

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

MUR DM 117/Leonardo - Stress and Work-Load Monitoring by a Multi-Sensing Wearable System

Funded By	LEONARDO S.p.A. (Roma) [P.iva/CF:00881841001] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [P.iva/CF:97429780584] Politecnico di TORINO [P.iva/CF:00518460019]
Supervisor	DEMARCHI DANILO - danilo.demarchi@polito.it
Contact	
Context of the research activity	Study and implementation of a multi-sensing system for the monitoring and detection of stress and work-load of an airplane pilot. Progetto finanziato nell'ambito del PNRR - DM 117/2023 - CUP E14D23002000004
Objectives	<p>Object of the PhD, developed in cooperation with Leonardo SpA, is placed within the research line related to the study of autonomy applied to piloted and unmanned aircrafts. This type of problem is covering for example Single Pilot Operations, i.e. a commercial aircraft with a single pilot on board instead of the traditional Pilot and Co-Pilot pair.</p> <p>In this context, the growing automation/autonomy is accompanied by the need to keep the pilot involved in flight operations during the entire flight in order to preserve his complete situation awareness. The Pilot Assistant is that device capable of supporting the pilot in these terms.</p> <p>The Pilot Assistant must also be able to support the pilot in carrying out the mission, taking into account not only the specific task in which the pilot is involved, but also any secondary tasks that require his attention.</p> <p>A fundamental element of every Pilot Assistant solution is therefore the Pilot Performance Monitoring (PPM), i.e. the system that has the ability to detect the psychophysical state of the pilot in real time so as to allow the Pilot Assistant to intervene in his support, guaranteeing adequate security levels.</p> <p>In general, the measurement of the workload will make the intervention of the Pilot Assistant possible in various ways: by sending warnings that draw the pilot's attention to a specific task, by simplifying or reducing the information provided to the pilot (Adaptive Human Machine Interface) or modulating the level of automation/autonomy of the aircraft.</p> <p>To reach project targets, a multi-sensing system has to be implemented,</p>

measuring and analysing several vital parameters as heart beat, respiration, muscular activity, brain activity, and others that will be elaborated using also machine learning algorithms for extracting the pilot status.

Skills and competencies for the development of the activity

Competences in: Biosignals detection and processing; Development of electronic systems and interfaces for biosignals; Biosignal processing; Design of electronic boards (PCB)