ABSTRACT

This research aims to design and optimize a wearable antenna within the frequency ranges of Medical Body Area Network (MBAN), Industrial, Scientific and Medical (ISM), and Ultra Wide Band (UWB) in the context of telemedicine. In telemedicine, it is crucial for doctors to regularly monitor the health condition of patients, especially in situations where direct physical meetings are not possible, such as when patients are located far away. Wireless Body Area Network (WBAN) technology is utilized as a solution for remote health monitoring and reducing the reliance on cumbersome cables that can cause discomfort to patients.

Based on these issues, three wearable antennas will be developed, each designed for the specific frequency ranges of MBAN, ISM, and UWB. The antennas will utilize textile materials, such as polyester fabric, for the substrate, while copper tape will be used as the conductor for the patch and groundplane. The frequency ranges will be as follows: MBAN (2360 - 2400 MHz), ISM (2400 - 2500 MHz), and UWB (5000 - 6400 MHz).

Through the process of design, optimization, simulation, and measurement, several conclusions were drawn. The designed wearable antennas employ a polyester substrate and copper tape for the patch and groundplane. The shape of the patch varies for each frequency range, with rectangular patches for MBAN and ISM, and circular patches for UWB. The patch shape significantly affects the antenna's bandwidth and gain. Simulations and measurements were conducted in both *Off-Body* and on-body conditions, resulting in frequency shifts observed between the two scenarios. The simulation results indicated differences between the antenna's performance in *Off-Body* and on-body conditions due to the human body acting as a reflector when the antenna is placed on it. The Specific Absorption Rate (SAR) values of the antennas complied with the established standards, which are ≤ 1.6 W/kg.

Keyword : *wearable antenna,* WBAN, MBAN, ISM, UWB