International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER
SSRN

IJIEMR Transactions, online available on 30h Nov 2018. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-07&issue=ISSUE-12

Title: DESIGN OF CIRCULAR PATCH FRACTAL ANTENNA BY USING FRACTAL GEOMETRY

Volume 07, Issue 12, Pages: 699–705.

Paper Authors

G.SREENIVASULU, N.RAMANJULU
MJRCET, Pileru

.
.

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

DESIGN OF CIRCULAR PATCH FRACTAL ANTENNA BY USING FRACTAL GEOMETRY

[1]G.SREENIVASULU, [2]N.RAMANJULU
[1]M.Tech Student, Dept of ECE, MJRCET, Pileru
Assistant professor, Dept of ECE, MJRCET, Pileru
[1]Sreenivasulu.ece2011@gmail.co, [2]ramnandyala85@gmail.com

Abstract- Remote Communication Technology is the best introduction in the recorded setting of humankind in the extents of forefront front line correspondence structures. Fractal orchestrates system is utilized in context of its self-close and space filling property. The extent of the proposed getting wire is to be lessened by utilizing the round fix gathering contraption. In the Proposed work, we execute the Rogers RT/duroid 5880(tm) substrate and the dielectric persistent is 2.2 for improve the rehash of the accepting wire. In continuation rehash the execute of one more cycle in the radio wire handle. Fractal orchestrates approach is utilized in context of its self-equivalent and space filling property. The area of the proposed assembling mechanical gathering is to be diminished by utilizing the circumlocutory fix accepting wire radio wire and following the parameters are radiation design, directivity, return misfortune, VSWR and Bandwidth of the proposed getting wire recieving wire figured by utilizing the HFSS.13 programming pack

Index Terms— Sierpinski carpet geometry, fractal Antenna, MSA, Return Loss, microstrip feed line.

I.INTRODUCTION

A little scale strip getting wire is on an extremely fundamental dimension shaped with the ultimate objective that a joining of two parallel planning layers which is separated by a dielectric material is engraved on to a solitary board. The lower layer and upper layers go about as a ground plane and radiator autonomously. An immediate fix getting wire utilizes a fix of half wavelength long and having a more noteworthy ground plane which may produce the social occasion gadget measure disregarding what might be typical gives better execution. We can outline specific states of little scale strip settle fragments, for example, dipole, triangular, rectangular, twisted, round and square. All things considered, we utilize rectangular small scale strip for better radiation characteristics. Little scale strip radio wires are the successors of the printed accepting wires which are the present stock for a remote application with its recurrent sections saving to various applications in shield, GPS, rocket structures and satellite correspondences [2, 4]. Downsized scale strip radio wires have unprecedented execution in social event contraption moves when showed up diversely in connection to other metallic accepting wires obliging no effort. We can execute undeniable frameworks and advances to accomplish radio wire mix inside an interesting chip utilizing this kind of getting wire. In reference to this in our paper we have shaped a serrated rectangular downsized scale strip settle gathering contraption on Rogers RT/duroid 5880(tm) substrate. The primary idea behind orchestrating a serrated

fix gathering gadget is that it has multiband characteristics, since we have acquired twofold band for this condition, it will be productive that it will have high data transmission and high get with just a solitary oozing part and Omni directional radiation setup like those of general printed recieving wires, anyway these are more positive as a result of its applications. In serrated assembling contraption graph we have utilized Rogers RT/duroid 5880(tm) substrate since all the printed circuited sheets are commonly made of this material it is unquestionably not difficult to make serrated openings with this material. Serrated assembling contraptions have multiband attributes since serrated openings are utilized for optical correspondence where speedy is crucial, this would be profitable for fast long range information transmission to satellite in microwave rehash enhance. Also, multiband frequencies are extremely fundamental in military applications created with satellite accomplishes, we can have association with high secure, quick and irrelevant effort utilizing the proposed the radio wire points of interest. HFSS composing PC programs is utilized to plan and duplicate Patch.Edge Patch getting wire. The created round fix gathering device with edge.

