Review of Ultrawide band Micro strip patch antenna as a wireless sensor

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Abstract: **Antenna plays a very popular role in communication field, especialy the Microstrip patch antenna designed and investigated for digital IoT applications. This proposed paper deals about the various analysis of microstrip patch antenna design with the particular slot to enhance the performance of an antenna in the range of Ultrawide band 3.1GHz to 10.6GHz and various substrate materials are used to investigate the fabrication of an antenna. the characteristics of various antenna have been discussed, depending on the antenna parameters and its specific absorption rate (SAR) the antenna should be considered for the suitable wireless applications.**

Index Terms- **UWB, IoT and SAR**

I. INTRODUCTION

The High speed, high data rate and low cost system gives the better performance in the communication industry, the UWB antenna developed to investigate the signal propagation through tissues[1].The antenna investigated to analyze the propagation through active circuit and delay between the UWB antenna nodes[2].Recently the UWB antenna designed for underwater 5G communication and the antenna parameter analysis can be made with various water level i.e., sea water, fresh water and distilled water also it shows the good characteristics[3]. Antenna designed for health monitoring system i.e., wireless body area network (WBAN) gives the continuous monitoring of patient and it shows good performance in sensing application in medical field [4]. Antenna meets the wide bandwidth with compact size, washable and flexible materials uses in medical applications[5].wearable antenna was fabricated and antenna parameters meet good agreement with the UWB, three designs were analyzed[6].UWB textile antenna could be used for medical monitoring techniques, the data transmission function should be made with the partial ground plane and it is suitable for UWB devices[7].the enhanced bandwidth with the suitable gain of an antenna was developed using the slot for IoT applications[8].A UWB antenna developed for skin cancer detection in the medical field using the antenna array reconstruction algorithm with the wide bandwidth[9]. A full ground UWB antenna developed for human health monitoring and high-speed data transmission with the SAR in the acceptable range [10]. The UWB rectangular monopole antenna with circular ring was developed for industry and wireless applications [11]. A small size UWB antenna Investigated as wide fractional bandwidth for health monitoring using wireless technology WBAN system[12].The UWB antenna with defected ground structure Investigated to enhance the bandwidth using the meander line slot in the circular patch to obtain the high gain during the UWB range[13].On-body antenna developed with good directivity and bandwidth for wireless communication applications[14].The UWB antenna developed to sense microwave imaging technique and wireless applications[15].Rectangular patch antenna investigated and the notch band characteristics are analyzed with EBG structure in the proposed design[16].Leaf-shaped UWB antenna investigated with the E-shaped stub resonator on the bottom of the substrate to tune the notch band independently[17].Compact UWB antenna with multiband characteristics acts as a RF sensing application as well as in portable UWB devices[18]. UWB reconfigurable antenna investigated based on slot for MIMO system for cognitive radio application [19]. Hexagonal shaped split-ring resonator UWB antenna investigated for pH level sensing [20]. Switching technique investigated in tunable characteristics of the antenna in single band as well as dual band tuning in radar were analyzed [21]. The enhanced bandwidth of an antenna developed for wearable applications [22].

II. ANTENNA DESIGN

The microstrip patch antenna can be designed using the dimension of rectangular as well as circular patch on the top of the antenna, bottom of an antenna is ground plane, i.e., partial (defected ground) or full ground should be used depends on the application requirement and the middle point consist of substrate. The substrate was chosen as FR4, Roger or Textile material. Antenna design procedure is to select the suitable substrate material, calculate the length and width of the patch and identify the springing field of the design, and take the ground plane for the complete analysis, output parameters of an antenna are return loss, bandwidth, VSWR, Radiation pattern and Gain were analyzed.

II. RESULTS AND DISCUSSION

The various antenna design slot, substrate material and parameters can be discussed below,

SI. No	Antenna type	Antenna material	Analysis and application
1	Capsule antenna	Antenna substrate	Signal propagates through tissues and it is used for medical monitoring.
2	Delaycalibrated antenna	Sensing element	Message exchange between UWB nodes used for wireless sensing.
3	Elliptical shape patch	polytetrafluoroethylene (PTFE) layer	Underwater 5G communication
4	Rectangular patch	Denim substrate	Medical monitoring function
5	UWB textile antenna	Textile substrate material	Wearable used for heath monitoring applications.
6	Circular antenna with three types of radius	Jeans material substrate	Antenna used for Portable devices
7	Circular patch with rectangular slot	Cotton substrate	Wireless body area network sensor.
8	Circular shape antenna	polyethylene terephthalate (PET) substrate	IoT applications
9	Circular patch	Image reconstruction algorithm	Tumor in skin sensing
10	Rectangular patch	Textile material	Wearable antenna for sensing and monitoring
11	Rectangular monopole with circular ring	FR4 substrate	Wi-max,5G communication
12	Dual band antenna	Jean's substrate material	WBAN communication system
13	Circular shape antenna	FR4 substrate	High gain and directivity antenna used for wireless applications
14	On-body antenna	Antenna substrate	Health monitoring.
15	Rectangular split ring resonator	RogersRO5880 substrate	Antenna used for microwave image sensing applications
16	Notch band WLAN antenna	TLY material, highly stable	UWB Notch characteristics applications
17	Leaf shape radiating element	FR4 substrate	Three notch bands used for tuning applications.
18	Complimentary ring resonator antenna	Rogers RO4003 substrate	UWB sensing and communication
19	Slot based MIMO antenna	RO-4350	Wireless devices
20	Hexagonal split-ring resonator	FR4 substrate	pH level sensing antenna
21	Tunable notch antenna	Rogers RO4003	Wireless signs monitoring

22	H-slot antenna	polyethylene terephthalate (PET) substrate	Wireless sensing applications .

Table 1.1

III.CONCLUSION

The various antenna types, parameters, substrate, analysis and applications were discussed in the table [1.1]. The proposed paper presents different methods of slots in the ultrawideband antenna investigated for medical, scientific and IoT applications. Wireless technology plays a very smart role in sensors and communication because of variety of antenna were used for better applications based on the substrate materials, antenna gain, directivity, return loss, specific absorption rate and bandwidth.

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