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Design of Frequency Reconfigurable Slot Antenna for Wireless Applications

[1]M. Paranthaman, [2]Dr.S.Palanivel Rajan
[1]Assistant Professor, [2]Associate Professor
Department of Electronics and Communication Engineering,
M.Kumarasamy College of Engineering, Karur, Tamilnadu

Abstract:
Frequency reconfigurable slot antenna is used for wireless application to operate in a multi bands. The existing system has many issues like less radiation efficiency, cross polarization at high frequencies. In this project we are overcoming with these issues like changing the substrate material of the antenna to be fabricated. The area of the antenna is also reduced to make it more compact so that it can be widely used in all wireless applications .All the parameters of the antenna are measured and compared with the existing one. The proposed system has better radiation efficiency compared to current system. All characteristics are improved compared to the existing system. Cross polarization does not occur in high frequencies which make this antenna to operate in higher frequency ranges so that the direction of output radiation does not change in high frequency. The gain of the antenna also increased comparatively.

Index Term:HFSS, IMD, SAR

I . INTRODUCTION

Wireless antenna is a antenna which send or receive radio frequency waves.It can be connected to wireless routers using splitter amplifier etc. Wireless antenna are classified into two types. They are omnidirectional antenna and directional antenna.Omni directional antenna is used to emit radiation in all direction. It is used to cover wide range for best yield it can be rotated and it is flexible. The other type of wireless antenna is directional antenna.It can emit radiation in single direction.Due to this property these antennas have high strength. It is many applied in point to point communication dish antenna, yagi-uda antenna comes under this category

Reconfigurable antenna can be define as the antenna whose parameter can be changed dynamically. The changes are reversible.This process can be controlled.The reconfigurable antenna is mainly depends on the internal characteristics.

The reason for reconfigured to obtain desire performance in desired range and to increase the yield of the antenna. Generally this antenna is classified into four types fequency reconfiguration,radiation pattern reconfiguration, polarization reconfiguration, compond reconfiguration

In frequency reconfigurable antenna the antenna frequency can be changed among different situation.The main purpose of frequency reconfigurable antenna is to replace multiple antenna by single reconfigurable antenna.By using RF switches and impedence load frequency reconfigurable can be achieved.

Radiantion pattern reconfiguration is used to modify the shape of the radiation pattern movable switches and parasitic element are used for defining radiation pattern antenna.To change the modes of polarization in antenna, polarization reconfigurable antenna are designed by using this antenna mismatch loss is reduced.Compound reconfiguration can also be defined as multiple reconfiguration because it can be used to tune the frequency,change the frequency at the same time.

Slot antenna is a simplest antenna.It comes under aperture antenna. Slot antenna is a rectangular slot cut on the conducting sheet. The cut is made on the area,where it is to be mounted. The frequency coverage of slot antenna is above to 300MHz to 30GHz.In other word it cover ultra high frequency and super high frequency.

The working of slot antenna is based on babinet principle.It can be simply stated as where high frequency field in slot the energy is radiated. It has omnidirectional radiation pattern

II . LITERATURE SURVEY

In paper [1] Micro Electric Mechanical System reconfigurable antenna is used to modify the frequency level so that it in can be suitable for cognitive radio applications. The frequency range is from 2 Ghz to 3.2 Ghz. The

bandwidth obtained is twice more than the usual E-Shaped patch bandwidth. High Cross polarization is observed in the ON state. This cross polarization can be eliminated by element rotation.

In Paper [2] how multiple input multiple output antenna can be made suitable for the local area network application can be seen. The operating frequency is in the range of 5.6Ghz to 5.8 Ghz. The isolation is more than 17 db compared to the existing system. Proposed system has four antennas with small area having great isolation. Performance of MIMO antenna can be measured by two parameters envelope correlation coefficient and channel capacity loss. Envelope correlation coefficient is less than 0.01 for operating frequency so it can give good diversity performance. The channel capacity loss is 0.5 bits/Hz which is in the acceptale limit. It can be applied in mobile tablet etc.

In Paper [3] how compact frequency reconfigurable antenna can be used for wireless application can be seen. In this system U shaped and L shaped slot antennas are used for dual band operation. The antenna able to switch between two single band modes and two dual band modes. Here the size of the slot antenna is reduced by 32% compared to the size of conventional slot antenna. The proposed system has four switchable states because of two single bands and two dual bands. The proposed system has larger frequency ratio between band and switches compared to existing ones. This can be applied in LTE AMT fixed service and WLAN.

