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Integrating Wearable-Textiles Sensors and IoT for Continuous Electromyography Monitoring

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Abstract : Electromyography (EMG) is a technique used to measure the electrical activity of muscles. EMG can be used to assess muscle function in a variety of settings, including clinical, research, and sports medicine. The aim of this study was to develop a wearable textile sensor for EMG monitoring. The sensor was designed to be soft, stretchable, and washable, making it suitable for long-term use. The sensor was fabricated using a conductive thread material that was embroidered onto a fabric substrate. The sensor was then connected to a microcontroller unit (MCU) and a Wi-Fi-enabled module. The MCU was programmed to acquire the EMG signal and transmit it wirelessly to the Wi-Fi-enabled module. The Wi-Fi-enabled module then sent the signal to a server, where it could be accessed by a computer or smartphone. The sensor was able to successfully acquire and transmit EMG signals from a variety of muscles. The signal quality was comparable to that of commercial EMG sensors. The development of this sensor has the potential to improve the way EMG is used in a variety of settings. The sensor is soft, stretchable, and washable, making it suitable for long-term use. This makes it ideal for use in clinical settings, where patients may need to wear the sensor for extended periods of time. The sensor is also small and lightweight, making it ideal for use in sports medicine and research settings. The data for this study was collected from a group of healthy volunteers. The volunteers were asked to perform a series of muscle contractions while the EMG signal was recorded. The data was then analyzed to assess the performance of the sensor. The EMG signals were analyzed using a variety of methods, including time-domain analysis and frequency-domain analysis. The time-domain analysis was used to extract features such as the root mean square (RMS) and average rectified value (ARV). The frequency-domain analysis was used to extract features such as the power spectrum. The question addressed by this study was whether a wearable textile sensor could be developed that is soft, stretchable, and washable and that can successfully acquire and transmit EMG signals. The results of this study demonstrate that a wearable textile sensor can be developed that meets the requirements of being soft, stretchable, washable, and capable of acquiring and transmitting EMG signals. This sensor has the potential to improve the way EMG is used in a variety of settings.

Keywords : EMG, electrode position, smart wearable, textile sensor, IoT, IoT-integrated textile sensor
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