Force Myography using Skin-Conformal Strain Sensors based on Laser Induced Graphene

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**Abstract:** Myography, used in various fields, including biomechanics and sports science, involves measuring muscle activity.1 Surface electromyography (sEMG), while a widely used electrical myography method, suffers from limited resolution, signal crosstalk, and skin impedance, requiring careful skin preparation and electrode placement, which complicates its home use.2 Force myography (FMG), alternatively, measures limb movement by detecting changes in muscle and tendon stiffness. It is more user-friendly, less affected by skin impedance, and more compatible with dynamic environments and prosthetics, making it a promising alternative to sEMG.3 Current FMG devices are bulky, leading to the need for more flexible, skin-conformal sensors for better integration with prosthetics.4 Laser induced graphene (LIG) emerges as a promising material for wearable FMG devices due to its ease of fabrication, cost-effectiveness, and tunable properties.5 In this work, we developed a skin-conformal FMG wearable device using LIG, optimized for continuous strain measurement on the forearm for gesture recognition. The device features ten strain sensors, each connected to a wireless system for resistance measurement. Different forearm and wrist gestures are recognized with over 97% accuracy using a machine learning classifier. Future enhancements include increasing sensor density and integrating other materials for improved sensitivity and multisensory health monitoring capabilities.

**References**

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