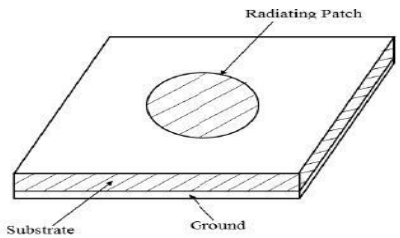

Figure 1: Designed Circular Patch Antenna

Return hardship shows up at what anyway for the better flag quality the section hardship ought to be as higher as conceivable than that Multi-band serrated assembling mechanical gathering surmises it transmits affect at two unique frequencies. The operational drawback with these downsized scale strip radio wires is having low get. So get is the vital need to be accept mind as it relies upon shape, size and dielectric material utilized. As appeared in the Figure11 the delineated serrated assembling gadget has a 6.8dB which is best sensible for relentless applications. Radiation Characteristics depicts the relative field nature of the social occasion contraption from various headings. 2d-radiation representation is only the graphical delineation of radio wire diagram in two estimations, anyway 3d-radiation case is the graphical portrayal of social occasion mechanical get together arrangement in three estimations. The proposed printed-sort recieving wire relies upon a 1.6 mm-thick Rogers RT/duroid 5880(tm substrate with estimations 25mm and 38mm. It has a rectangular part ring opening encased inside a rectangular fix. The circuit of the split-ring opening and the U-shaped space in the midway ground plane gives resonation at two additional frequencies. The estimations of the fix, the ground, and the two openings are enhanced to get these pined for sensible repeat run. An epic triple-band recieving wire authentic for WLAN/WiMAX applications is proposed in this paper. Using a split-ring space installed in the rectangular fix and a U-framed opening cut midway ground plane, three resonating modes with brilliant impedance execution are refined. The preservationist measure, triple-band go over, astounding radiation organizes, surprising get and an essential structure makes this recieving wire sensible for valuable remote correspondence structures, regulating WLAN and WiMAX frameworks, in three diverse repeat get-togethers. In this paper, using a split-ring opening encased

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

inside a rectangular fix and scratching a U-shaped space in the fragmentary ground plane are the two systems used to fulfill triple-band task execution, and moreover more diminutive size and less unusual structure. By using the three di®erent resonating frequencies, the proposed recieving wire a convey three blasting modes to cover three searched for gatherings for WLAN and WiMAX applications. The geometry and the framework principles of the proposed Progress In Electromagnetics Research Symposium Proceedings, Moscow, Russia, August 19{23, 2012 609 recieving wire structures are present.

II. Existing Method

Fix reception apparatus experienced vast development as of late in the field of remote correspondence and turn into the primary subject of many explores. Benoit Mandelbrot in 1975 acquaints the fractal geometries with accomplish the multiband and wideband qualities. These attributes are started by the fractal geometrical properties, for example, self-similitude and space-filling.The piece outline as shown in underneath. Fractal geometries rehash their geometries by a scale at specific measurements in progressive emphases the geometry for the fix of fractal radio wire is the comparable example of the entire geometry at various scales to make distinctive cycles and to get the better outcomes.Self-similitude property of radio wire is used to gain the multiband direct and the space-filling property is used to achieve downsizing of getting wire. Fractal getting wire in like manner has numerous components like minimal size, less weight and better execution over different remote applications [6] in the repeat gatherings, for instance, L-band (1-2GHz), S-band (2-4GHz), C-band (4-8GHz), X-band (8-12GHz), Ku-band (12-18GHz). In this paper two exceptional cycles of proposed gathering contraption has been arranged and different parameters are dismembered for both the accentuations. The unequivocal plans, graphical and theoretical estimation of results are discussed in the further sections of this organization. In this work, to design the round fix getting wire for multiband applications.By using the Microstripline supporting, this achieves the most significant execution for the made radio wire. Fractal radio wire is one of those systems to upgrade gathering device properties using .Fractal reception apparatus is one of those strategies to enhance recieving wire attributes utilizing fractal geometry.The substrate with dielectric consistent 2.2 that is Rogers RT Duroid5880 substrate material.Finally, to discover the arrival misfortune, radiation example, VSWR and bandwidth.Simulation is finished by utilizing HFSS.13(High Frequency Structure Simulator).

