

ABSTRACT

Telemedicine is a remote health care service method that utilizes Information and Communication Technology (ICT) to obtain valid data. Wireless Body Area Network (WBAN) is a technology that can be used to monitor health services remotely. A wearable antenna is an antenna that can function when worn on the human body. This antenna is for WBAN with Industrial, Scientific, and Medical (ISM) frequencies. The advantages of this antenna are small size, lightweight, easy to make, and others. This antenna has several drawbacks, such as narrow bandwidth and others, that need to be considered.

In this Final Project, the design and realization of a planar monopole antenna are carried out. The planar monopole antenna is one of the antennas that can be used in WBAN. An Electromagnetic Band Gap (EBG) is added to the antenna design, which can improve antenna performance and produce a band gap. The effect of EBG on the antenna is tested using the suspended line method. This method helps analyze the performance of unit cells in EBG. The planar monopole antenna design uses circular patches at frequencies of 2.4 GHz and 5.8 GHz. The EBG structure uses the Uniplanar Compact Electromagnetic Band Gap (UC-EBG) shape.

The effect of UC-EBG can be seen at a frequency of 4.2 GHz. The receiving power for the suspended line without EBG is 82%, while the suspended line with EBG is 25.6%. The use of UC-EBG in this study can inhibit the current of electromagnetic waves at a frequency of 3.5-4.8 GHz. For simulation results at frequencies of 2.4 GHz and 5.8 GHz, return loss is -15.269 dB and -17.491 dB, VSWR is 1.417 and 1.308, bandwidth is 1.48 GHz and 9 GHz, and gain is 2.869 dBi and 5.208 dBi. As for the measurement results at frequencies of 2.4 GHz and 5.8 GHz, the return loss is -13.134 dB and -18.421 dB, VSWR is 1.566 and 1.273, bandwidth is 2 GHz and 0.98 GHz, and gain is 2.198 dBi and 4.981 dBi. The radiation patterns at both frequencies have an omnidirectional shape for both simulation and measurement results.

Keywords : Wearable Antenna, Planar Monopole, Circular Patch, Dual Band, ISM band, EBG, UC-EBG, Suspended Line