MSA AGENT FOR MULTIMEDIA APPLICATIONS

Aruna Rani[1] and A. K. Gautam[2]

[1]Department of Computer Science and Engineering

[2]Department of Electrical and Electronics Engineering

G B Pant Engineering College, Pauri Garhwal (UK) India-246 194

Abstract

The MSA Agent is the software developed to design rectangular and U slotted micro strip antenna. It is applied for the various applications such as satellite communications, UHF applications. Within the multimedia frequency range the developed software is tested and analyzed for various results. The software is developed using genetic algorithm. This provides extra flexibility and new capability to design rectangular and U slotted micro strip antenna for multimedia application also. The result shows good agreement with earlier reported result.

Index terms

Multimedia , frequency slotted micro strip antenna, MSA agent, genetic algorithm, Micro strip antenna, GA.

1. INTRODUCTION

Multimedia is the booming demand in present scenario. So this is a need to transfer the multimedia based data from source to the destination without any interference. Micro strip patch antennas (MPAs) have attracted widespread applications due to their small size, light weight, low profile and low cost as well as to the fact that they are simple to manufacture, suited to planar and non planar surfaces, mechanically robust, easily integrated with circuits, allow multi frequency operation to be achieved . The Software for accurately design MSA[1], within minimum time and cost with added features, is in booming demand today in the field of wireless communication[2]. The MSA agent is special kind of software or a computer program that helps to design rectangular and U slot loaded MSA [3] at any resonating frequency [4] within its design limitations. The use of Genetic algorithm [5] made it a potential program. The parametric study can also be carried out by the proposed program. It performs the task autonomously and intelligently in response to calculate the bandwidth [6] and gain [7] of rectangular and U slotted MSA. The parameter passing is on hit and trial basis the GA searches the various results to design the MSA.

2.   THE MULTIMEDIA SECURITY SETUP

The army people at border are always lacking the high quality latest technology communication devices. If we could be able to implement this technique for them. The half of the problem regarding insecurity will be solved and simultaneously we will save our man power and minimize the budget. Though the communication setup shown in the figure is just an idea but it can be implemented in real.The main problem at border is to keep watch

over enemies. Let us assume a virtual environment as shown in fig. 1at border among the tedious hills and forests. With the help of projector we will make a virtual 3D station and the control room will be somewhere else far from the virtual station whenever the enemy will try to attack on our virtual station or come in the range of the virtual station, will be detected at the control room without any harm.

Fig. 1 The multimedia setup for security

To provide such kind of setup we need the multimedia devices and the antenna for communication. The antenna should be able to work at a wide multimedia frequency range.

Here the micro strip antenna plays a vital role. Using the said software the frequencies can be varied according to the requirement and the information can be retrieved. Though the information is the video information , so we require 3G spectrum .With the help of 3G, we can access many new services too. One such service is the GLOBAL ROAMING. Another thing to be noted in case of 3G is that Wide Band Voice Channel that is by this the world has been contracted to a little village because a person can contact with other person located in any part of the world and can even send messages too. Then the point to be noted is that 3G gives clarity of voice as well can talk without any disturbance. Not only these but also have entertainments such as Fast Communication, Internet, Mobile T.V, Video Conferencing, Video Calls, Multi Media Messaging Service (MMS), 3D gaming, Multi-Gaming etc are also available with 3G.

Many software, however, are present today like EM simulator software, IE3D to design micro strip antennas but they are very much time consuming, complicated and are less user friendly. The MSA agent will add a new chapter in this world for designing rectangular and U slotted micro strip antenna which is capable to generate various design parameters accurately within a second. It is Graphical User Interface based user friendly software. It is very simple to use for specific proposed shape antenna.

3. THE GENETIC ALGORITHM

The Genetic Algorithm is a class of search techniques that use the mechanisms of natural selection and genetics to conduct a global search of the solution and this method can handle the permittivity, shape and the dimensions for U slot and the rectangular micro strip antenna. According to the probability of mutation, the

chromosome are chosen at random and any one bit chosen at random is flipped from "0" to "1" or vice versa. The fitness is evaluated after mutation has taken place and then the old generation is replaced completely or partially. This process is repeated again and again. After a while all the chromosome and associated fitness become same except for those that are mutated. At this point, the genetic algorithm has to be stopped.

