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Reliability of Electrocardiogram Signals during Feature Extraction Stage for Smart Textile Shirts
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Abstract
Wearable smart textiles have garnered significant interest due to their high flexibility, reusability, convenience and ability to work on home-based, real-life and real-time monitoring. Wearable smart textiles are shirts with inbuilt textile sensors that enable electrocardiogram (ECG) data to be collected more comfortably and smoothly outside the laboratory and clinical environment for a continuous and longer duration for ECG data collection. However, the existing ECG wearable smart textile main challenge is maintaining the quality and reliability of data across multiple wearable smart textile shirts. Therefore, this research analyses the capability of ECG morphology during Feature Extraction stages for different wearable smart textile shirts. This paper reports the experiment conducted on eleven healthy volunteers, either wearing the Hexoskin smart shirt or the HeartIn Fit shirt or both. ECG data were recorded while they are doing normal daily routine activities for at least 45 minutes. The study demonstrates a significant possibility of reliability in Feature Extraction stages at different time instances among subject and wearable smart textiles shirts. With R peaks average between 0.543 to 1.194 mV and R-R interval average between 0.625 to 0.799 seconds, the study concludes that both wearable smart textiles do not significantly differ in Feature Extraction stages. Thus, both wearable smart textiles gave a significant result, although both are affected by their wearer's motion artefacts during the shifting of body postures and the wearer's body physical states. Furthermore, the ECG morphology in this study has yielded a promising result in real life and as on-the-go ECG smart textile biometric readiness for future explorations. © 2021 Institute of Physics Publishing. All rights reserved.

Author Keywords
ECG; Feature Extraction; Smart textile; Wearable

Index Keywords
Biomedical signal processing, Electrocardiography, Extraction, Morphology, Reliability, Reusability, Smart textiles, Wearable technology; Clinical environments, Electrocardiogram signal, Features extraction, High flexibility, Home-based, Laboratory environment, Life-times, Long duration, Real time monitoring, Textile sensors; Feature extraction

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