low band has frequency from 2.5 GHz to 2.8 GHz, the middle band has frequency from 3.2 GHz to 3.8 GHz and the high band has 5.2GHz TO 5.8GHz. The microstrip patch antenna is a low profile antenna that has a number of advantages over other antennas. It is light weight, inexpensive and easy to integrate with accompanying electronics. A microstrip antenna consists of conducting patch on a ground plane separated by a dielectric substrate. Low dielectric constant substrates are generally preferred for maximum radiation (RT-Duroid). The conducting patch can take any shape but we used a Triangular shaped configuration for our analysis.

A microstrip patch antenna is characterized by its length, width, input impedance, gain and radiation patterns. The length of the antenna is nearly half wavelength in the dielectric, which governs the resonant frequency of the antenna. Microstrip patch antennas radiate primarily because of the fringing field's between the patch edge and the ground plane. For good antenna performance a thick dielectric substrate having a low dielectric constant is desirable. Since this provides better efficiency, larger bandwidth and better radiation. With loading of some specific slot in the radiating patch of microstrip antennas can be obtained. The loading of the slots in the radiating patch can cause meandering of the excited patch surface current paths and result in lowering of the antennas fundamental resonant frequency, which corresponds to the reduced antenna size for such an antenna compared to conventional microstrip antenna at same operating frequency.

## DESIGN SPECIFICATION FOR PROPOSED ANTENNA:

In this paper several parameters have been investigated using Ansoft HFSS software. It is a triangular shaped v–slotted patch antenna fabricated on RT-Duroid substrate with a dielectric constant of $€_r$=2.2 and a substrate thickness of t=0.6mm The antenna is fed by 50ohm coaxial probe, through a quarter wavelength transformer for impedance matching. The antenna has the following parameters. L1=5cm; L2=5cm; L3=5cm; εr = 2.2,

