

# A Wideband Circularly Polarized Wearable Antenna Based on Metasurface for WBAN Applications

## **Abstract**

This conference paper presents a circularly polarized wearable antenna array based on metasurface with wideband for wireless body area network (WBAN). The antenna array consists of four metasurface antennas, and each antenna has a sub array including  $2 \times 2$  metasurface elements. A ring-shaped feeding structure with four arms is employed in this array. Using this structure, a quasi- $90^\circ$  phase delay is generated between each adjacent arm, and thus the antenna array can radiate a circularly polarized pattern. For the wearable antenna array, the simulation -10 dB impedance bandwidth is from 3 GHz to 5.92 GHz with 65.5% relative bandwidth. And the 3 dB axial ratio bandwidth is from 3 GHz to 5.45 GHz with 58% relative bandwidth. The whole size of the antenna array is  $1.59\lambda \times 1.59\lambda \times 0.09\lambda$  ( $106 \times 106 \times 6$  mm<sup>3</sup>) at 4.5 GHz, and the maximum gain is 8.3 dBi. Eventually, the Specific absorption rate (SAR) at different frequency of proposed antenna is assessed on the body phantom, and the values are satisfied the FCC standards. This flexible antenna array is an excellent candidate for WBAN and 5G applications.

## **Keywords**

Antenna array; Circularly polarized; Wearable antenna; Wideband