Enhancing Soldier Readiness Through a Wearable Physiological Monitoring Vest

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Abstract

Military personnel are operating in increasingly complex battlefield environments that impose substantial physical and mental demands, thereby increasing the risk of injury. The necessity of continuous and remote monitoring of physiological parameters is therefore essential for the purpose of evaluating health status, managing long-term risks, and ensuring the safety, readiness, and operational effectiveness of military units.
Textiles have a pivotal role in military operations due to their extensive use across a wide range of equipment, while also providing comfort and versatility. In recent decades, there has been a notable increase in the level of attention given to the integration of electronic capabilities into textile materials. This integration is regarded as a means of enhancing the functionality and operational efficiency of defence systems. Advancements in electronic textile technologies, particularly in the miniaturization of sensors and actuators, have facilitated their seamless integration into military uniforms and equipment without a substantial increase in weight or bulk. Consequently, electronic textiles may provide comfortable, wearable, and unobtrusive solutions that are well suited to the demands of advanced military systems.
The present work focuses on the development of a physiological monitoring vest for military personnel, designed to enable the simultaneous measurement of cardiovascular, respiratory, and thermal parameters. The system architecture has been carefully designed to ensure effective sensor-to-skin contact while supporting continuous, real-time monitoring, without causing discomfort or restricting the user's movement.

Keywords: Physiological monitoring, Wearable textiles, Military personnel, Soldier readiness, Smart vest

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