The proposed micro strip antenna design agent has a number of attractive features including:

- It execute on any platform, the Java Run Environment made it easier to access for the user.
- It analyzes a micro strip antenna structure using different dielectric layers.
- Simultaneously two types of antennas can be design.
- Easy to use which will promote student interest and learning in the field of antenna design.
- Slot coupled antennas can also be modeled and design.
- It can be used for parametric study of micro strip antenna.
- It has controlled integration accuracy.

Genetic Algorithms (GAs) are adaptive heuristic search algorithm premised on the evolutionary idea of natural selection and genetic. The basic concept of genetic algorithm is designed to simulate the process in natural system necessary for evolution, specifically those that follow the principles laid down by Charles Darwin of survival of the fittest. As such they represent an intelligent exploitation of a random search within a defined search space to solve a problem.

The Genetic Algorithm was proposed by John Holland [8,9] in the 1960, and then genetic algorithms has been widely studied, experimented and applied in many fields of engineering worlds. Genetic Algorithm not only provides an alternative method to solving problems, it consistently outperforms other traditional methods in most of the problems link. Many of the real world problems involved finding optimal parameters, which might prove difficult for traditional methods but ideal for GAs because of its outstanding performance in optimization.

Genetic Algorithm was introduced as a computational analogy of adaptive systems. They are modeled loosely on the principles of the evolution via natural selection, employing a population of individuals that undergo selection in the presence of variation-inducing operators such as mutation and recombination (crossover). A fitness function is used to evaluate individuals, and reproductive success varies with fitness.
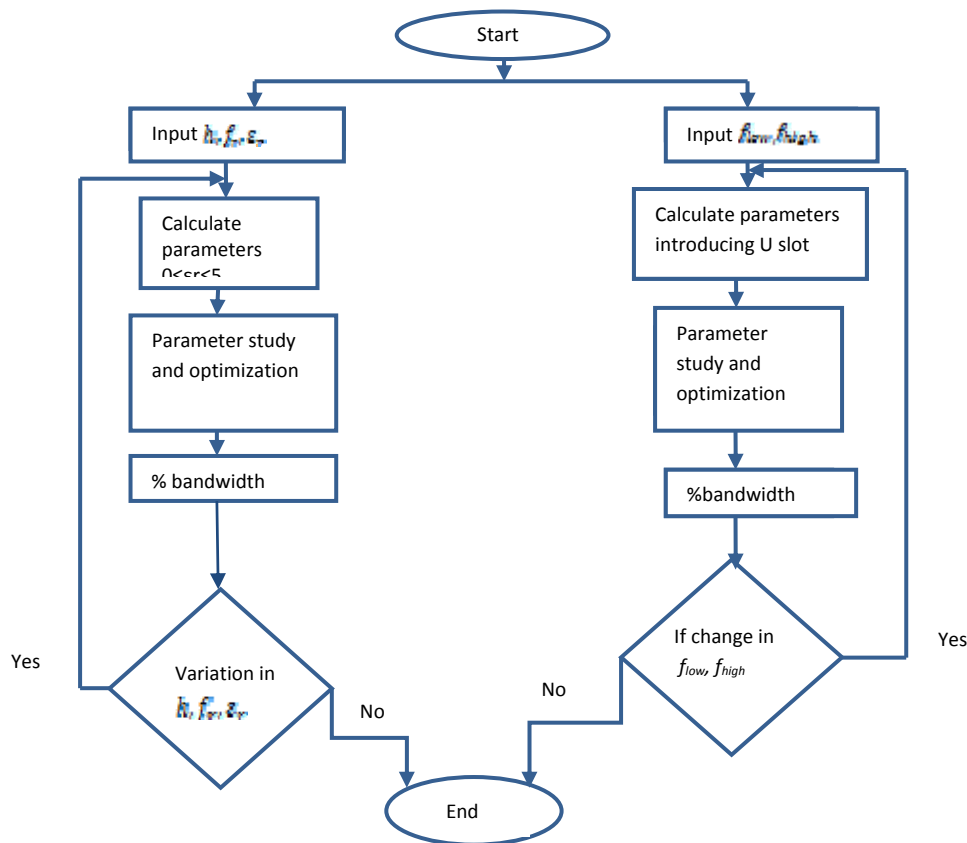
Figure 2: The MSA agent algorithm