III.ANTENNA DESIGN CALCULATION

Step 1: Calculation of the width W:

$$W = \frac{c}{2fo\sqrt{\frac{(\varepsilon r+1)}{2}}} = 1.22\text{mm} \quad \text{----------} \quad \text{-- (1)}$$

Step2: Calculation of the Effective Dielectric Constant. This is based on the height, dielectric constant of the dielectric and the calculated width of the patch antenna

$$\epsilon_{eff} = \frac{\epsilon_r + 1}{2} + \frac{\epsilon_r - 1}{2}\left[1 + 12\frac{h}{w}\right]^{\frac{-1}{2}} = 8.89 \text{ ---- (2)}$$

Step 3: Calculation of the Effective length

$$L_{eff} = \frac{c}{2f_o\sqrt{\epsilon_{eff}}} = 5.6 \text{ ----------}$$

-- (3)

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

Step 4: Calculation of the length extension

$$\Delta L = 0.412h\frac{(\epsilon_{eff}+0.3)(\frac{W}{h}+0.264)}{(\epsilon_{eff}-0.250)(\frac{W}{h}+0.8)} = 0.6\text{----------}$$

(4)

Step 5: Calculation of actual length of the patch $L = L_{eff} - 2\Delta L = 4.4\text{mm}$ ----------

-- (5)

Circular radius (a)=5.255mm

$$a = \frac{F}{\left\{1+\frac{2h}{\pi\epsilon_r F}\left[\ln\left(\frac{\pi F}{2h}\right)+1.7726\right]\right\}^{1/2}}$$

Table: Frequency Vs Radius of circular patch antenna

Frequency(GHZ)	Radius(cm)
10.7	0.0735
16.7	0.1830
21.7	0.2041
25.6	0.1375
43.3	0.1555
49.3	-0.1991

IV.PROPOSED METHOD

Transmission line model is used to design patch antenna.The parameters used to calculate patch dimensions are given Antenna shown in the figure 1 & 2 was fabricated using a software HFSS. Because of low

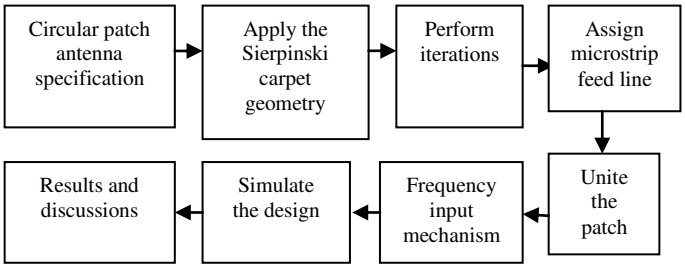

Fig 2.Block diagram

Spurious radiations and simplicity of creation the coaxial feeds are available. HFSS is an economically accessible limited component strategy solver for electromagnetic structures Rogers RT/duroid 5880(tm) and printed circuit sheets (PCB). Rogers RT/duroid 5880(tm) is a composite material made out of woven fiber glass texture with an epoxy tar cover that is fire safe (self-covering). Rogers RT/duroid 5880(tm) is a notable and adaptable high-weight thermo set plastic overlay audit with extraordinary quality to weight extents. With very nearly zero water absorption, Rogers RT/duroid 5880 is most typically used as an electrical encasing having amazing mechanical quality.

I. Meshing the Dielectric Substrate

The going with is the work used to show the get-together contraption? The triangles are used to censured the metal extents of the settle, and tetrahedral are used to discrertize the volume of the dielectric substrate in the settle. These are showed up by the tones yellow and green openly. The total number of demand is the entire of the demand for the metal regardless of the demand used for the dielectric. Thusly, only a specific layer of tetrahedral are used to exhibit the dielectric substrate. This gives uncommon results when the substrate thickness is small with respect to this circumstance. Anyway for thicker substrates this might be an internment. Manual cross segment may be required to insinuate to change exactness. This is clarified in the running with region. Demonstrating. Thin versus thick Dielectric Substrates.

II.ITERATIONS

The Radius of the circular patch is 5.25mm,L_f =4.4mm and W_f=1.2mm by using these values we can design the circular patch antenna and then making the iterations by using the sierpinski carpet geometry as showen in below figures