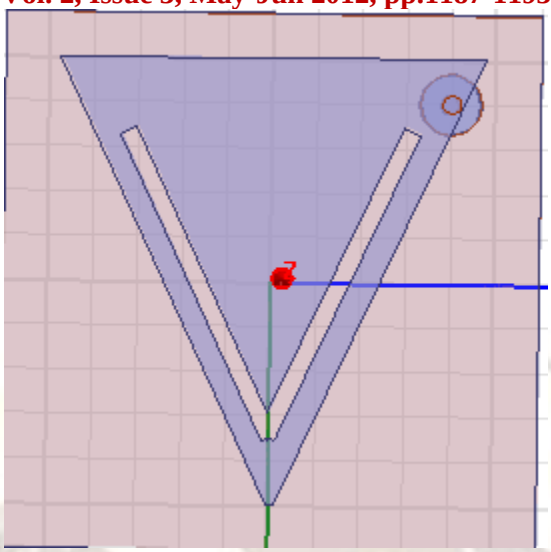

Fig (1) V-slotted triangular shaped micro strip patch antenna

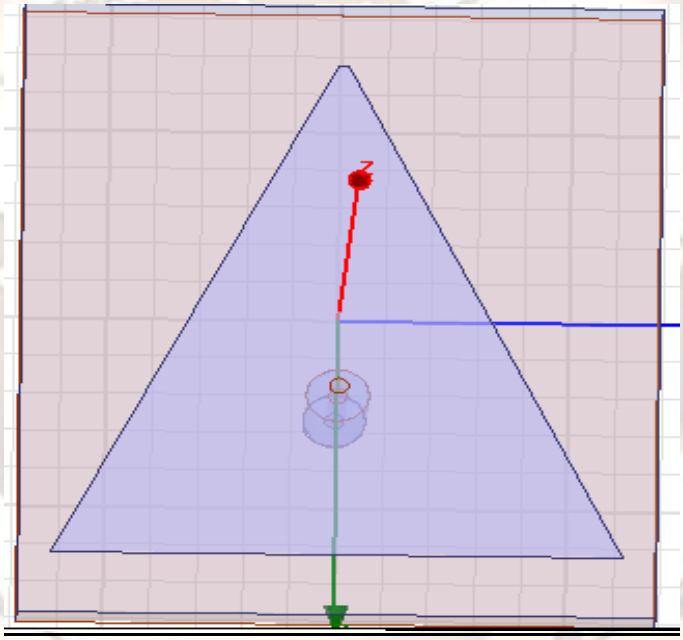

Fig (2) triangular shaped patch antenna without v-slot

WiMAX technology has a data rate up to 70 Mbps. According to design conditions, the simulation results of return loss for the proposed antenna is shown in the figure (3) The return loss obtained for triangular shaped v-slotted patch antenna is below-10db from 2.75GHz to 3.754GHz.

