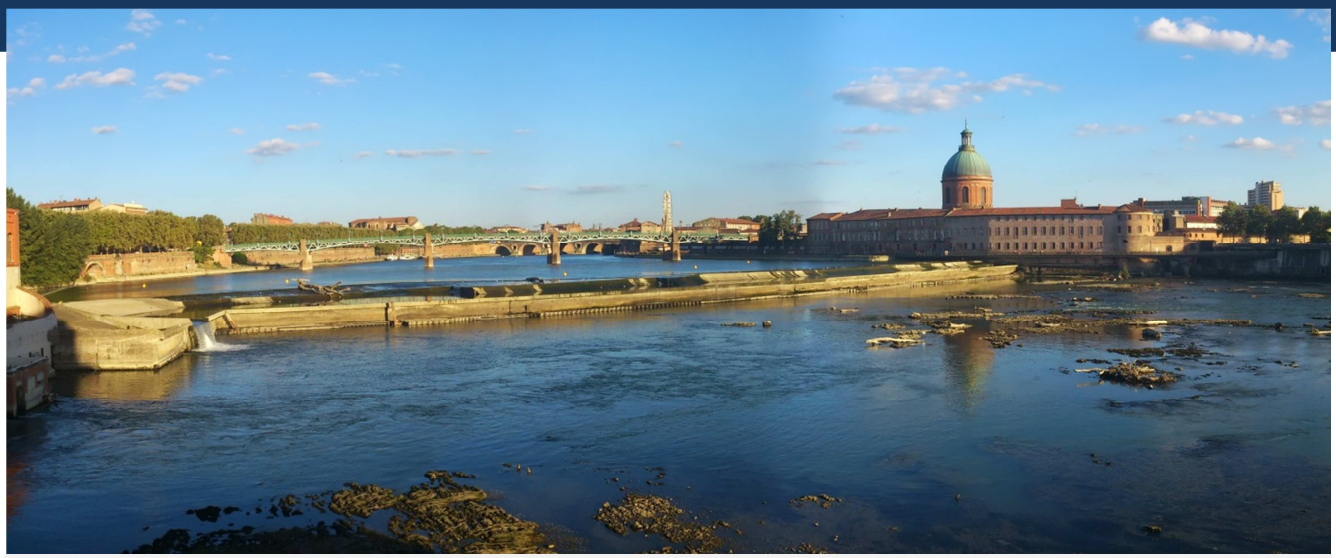

The 1st International Conference on Cognitive Aircraft Systems – ICCAS

March 18-19, 2020

https://events.isae-supaero.fr/event/2

Scientific Committee

- Mickaël Causse, ISAE-SUPAERO
- Caroline Chanel, ISAE-SUPAERO
- Jean-Charles Chaudemar, ISAE-SUPAERO
- Stéphane Durand, Dassault Aviation
- Bruno Patin, Dassault Aviation
- Nicolas Devaux, Dassault Aviation
- Jean-Louis Gueneau, Dassault Aviation
- Claudine Mélan, Université Toulouse Jean-Jaurès
- Jean-Paul Imbert, ENAC

Permanent link : https://doi.org/10.34849/cfsb-t270

Cognitive Load Assessment During Human-Multi-UAV Interaction

SINGH, Gaganpreet; Dr ROY, Raphaëlle (ISAE-SUPAERO, Université de Toulouse, France); CHANEL, Caroline (ISAE-SUPAERO)

Content

The unpredictable nature of human agents may bring considerable uncertainty to the possible outcomes of human-robot(s) interactions. On one hand, our knowledge of embedded decision algorithms and mission execution monitoring of robotic agents is quite well-known, on the other hand, our understand on human decision's and human agent's state monitoring still remains challenging tasks. Therefore, to enhance human-robot interaction in a multi-UAV manned-unmanned teaming (MUM-T) scenario, and to bring equal weight to the understanding of state-space of all the agents (human and robots) - it is important to have a proper knowledge (e.g. estimation) of human agents' mental state. In this study we have analyzed cognitive features that are specific to workload-related mental states of human operators who deal with aerial robots. These cognitive features are extracted from electroencephalography (EEG). They specifically consist in voltage modulations elicited at the scalp level by the occurrence of stimuli, such as alarms, and are known as event-related potentials (ERPs). Moreover, an Eye-Tracking (ET) device was also used to acquire gaze data during interaction. Two workload levels (high and low) were addressed in a controlled experimental protocol built upon a search and rescue mission scenario. The results disclosed the usability of such cerebral and visual measures to characterize and discriminate workload states. They pave the way towards systems that would assess agents' states (human and artificial agents) to further adapt agents' roles to increase the performance of manned-unmanned teaming.

Keywords : Mental workload, Acute stress, Emotion, Fatigue