

**Flexible Quasi-Yagi Antenna Arrays For
Wearable Electromagnetic Head Imaging
Based on Polymer Technology**

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ABSTRACT

A flexible, low profile, compact and wideband planar quasi-Yagi antenna array is proposed for a wearable electromagnetic head imaging system. The array is designed on a low cost, high-flexibility, and robustness polymer polydimethylsiloxane (PDMS) substrate and is optimized to operate in a low microwave frequency band of 1.63 GHz- 2.66 GHz. An array of 12 antennas is configured and embedded in a polymer-based 3D elliptical structure which is wearable. Numerical simulations using CST Microwave Studio are performed in free space, on a realistic (Hugo) human head model, and under folded conditions. The simulations results show that the proposed antennas exhibit 51% impedance bandwidth, a maximum gain of 3 dB, more than 83% of radiating efficiency and ≥ -14 dB mutual coupling between neighboring antennas.

EXISTING SYSTEM

- Electromagnetic imaging (EMI) methods have drawn a significant interest in biomedical applications due to their favorable features.
- They provide an early detection of some diseases and tissues abnormalities, such as cancer, and stroke, based on the contrast in the dielectric properties of healthy and unhealthy tissues which create variances in backscattered signals.
- However, the fulfillment of these requirements in EM head imaging system that works in close proximity with head tissues are challenging due to complexity of the human head tissues and their natural losses characteristic, which attenuate the transmitted signal and limit the penetration level.

PROPOSED SYSTEM

- In this paper, we propose a wearable EM head imaging system based on a flexible, and low-cost polymer technology, namely, polymer polydimethylsiloxane (PDMS).
- An array of twelve low profile, compact and high efficient quasi-Yagi antennas are designed and integrated inside PDMS material and arranged in a 3D shape that can fit the average human head size.
- The directors on the rear side serve as additional passive elements that are used to tune the radiation characteristic to propagate in one direction mode and reduce the back and side lobes.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS:

- Processor - intel core i3
- RAM - 2GB
- Hard Disk - 20 GB

SOFTWARE REQUIREMENTS:

- Ansoft HFSS(High Frequency Structure Stimulator)

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