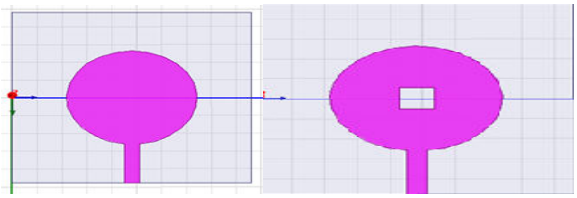

Fig1:0th iteration slot Fig2:1st iteration Slot =2.1*2.1mm

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

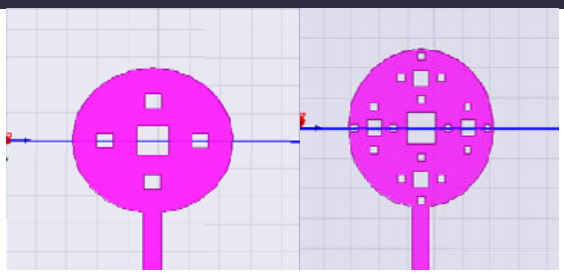

Fig3:2nd iteration= 2.1/2mm Fig4: 3rd iteration=1.05/2mm

In this section the Figure1 shows the circular patch antenna and Figure2 shows the 1st iteration it is made by Sierpinski carpet geometry (i.e. half of the circular radius value).In Figure3 the iterations is formed by half of the first iterations and Figure4 is formed by the half of the second iterations

V.RESULTS AND DISCUSSIONS

In this section the simulation of the proposed antenna is performed and the respective results are presented and discussed. The simulation is carried out in HFSS and the different antenna parameters like s-parameters, VSWR and gain in dB are observed, the relevant figures are shown below. The table2 shows the characteristics of the circular patch fractal antenna by using Sierpinski carpet geometry.

Different VSWR's are obtain at different frequency of operation by the CPFA .Their respective results are shown as follows.

(i) At Frequency 16.7GHz

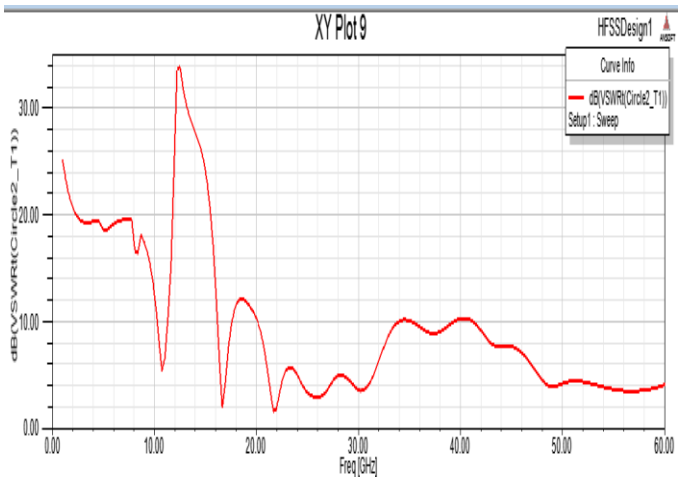

Fig5: VSWR =1.22

(ii) At Frequency 21.65GHz

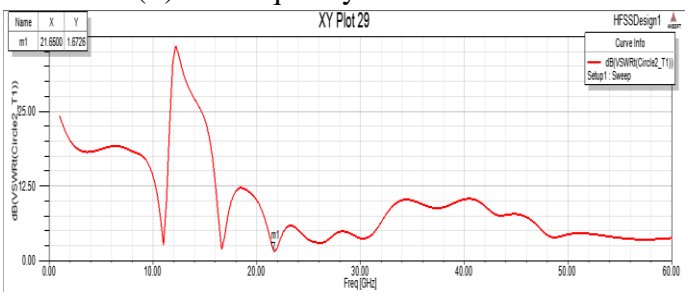

Fig6: VSWR = 1.67

Different Return losses are obtained at different frequency of operation by the CPFA .Their respective results are shown as follows.

Return losses:

