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Area of Research: **RF Communication (Antennas)**

Research Proposal

Proposed Title: Circular Patch Yagi Antenna

Problem Statement:

Many of the modern wireless devices now a day's i.e. laptops, tablets and mobile phones requires small size antennas as there is much acute space available in these devices due to their compact sizes. For these devices and applications, micro strip patch antennas (MPAs), are the most preferred type. The MPAs have gained tremendous importance because of their compact size, low profile and ease of fabrication[2] , However, there are few limitations associated with MPA design which includes lower efficiency, gain and low bandwidth characteristic of the antenna elements i.e. usually 1-3% for the basic patch element,

Scientific Background:

The bandwidth of an antenna depends on the shape of the patch, its resonant frequency (f), dielectric constant and the thickness (h) of the substrate. Thick substrates with low Er increase the bandwidth, Although, if the substrate thickness is increased, problem with antenna integration and surface wave propagation can occur. [1]To overcome these issues, several techniques have been implemented and their respective results are analyzed in detail. In order to enhance the bandwidth many efforts are made in which the focus of the work was more on making the antenna's impedance bandwidth better. There are several techniques available that can be used to enhance the bandwidth of antenna, One of the efficient techniques that is preferred for increasing the bandwidth of the antenna is log- periodic antenna (LPA) design technique.

Novelty:

Now a day, wireless local area network (WLAN) applications are very popular. The IEEE 802.11a, operating at 5GHz band facilitates relatively higher data-rate than the IEEE 802.11 b/g which operates at 2.4GHz band, A lot of efforts are being made to combine the WLAN a/b/g bands together to achieve multiband operation. In order to acquire multiband antenna, a technique is presented in this paper using two square patch elements, each for both frequency bands. An inset feed method is used in this design for antenna feeding. Considering this scenario, a LPA array operating on multiple frequencies will be an effective solution. The simulation of the proposed antenna is performed in Agilent Advanced Design System (ADS), an electromagnetic simulator. Its simulation tool is based upon full-wave Method of Moment (MoM) numerical technique.

Objective:

To design and fabricate a yagi antenna with circular patch feed and circular reflector and directors.

Methodology:

High directivity & Gain are features of a Yagi-Uda Antenna. Better Signal Quality, Good bandwidth & low noise are the features of a patch antenna. Thus to obtain these requirements, a combination of Yagi-Uda Antenna and patch antenna is proposed.[16] A microstrip patch is placed as the feeding element of a Yagi-Uda Antenna array. This results in an amplified effect where the features of a rectangular patch are improved by the effect of Yagi design. This design methodology improves the gain of patch antenna as well as improves the signal quality of a Yagi antenna. Thereby reducing the disadvantages in both of the antenna structures.

Time-line:

Stages of Research	0-6 months	6-12 months	12-18 months	18-24 months	24-30 months	30-36 months
Literature Review						
Planning of Research Methodology						
Selection of appropriate research techniques						
Analysis						
Findings and recommendations						
Data Compilation, Publications and Final Report						

Possible outcome:

The combined effect of properties of each antenna brings the advantages of both designs together & overcomes the disadvantages of both designs altering the gain and bandwidth of the existing systems to a considerable level. The other factors like noise immunity directivity signal quality is expected to be much better than that of the individual designs.

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