ABSTRACT

Monitoring cardiac electrical activity is an important aspect of early detection of heart disorders. However, conventional heart monitors are generally not designed for practical use outside of a medical setting. This study aims to develop a wearable ECG system based on a jacket with electrodes arranged in the frontal plane (RA, LA, RL) that can record heart signals wirelessly and be used independently by users.

The methods used include the design of a microcontroller-based electronic system, the integration of electrodes into the jacket, and the processing and visualization of ECG signals through software. Testing was conducted at five different locations using two methods: the Standard Testing Method (STM) and direct application to the body. In addition to technical testing, comfort and ease of use were evaluated through a questionnaire administered to 30 participants. The parameters analyzed included peak R amplitude, heart rate (HR), RR interval, and signal-to-noise ratio (SNR), as well as the impact of electromagnetic fields (EMF) on signal quality.

The results of the study indicate that the MPS method produces higher amplitude and SNR compared to the body method; however, the HR and RR from the body method are closer to the normal physiological range. The influence of environmental EMF was also found to affect signal quality, particularly in the body method. Additionally, questionnaire results indicate that this wearable ECG-based jacket is considered sufficiently comfortable and easy to use, with an average score ranging from 4.0 to 4.6 on a 1–5 Likert scale. Therefore, this device is deemed suitable for further development as a heart health monitoring tool outside of medical facilities.

Keywords: *Wearable ECG, Frontal Field Electrodes, Heart Monitoring, Signal Quality, User Comfort*