4.   THE MSA AGENT ALGORITHM

The algorithm of proposed MSA agent is working on the concept of genetic algorithm whose flow chart is shown in figure 2., which is capable to generate around 2600 results for various parameters and very much helpful to calculate the various parameters for Rectangular and U slit loaded micro strip antenna. The number of generations (G) for the agent software can as by the follows:

$$G = P(n) \times X(X + 22)$$

Where P is the permutation of the total number of elements and X are the variable parameters. The steps for the proposed MSA Agent algorithm will be as follows:

1. Start and randomly generate an initial population $M(x)$,

2. Compute and save the fitness for each individual x in the current population,
3. Define selection probabilities for each individual n in M(t) (total population),

4.Generate $M(t+1)$ by probabilistically selecting individuals from $M(t)$ to produce offspring.

5.Repeat steps 2 until satisfying solutions are obtained.

The paradigm of GAs described above is usually the one applied to solving most of the problems presented to Rectangular and U slotted microstrip antenna. The time complexity [9] for the two extreme cases of building block scaling, uniform and exponential, genetic algorithms with perfect mixing have time complexities of $O(m)$ and $O(m2)$, respectively.

Figure 2 shows the pictorial representation of the proposed MSA agent algorithm. After the start point the algorithm takes the initial input parameters h, fr, r, *flow*, *fhigh*, R.Where h is the height of the substrate material, fr is the resonating frequency, r is the permittivity of the substrate, R is the probe feed resistance which is 50 Ω. *flow*, *fhigh*, are the upper and lower frequencies of U slit loaded with micro strip antenna. The algorithm is divided into two sub parts, first part will calculate the various parameters for rectangular microstrip antenna and the second part will calculate the various parameters for U slit microstrip antenna. As the fitness function will be applied to the parameters and then Mutations will be performed after applying fitness function on both subparts. If there is variation in the parameters like h, fr, r, *flow*, *fhigh*, R is needed the pointer will jump back to step 3 and the process will be continued till the best optimized solutions are obtained.

5. Implementation of MSA agent for 3G/ Multimedia applications.

The 3G application can work on 2.1 GHz. So we have to design the micro strip antenna for the resonating frequency 2.1 GHz. The software can find out all the design parameter for U slotted and Rectangular Micro strip antenna accurately within its design limitation without wasting even a second. The software is efficiently implemented using the java technology, genetic algorithm based. Here are few parameters has been derived using the genetic algorithm. The interface for finding the design parameter of U slotted and Rectangular micro strip antenna is as given below:

Fig. 3 The MSA Agent Interface

6. RESULT AND DICUSSION

If we takes the height of the patch as 10 mm, resonating frequency 2.1GHz ,dielectric constant 2.2, upper and lower frequencies as 1.1 and 3.1 GHz, the other design parameters can be obtained as shown in the table1 below:

Normal patch	readings	U slot patch	readings
Width	56.46	Slot width D(mm)	98.017
Effective dielectric constant	1.939	Slot width E=F(mm)	2.38
Delta Lamda(mm)	2.1	Slot height C (mm)	16.94
Length(mm)	41.2	PP effective dielectric constant	1.996
Input impedance(mm)	151.30	PP Delta Lamda(mm)	5.154
Feed point location(mm)	12.57	PP Length(mm)	30.92
Bandwidth(MHz)	189.57	Checksum(mm)	93.334
		Height of slot fro base	74.012
		PP bandwidth	253.027

Table 1

The bandwidth of the rectangular patch and the parasitic patch [] can be changed by varying its parameters using the software.

6.CONCLUSION

The MSA agent using genetic algorithm is successfully implemented and verified to calculate various parameters of rectangular parameters and U slot antenna. The result of MSA is also validated by the results available in literature.

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