(i) At Frequency 16.7GHz

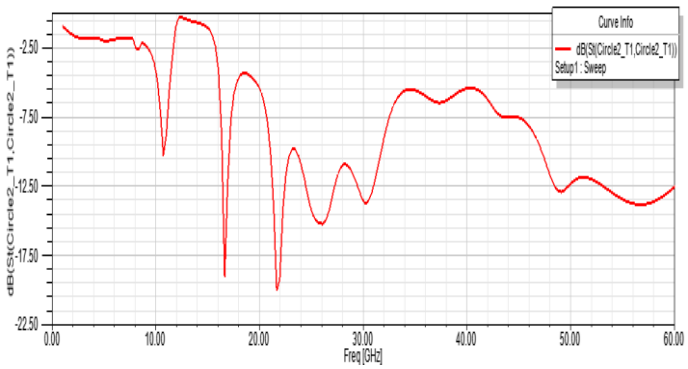

Fig7: S-parameters Return loss = -20.52dB

(ii) At Frequency 21.65GHz

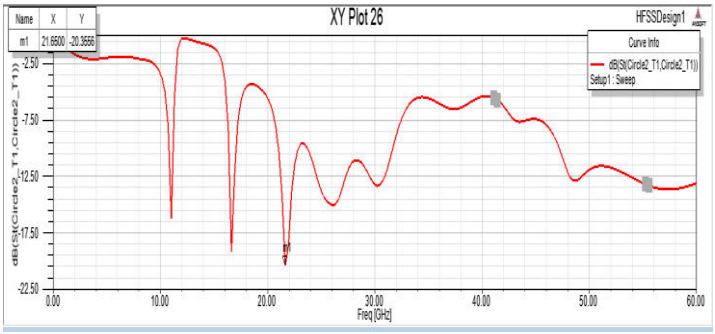

Fig8: S-parameters Return loss =-21.36

Radiation pattern :

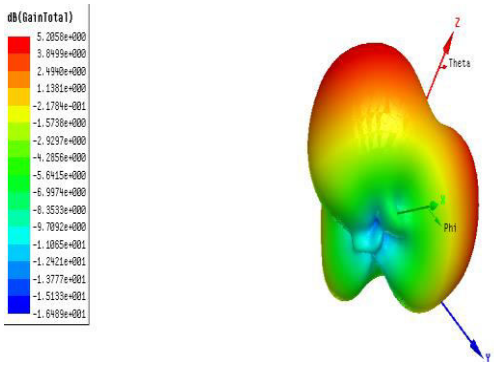

Fig10: Frequency 16.7GHz

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

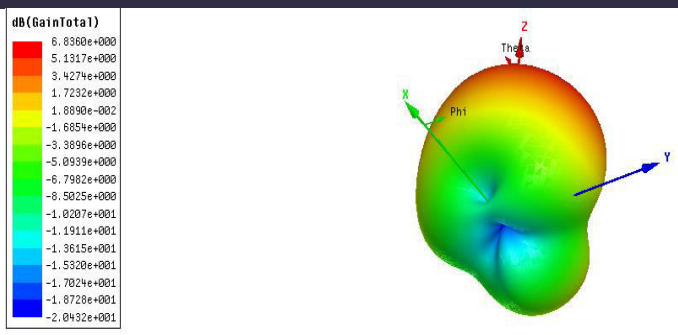

Fig11: Frequency 21.65GHz

Table2: Characteristics of the CPFA by using SC geometry

Resonant frequency(GHz)	Return loss(db)	VSWR	Antenna gain(dB)
16.7	-20.52	1.22	5.2
21.65	-21.36	1.67	6.88

In the above segment the reenacted outcomes are introduced and discused, explicitly unique full frequencys, their respectieve s-parametrs, Return misfortune and gain.The Figure6 demonstrates the about VSWR charecterstics is 1.22 at 16.7GHz thunderous recurrence and Figure7 demonstrates the about s-parameters regarded their arrival misfortunes - 20.52 at 16.7GHz resounding frequency.The Figure8 demonstrates the s-parameters their arrival misfortunes - 21.36 at 21.65GHz resonan frequncy and Figur9 demonstrates the VSWR charecterstics is 1.67.The fig 10 demonstrates the reception apparatus gain is 5.2dB at 16.7GHz and Figure11 demonstrates the radio wire gain is 6.88 at 21.65GHzThe Figure4 roundabout fix fractal recieving wire is having great return misfortunes at two full frequncy's those are 16.7GHz&21.65GHz and VSWR and gain.

VI. CONCLUSION

Circular patch fractal antenna is intended and simulated using HFSS programming and diverse parameters like return misfortune, and radiation design are resolved at various thunderous frequency's. The fractal reception apparatus has accomplished enhanced return misfortunes, Gain and example and VSWR is additionally diminished. This radio wire can be great at satellite interchanges, space ,radar correspondences. Planning of dissimilar to formed opening may raise the parameters like gain, VSWR, Return misfortune. In present work, round Patch fractal recieving wire is structured by utilizing Rogers RT/duroid 5880(tm) substrate it is having dielectric constant is 2.2.

VII. REFERENCES

[1]. Hari Shankar Singh Mayank Agarwal, Gaurav Kumar Pande, and Manoj Kumar Meshram "A Quad Band CompactDiversityAntennaforGPSL1/WiFi/LTE 2500/WiMAX/HIPERLAN1 Applications," IEEE Antennas and Wireless Propagation Letters, Vol. 13, 2014.