In paper [4] significance of radiation efficiences are discussed and how to calculate the signal correlation from two antennas. If the antenna has poor accuracy it is due to low radiation efficiency and correlation of loss are unknown. So to imporve the accuracy and efficiences we are calculating loss correlation The are two steps to be followed in calculating received signal first one is relation and the second one is unknown loss correlation.

In Paper [5] how ultra wide band antenna can be used to know the effect of depth and soil moisture here the frequency range of ultra wide band antenna is 3.1Ghz to 10.6Ghz. This proposed system is applicable on two types of soil sandy soil and railway pebbles. The buried UWB antenna has return loss and bandwidth is available for two soils. The burial depth is varied from 5cm to 30 cm. Here the soil moisture is indicated by the shifting of bandwidth levels. The increase in soil moisture increase in shifting of bandwidth levels and return loss.

III . ANTENNA GEOMETRY

This C shape antenna is made of FR4 substate with the relative permittivity of 4.4 and thickness of 1.25mm. The radiator which is made-up of copper.Due to good strength to weight ratios and very negligible water absorption, we use FR4 substate. The FR4 substate which have high mechanical values and electical insulating qualities, so we can able to use in both dry and humid conditions. Due to no radiation we are going for FR4 substate. The design of C shape antenna comprises various dimension. The outer C shape measures 900mm^2 in area.

Fig 1. Design of frequency reconfigurable antenna

IV . RESULT AND DISCUSSION

A . Radiation patterns

The normalized radiation patterns of reconfigurable antenna at frequency in the range of 2.4GHz

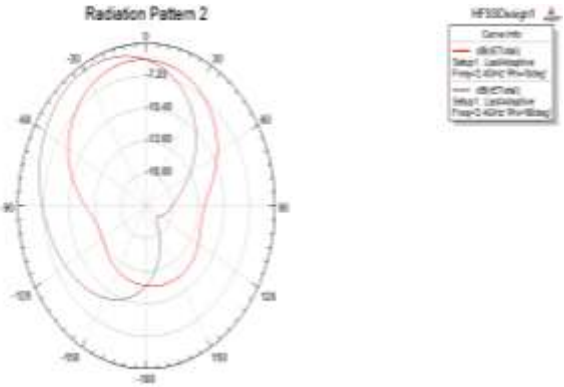

Fig 2.Radiation Pattern

When compared to [1]-[4], the designed antenna shows comparatively good pattern and better return loss in both the operating frequencies.

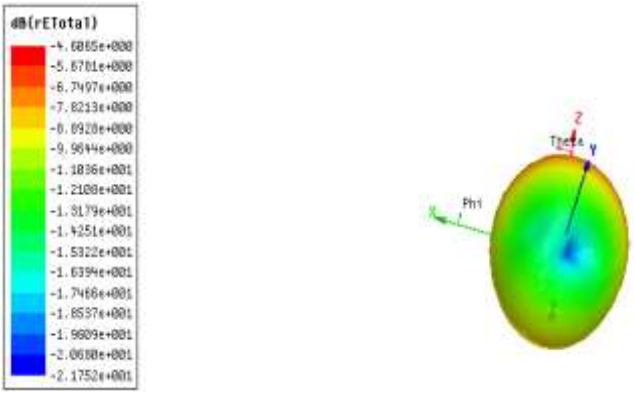

Fig 3. 3D-Polar Plot

B . Return Loss

The reconfigurable antenna have 3 frequency bands.The values are 3.8GHz, 6GHz and 8.5GHz with respective to the values of return loss are -28dB, -21.5dB and -21dB.

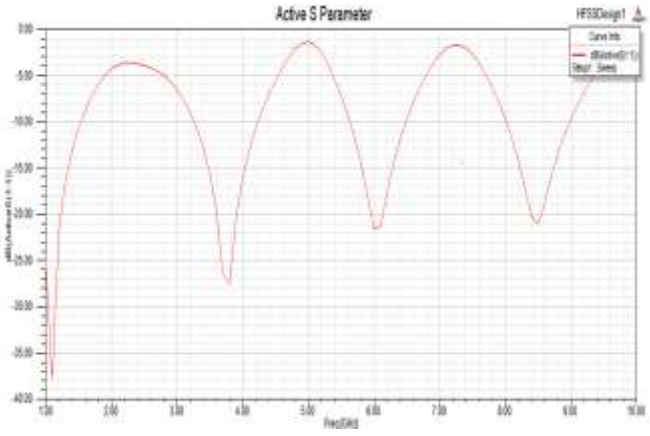

Fig 4. Return Loss

C . Voltage Standing Wave Ratio

The Voltage Standing Wave Ratio (VSWR) is the measure to carry out between the reception apparatus and sustain line interfacing with it.

