BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

Ammin/DET - From Behavior to Brain: How Stress Shapes alterations of Cognitive and Motor Functions

Funded By	Politecnico di TORINO [P.iva/CF:00518460019] Dipartimento DET
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Context of the research activity	Specific objectives of the research will be: 1) Acquisition and processing of biopotentials to evaluate stress levels; 2) Development and testing of Artificial Intelligence algorithms to evaluate stress-related reduction of motor-cognitive performance; 3) Assessment of motor-cognitive dual task effect in healthy and pathological populations.
Objectives	Stress assessment is a crucial challenge in biomedical research, with a wide range of potential measurement techniques and applications. This PhD project aims to explore innovative, non-invasive, and cost-effective wearable solutions for accurately quantifying stress conditions in real-world settings. The candidate will collaborate within an interdisciplinary team, including clinicians and engineers, to investigate digital biomarkers quantifying stress conditions. A particular focus will be placed on the acquisition and analysis of biosignals collected in ecological conditions to evaluate stress under realistic scenarios. Special attention will be given to dual-task paradigms, which can provide valuable insights into the interplay between cognitive and motor functions and their relationship with stress levels. The candidate will be responsible for designing experimental protocols, collecting and processing bio-signals, and developing methods to estimate dual-task costs as a marker of stress-induced performance variations. With the final aim to increase the knowledge on the effects of stress levels on motor and cognitive performance in individuals of different age, gender, health status and working condition, the candidate will acquire, process and interpret different kinds of biomedical signals developing new neuroengineering methodologies. Specific objectives of this PhD project include: 1) Acquisition and processing of biopotentials for stress assessment; 2) Development and validation of Artificial Intelligence-based algorithms to quantify stress-related motor-cognitive impairments; 3) Evaluation of dual-task effects on motor and cognitive performance in both healthy and clinical populations.

Skills and competencies for the development of the activity	Biomedical signal processing and interpretation, documented expertise in the analysis of physiological and pathological data, neuroengineering, and dual-task evaluations.