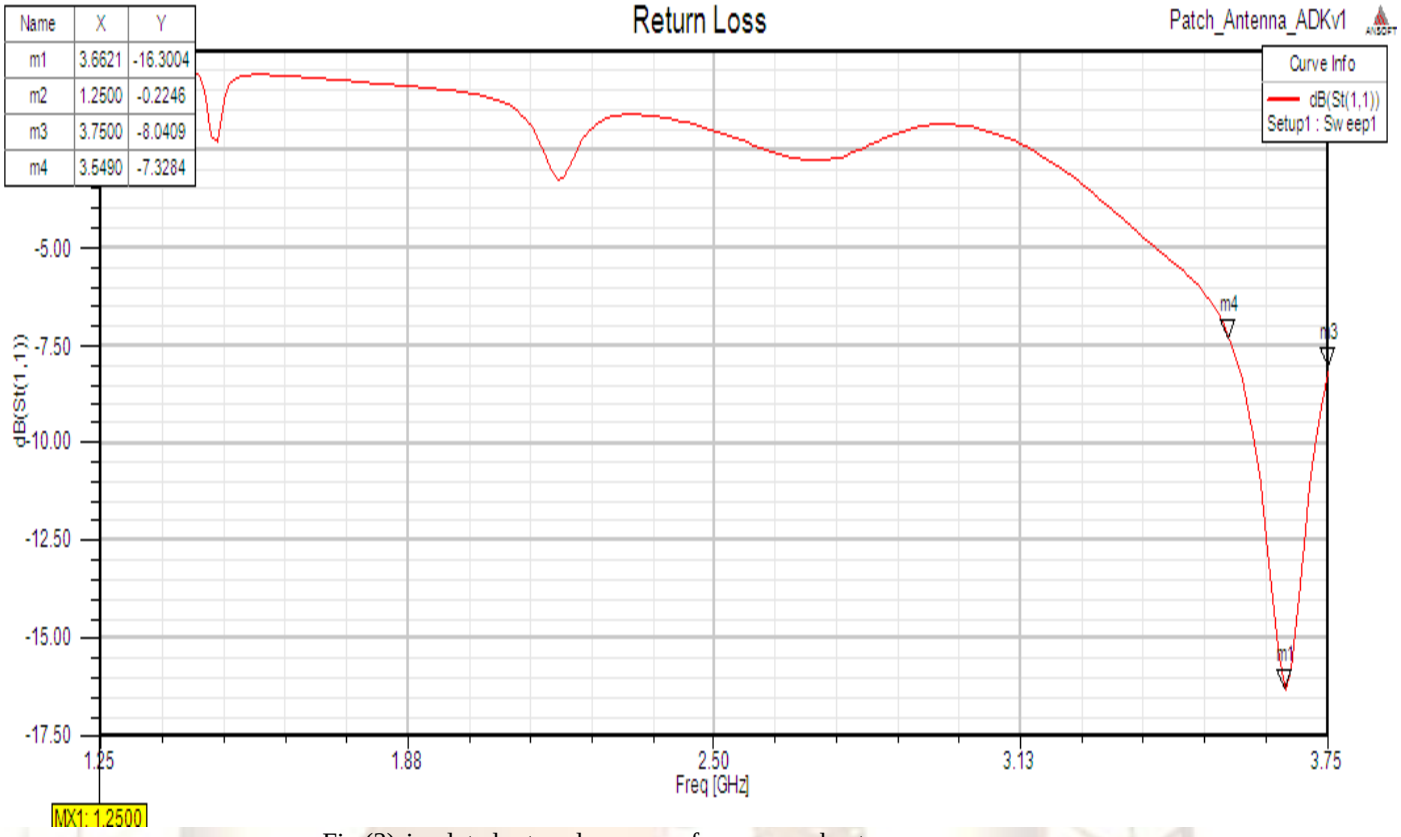


Fig (3)simulated return loss curve for proposed antenna

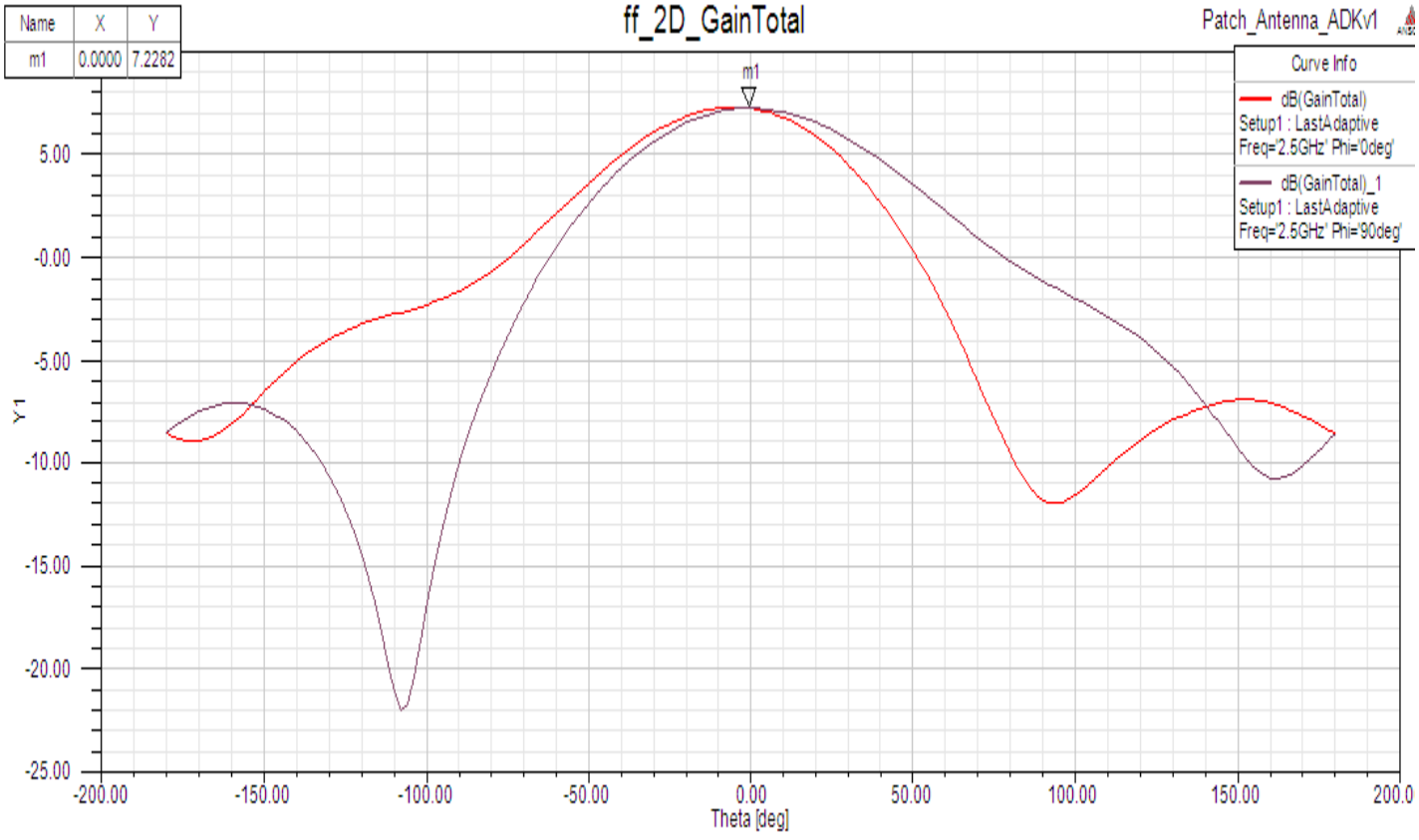

Fig (4)Gain for v-slot triangular patch antenna

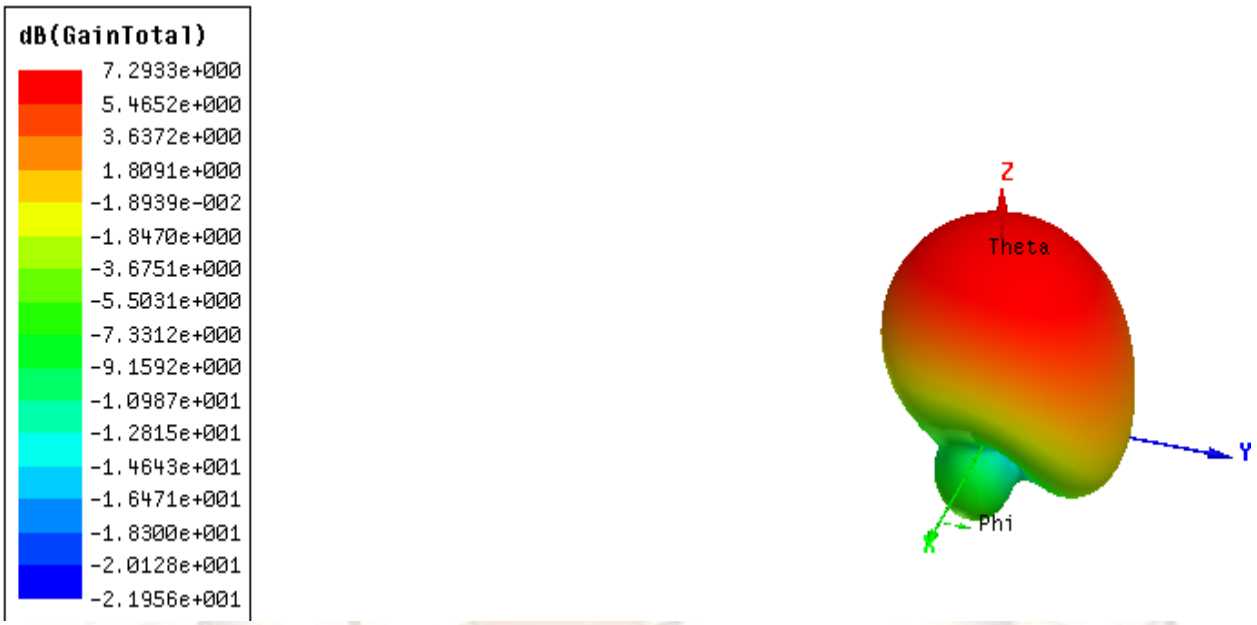


Fig (5)3D- gain for proposed antenna


Fig (6)3D- gain for triangular patch antenna without slot

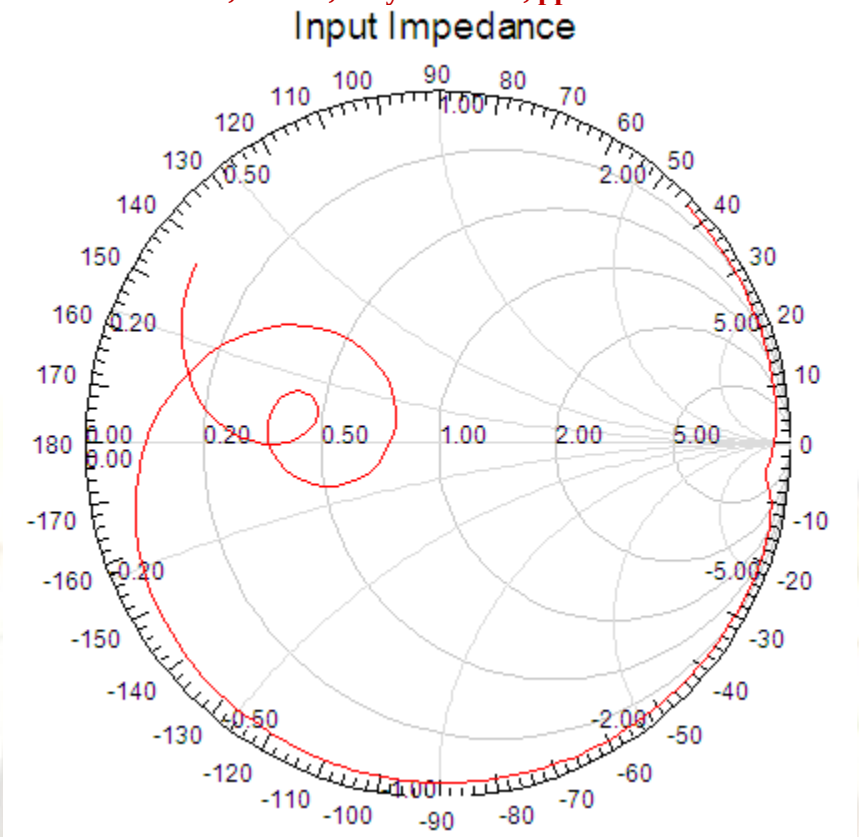


Fig (7)Input impedance

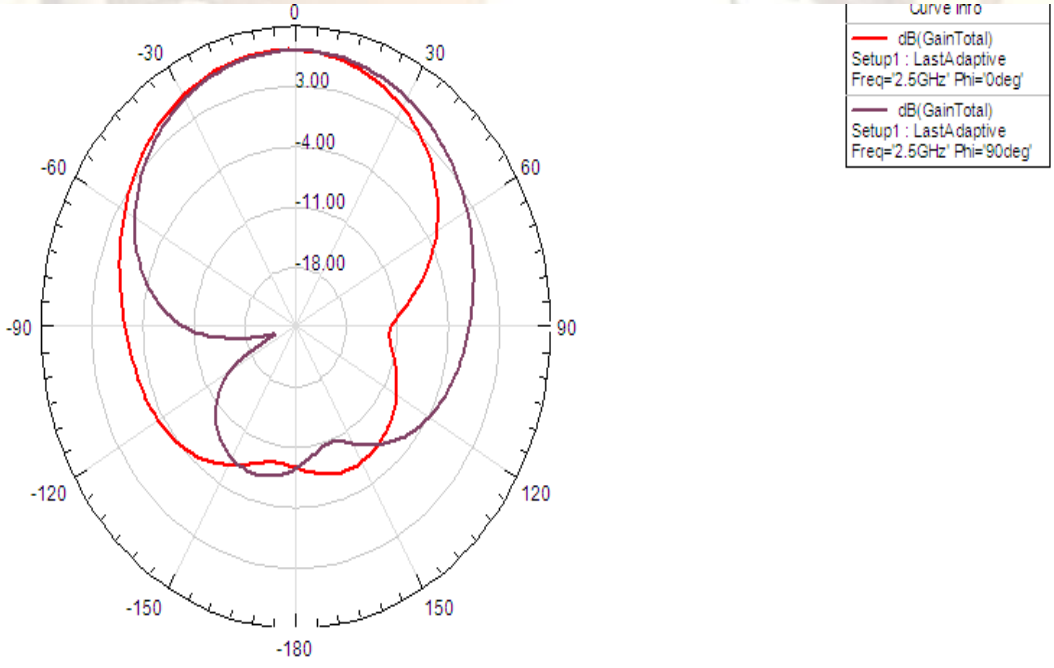


