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(71)**Name of Applicant :**
1)Painam Surendrakumar
Address of Applicant :Dr. Painam Surendra kumar, Associate Professor, Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India. ----------
2)Miriyala Suneel
3)Kommalapati Rajesh
4)Bapatla Engineering College
5)Thota Sai Kiran
6)Savaram Dharmila
7)Gangireddy Tharun Reddy
8)Shaik Basheer
9)Vanja Aswini
10)Talluri Praveen Kumar
11)Uppala.Srinivasa Rao
12)Kasukurthy Venkata Sai Sri Harsha
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)Painam Surendrakumar
Address of Applicant :Dr. Painam Surendra kumar, Associate Professor, Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India. ----------
2)Miriyala Suneel
Address of Applicant :Mr.Dr.Miriyala Suneel, Assistant Professor Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
3)Kommalapati Rajesh
Address of Applicant :Mr.Dr.Kommalapati Rajesh, Assistant Professor, Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
4)Bapatla Engineering College
Address of Applicant :Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
5)Thota Sai Kiran
Address of Applicant :Mr. Thota Sai Kiran Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
6)Savaram Dharmila
Address of Applicant :Ms. Savaram Dharmila Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
7)Gangireddy Tharun Reddy
Address of Applicant :Mr. Gangireddy Tharun Reddy Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
8)Shaik Basheer
Address of Applicant :Mr. Shaik Basheer Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
9)Vanja Aswini
Address of Applicant :Ms. Vanja Aswini Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
10)Talluri Praveen Kumar
Address of Applicant :Mr.Talluri Praveen Kumar, Assistant Professor Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
11)Uppala.Srinivasa Rao
Address of Applicant :Mr. Dr.Uppala Srinivasa Rao, Associate Professor Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------
12)Kasukurthy Venkata Sai Sri Harsha
Address of Applicant :Mr. Kasukurthy Venkata Sai Sri Harsha, Assistant Professor Department of Electronics and Communication Engineering, Bapatla Engineering College, Bapatla-522102, Andhra Pradesh, India Bapatla ----------

(57) Abstract :
The design and optimization of a two-element, rectangular slotted Multiple Input Multiple Output (MIMO) antenna system for C-band radar applications are presented in this work. The antenna is perfect for radar applications since it runs at a resonance frequency of 7.2 GHz. It has small dimensions, measuring 26.00 mm × 37.71 mm, and each patch is 12.22 mm × 10.6 mm. Because of its advantageous electrical characteristics, Rogers RT5880, which has a lossy dielectric constant of 2.2, is used as the antenna substrate. Rectangular slots are incorporated into the antenna design to improve impedance matching and bandwidth in an effort to achieve optimal performance. With careful optimization, the suggested design attains a significant gain enhancement of 6.3 dB and a remarkable 78% increase in efficiency over traditional designs. These improvements are essential for optimizing radar system performance, making certain precise signal transmission and dependable detection. For C-band radar applications, the suggested MIMO antenna layout is a strong option since it strikes a compromise between small size, broad bandwidth, improved efficiency, and higher gain. The design's effectiveness has been confirmed by extensive simulation and experimental results, underscoring its practical deployment in radar systems that demand high-performance antenna solutions.

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