Development of Smart Wearable Electronic Textiles for Biomedical Applications

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Research Area: Electronic textiles, bio-sensing, functional electrical stimulation, wearables, smart materials

Project Start Term: Fall 2026, Winter 2027, or Summer 2027

Project Description

This project focuses on the development of multifunctional electronic textile (e-textile) wearable devices for bioelectronic interfacing. Bioelectronic sensing or stimulation is traditionally done with single-use electrodes that are individually placed on the skin. This method results in material waste, long set up times, and cluttered wiring. By embedding reusable dry electrodes directly into a garment, electrode placement can be standardized and simplified, creating a more user-friendly and practical wearable system.

These devices are developed by integrating electronic functionality directly into textiles using biocompatible conductive materials and inks that are highly stretchable and capable of withstanding laundering. This approach enables the creation of soft, flexible, and reusable wearable devices with applications across a range of healthcare areas. Current projects within our research group are exploring e-textile technologies for rehabilitation, depression therapy, and pain management.

We are looking for passionate and motivated MEng students to join our team and contribute to the ongoing development of user-friendly wearable e-textile devices. Students will have the opportunity to gain hands-on experience with the fabrication and assembly of wearable devices, including the development of dry textile electrodes and conductive inks and fabrics. Students may also have opportunities to assist with clinical testing and the analysis of experimental results.

If interested, please submit your CV and a one paragraph statement describing your interest in the project, combined into a single file and sent by email to Prof. Hani Naguib.

Expected Outcomes

- Fabricated functional wearable devices
- Contribution to a publication

Qualifications

- Background in Materials, Electrical, or Mechanical Engineering
- Familiarity with characterization and testing of materials
- Hands-on skills in prototyping, assembly, design, and troubleshooting
- Interest in electronic textiles and smart materials
- Strong analytical and experimental skills