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Non-Confidential Description - PSU No. 4104 "Compact Wearable Metasurface Antenna for Medical Body-Area Network Applications"

Keywords:

antennas, body area network systems, wearable computing, health care monitoring

Links:

http://cearl.ee.psu.edu/

Inventors:

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Background

The field of body area network (BAN) systems foresees a huge market in the near future due to its widespread applications ranging from health care, wearable computing, to battle field survival, body monitoring, and other applications. The antenna is one of the key elements in the system, and its properties significantly affect the overall device performance. Due to the fact that these wearable sensors operate in close proximity to the human body, the lossy tissue loading effect makes the design of light-weight, low profile, and small form-factor wearable antennas a significant challenge. Prior designs suffer from significant energy radiation towards the human body, form-factors that are not compact enough for practical wearable medical devices, low front-to-back (FB) ratio and/or low antenna efficiency. Additionally, issues include the lack of an effective methodology to isolate the antennas from the extreme loading effects caused by the necessity for mounting them in very close proximity to the human body.

Invention Description

This new antenna technology provides a novel approach to achieving a low profile conformable wearable antenna using a metasurface concept for 2.4 Ghz medical body area network applications. Compared to previous methods, such as AMC backed slot antennas patch antennas and monopole antennas, this antenna provides more robust radiation and impedance properties, a much smaller form factor, and a much higher front-to-back ratio. It is anticipated that this technology will ensure stabile high speed data transfer for future wearable medical sensor systems.

Advantages / Applications

- Smaller than any previously proposed state-of-the-art (SOA) wearable antenna
- Very high FB ratio compared to its size
- Immune to both structural deformation and human body loading.

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