Fig (8)Radiation pattern for triangular shaped patch antenna with v-slot

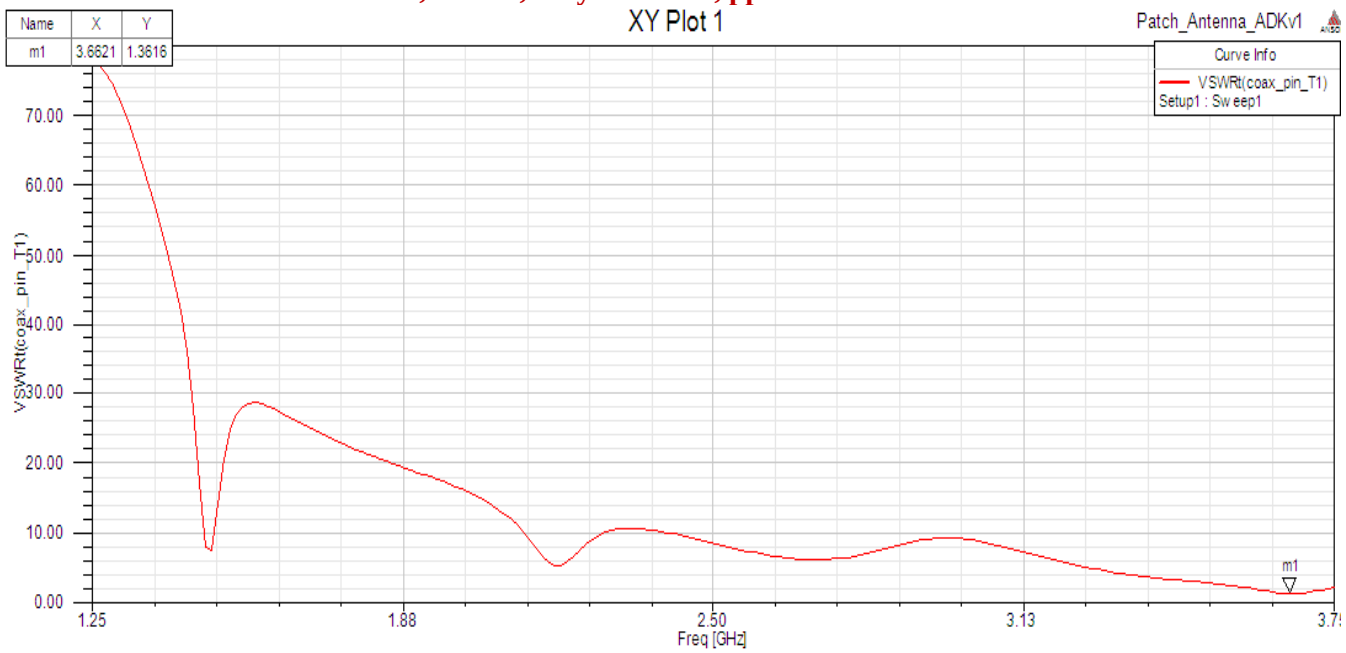


Fig (9)simulated VSWR curve

From this, it can be seen that the radiation patterns are omni directional and there is impedance matching.

## CONCLUSION:

This paper proposed a a triangular shaped patch with v-slot antenna for wi-max applications. Various parameters of antenna design are optimized. In this paper, we measured the results of return loss, Radiation pattern and gain of the proposed design and which ensures that this antenna gives the good results in WI-MAX applications.The proposed antenna have achieved good impedance matching, stable radiation patterns, and high gain. The triangular shaped patch with v-slot antenna can be used for wi-max application in the frequency range 2.5 to 4.5 GHz. This antenna is tested will be tested for different dielectric constants.

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**AUTHOR'S BIBILOGRAPHY:**

**Mrs. V. Ratna BHargavi** was born in 1984 in Krishna district, Andhra Pradesh, India. He received her Msc degree in Electronics, from NU Guntur in 2006. Currently he is pursuing M.Tech in Communication and Radar Systems in the ECE department of K L University. Her interested research areas are Antennas and Digital image processing

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