[2]. Ahmed Khidre, Kai-Fong Lee, Atef Z. Elsherbeni, and Fan Yang Wide Band Dual-Beam U-Slot Microstrip Antenna; IEEE Transactions On Antennas And Propagation, Vol

[3] T.F.A. Nayna, A.K.M. Baki, F. Ahmed, “Comparative Study of
Rectangular and Circular Patch Antennas in X Band”, IEEE
International Conference on Electrical Engineering and Information &Communication Technology (ICEEICT), 2014.

[4]. Wang Ren, "Compact H-Shaped Slot Antenna for 2.4/5.8GHz WLAN Applications," IEEE International Conference on Multimedia Technology (ICMT), 2010.

[5]. Tze-Hsuan Chang and Jean-Fu Kiang, Compact MultiBand H-Shaped Slot Antenna, IEEE Transactions on Antennas and Propagation, volume 6, issue 8, 2013.

[6]. Wang Ren, Compact H-Shaped Slot Antenna for 2.4/5.8GHz WLAN Applications, IEEE International Conference on Multimedia Technology (ICMT), 2010.

[7]. A.Balanis, Antenna Theory: analysis and design,2nd edition,1997.

[8].G.Guru Prasad, Dr.T.Ramashree, P.Srinivasulu, Design of Microstrip Antenna Array for wind Profile Radar, International journal of Electronics and Tele communication and Instrumentation Engneering, ISSN0974-4975, PP[38-42], Volume 04, Issue No 01, JULY 2010-SEPTEMBER 2010.

[9]. K. C. Lin, C. H. Lin, and Y. C. Lin, "Simple printed multiband antenna with novel parasitic-element design for multi standard mobile phone applications," IEEE Transactions on Antennas and Propagation, vol. 61, no. 1, pp. 488-491, 2013.

[10]. J. Anguera, A. Andujar, and C. Garcia, "Multiband and little coplanar radio wire framework for remote handheld gadgets," IEEE Transactions on Antennas and Propagation

[9] V. Saidulu, K.S. Rao, K. Kumarswamy, P.V.D. Somasekhar Rao, "Comparison Analysis of Rectangular and Circular Patch Microstrip. Antennas with Dielectric Superstrates", International Journal of Microwaves Applications, vol. 2, September-October 2013, pp 125-134.

[10] D. Bhardwaj, K. Sharma, D. Bhatnagar, S. Sancheti, "Broadband parasitically coupled concentric semi-circular elliptically ring antenna surrounding and elliptical patch with air gap", IEEE Applied Electro magnetics Conference (AEMC), 2009.

[11] H.F. AbuTarboush, R. Nilavalan, S.W. Cheung, K.M. Nasr, T. Peter, D. Budimir, H. Raweshidy, "A Reconfigurable Wideband and Multiband Antenna Using Dual-Patch Elements for Compact Wireless Devices", IEEE Transactions on Antennas and Propagation, vol. 60, 2011, pp. 36-43.

[12] S.K. Menon, B. Lethakumary, C.K. Aanandan, K. Vasudevan, P. Mohanan, "A novel EBG organized ground plane for microstrip reception apparatuses", IEEE Antennas and Propagation Society .

[13] S. Gupta, S.S. Dhillon, P. Khera, A. Marwaha, "Dual Band U- Opened Microstrip Patch Antenna for C Band and X Band Radar Applications", IEEE Computational Intelligence and Communication Networks (CICN), 2013, pp. 41-45.

[14] Jiang Huiling, H. Arai, "Enhancement of roundabout enraptured fix subterranean insect

[15] M. Nandel, Sagar, R. Goel, "Optimal and New Design of T-Shaped Triband Fractal Microstrip Patch Antenna for Wireless Systems", IEEE Computational Intelligence and Communication Networks (CICN),
2014, pp. 92-96.

[16] D. Kumar, M. Sharma, S. Bansal, "Novel Design of Key-Shaped Fractal Antenna for UWB Applications", IEEE Computational Intelligence and Communication Networks (CICN), 2014, pp. 87-91.

[17] D. Kumar, M. Sharma, S. Bansal, "Changed Ring Shaped Sierpinski Triangle Fractal Antenna for C-Band and X-Band Applications", IEEE Computational Intelligence and Communication Networks
2014, pp. 78-82.

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org