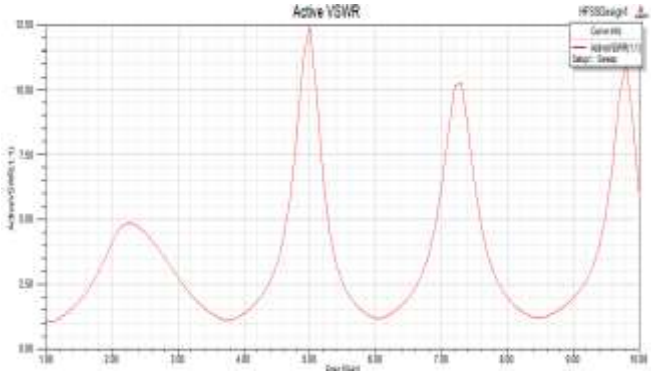

Fig 5.VSWR

IV . CONCLUSION

This project overcame the defects of existing system. It wil have high gain and radiation efficiency. All the parameters are improved compared to the existing system. It also had multiband operation so that it will be used in all type of wireless application. In future these types of antenna are used in all type of wireless application. The return loss has been reduced to 21dB, so signal can cover large area This antenna can be used in the WiMAX and WLAN application.

REFERENCES

1. G. O. Young, "Synthetic structure of industrial plastics (Book style with paper title and editor)," in *Plastics*, 2nd ed. vol. 3, J. Peters, Ed. New York: McGraw-Hill, 1964, pp. 15–64.
2. W.-K. Chen, *Linear Networks and Systems* (Book style). Belmont, CA: Wadsworth, 1993, pp. 123–135.
3. H. Poor, *An Introduction to Signal Detection and Estimation*. New York: Springer-Verlag, 1985, ch. 4.
4. Paranthaman, M., and S. Palanivel Rajan. "Design of Triple C shaped Slot Antenna for Implantable Gadgets." Current Trends In Biomedical Communication And Tele–Medicine (2018): 40. DOI: 10.21786/bbrc/11.2/6
5. B. Smith, "An approach to graphs of linear forms (Unpublished work style)," unpublished.
6. E. H. Miller, "A note on reflector arrays (Periodical style—Accepted for publication)," *IEEE Trans. Antennas Propagat.*, to be published.
7. J. Wang, "Fundamentals of erbium-doped fiber amplifiers arrays (Periodical style—Submitted for publication)," *IEEE J. Quantum Electron.*, submitted for publication.
8. Manikandan M, Andrews N V, Kavitha V (2018) Investigation On Micro Calification Of Breast Cancer From Mammogram Image Sequence. International Journal of Pure and Applied Mathematics 118(20): Pages 645-649
9. C. J. Kaufman, Rocky Mountain Research Lab., Boulder, CO, private communication, May 1995.
10. Mohanapriya S, Vadivel M (2013) Automatic retrival of MRI brain image using multiqueries system. International Conference on Information Communication and Embedded Systems (ICICES): Pages 1099-1103
11. Paranthaman, M., S. Palanivel Rajan (2018) Design of E and U Shaped Slot for ISM Band Application Indian Journal of Science and Technology, Vol 11(18), DOI: 10.17485/ijst/2018/ v11i18/123042
12. Y. Yorozu, M. Hirano, K. Oka, and Y. Tagawa, "Electron spectroscopy studies on magneto-optical media and plastic substrate interfaces(Translation Journals style)," *IEEE Transl. J. Magn.Jpn.*, vol. 2, Aug. 1987, pp. 740–741 [*Dig. 9th Annu. Conf. Magnetics* Japan, 1982, p. 301].
13. M. Young, *The Techincal Writers Handbook.* Mill Valley, CA: University Science, 1989.

14. M. Paranthaman, "T-shape polarization reconfigurable patch antenna for cognitive radio," 2017 Third International Conference on Science Technology Engineering & Management (ICONSTEM), Chennai, 2017, pp. 927-929.
15. V.Kavitha, V.Palanisamy(2013) ―New Burst Assembly and Scheduling T technique for Optical Burst Switching Networks, Journal of Computer Science, Vol. 9, Issue 8, pp.1030-1040
16. (Basic Book/Monograph Online Sources) J. K. Author. (year, month, day). *Title* (edition) [Type of medium]. Volume(issue). Available: http://www.(URL)
17. J. Jones. (1991, May 10). Networks (2nd ed.) [Online]. Available: http://www.atm.com
18. (Journal Online Sources style) K. Author. (year, month). Title. *Journal* [Type of medium]. Volume(issue), paging if given. Available: http://www.(URL)
19. R. J. Vidmar. (1992, August). On the use of atmospheric plasmas as electromagnetic reflectors. *IEEE Trans. Plasma Sci.* [Online]. *21(3).* pp. 876—880. Available: http://www.halcyon.com/pub/journals/21ps03-vidmar
20. M Paranthaman, G.Shanmugavadivel "Design of Frequency Reconfigurable E-Shaped Patch Antenna for Cognitive Radio" International Journal of Applied Engineering Research, ISSN 0973-4562 Vol. 10 No.20 (2015) pp.16546-16548
21. S.Palanivel Rajan, T.Dinesh, "Analysis of Human Brain Disorders for Effectual Hippocampus Surveillance", International Journal of Modern Sciences and Engineering Technology, Vol. 2, Issue 2, pp.38-45, 2015.
22. S.Palanivel Rajan, "A Significant and Vital Glance on "Stress and Fitness Monitoring Embedded on a Modern Telematics Platform", Telemedicine and e-Health Journal, Vol.20, Issue 8, pp.757-758, 2014.
23. Sivaranjani S, Kaarthik K, "Medical Imaging Technique to Detect Tumor Cells", International Journal of Pure and Applied Mathematics, Online ISSN No.: 1314-3395, Print ISSN No.: 1311-8080, Vol. No.: 118, Issue No.: 11, pp. 399 – 404, 2018.
24. S.Palanivel Rajan, S.Vijayprasath, "Performance Investigation of an Implicit Instrumentation Tool for Deadened Patients Using Common Eye Developments as a Paradigm", International Journal of Applied Engineering Research, Vol.10, Issue 1, pp.925-929, 2015.
25. S.Palanivel Rajan, "Diagnosis of Cardiovascular Diseases using Retinal Images through Vessel Segmentation Graph", Current Medical Imaging Reviews, Online ISSN: 1875-6603, ISSN: 1573-4056, Vol. : 13, Issue :4, DOI : 10.2174/1573405613666170111153207, 2017.
26. Ribana.K, Pradeep.S, "Contrast Enhancement Techniques for Medical Images", International Journal of Pure and Applied Mathematics, International Journal of Pure and Applied Mathematics, Online ISSN No.: 1314-3395, Print ISSN No.: 1311-8080, Vol. No.: 118, Special Issue No, pp. 695-700, 2018.
27. M.Paranthaman, S.Palanivel Rajan" Frequency Reconfigurable Patch Antenna Design Using HFSS" International Journal of Pure and Applied Mathematics, Volume 118 No. 20 2018, pp-2301-2306
28. S Palanivel Rajan, C Vivek, M Paranthaman "Feasibility Analysis of Portable Electroencephalography Based Abnormal Fatigue Detection and Tele-Surveillance System" International Journal of Computer Science and Information Security, Vol. 14, Issue. 8 (2016) pp-711
29. M Paranthaman, S Vijayprasath, S Palanivel Rajan "Design of a Frequency Tunable Patch Antenna using HFSS"International Journal of Advanced Research Trends in Engineering and Technology, Vol.3, Issue 7 (2016) pp.69-72
30. Abirami T, PalanivelRajan S, "Detection Of Poly Cystic Ovarian Syndrome(PCOS) Using Follicle Recognition Techniques" on Bioscience Biotechnology Research Communications, Volume-12(1), pp 156-161, 2019
31. S.Palanivel Rajan, C.Vivek "Analysis and design of microstrip patch antenna for radar communication", Journal of Electrical Engineering and Technology, Online ISSN No.: 2093-7423, Print ISSN No.: 1975-0102, Impact Factor–0.597, 2019
32. Paranthaman, M., and S. Palanivel Rajan. "Design of Triple C shaped Slot Antenna for Implantable Gadgets." Current Trends In Biomedical Communication And Tele–Medicine (2018): 40. DOI: 10.21786/bbrc/11.2/6