

Title of Project: Cognitive Assessment for Human-Machine Intelligent Coexistence (HELIOS)

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Brief Description:

Human machine coexistence is an area of research envisioning full-fledged teaming between humans and machines, drawing on recent advances in the fields of artificial intelligence, cognitive science, autonomous systems and robotics. From an engineering perspective, seamless coexistence between humans and machines in a task achievement context requires reliable interfacing and co-dependency within a complex cognitive system. Objective assessment of human cognitive (workload, fatigue, stress) and affective (emotional) state is therefore crucial for establishing an efficient coexistence environment, in which machines would be able to assist humans by reducing cognitive workload or facilitating decision making. Neurophysiological signals, such as EEG, electrooculography (EOG), heart rate variability (HRV), skin conductance (GSR) can be acquired noninvasively via wearable sensors and used to monitor humans cognitive and affective states in real-time.

In this project, we aim at building a system integrating relevant neurophysiological signals using advanced analysis methods for brain functional connectivity obtained from wireless EEG, as well as time and frequency domain analysis of physiological signals (EOG, HRV etc). The system will support online data acquisition and real-time processing and will have as goal the accurate detection of users cognitive and affective states while performing various realistic cognitive tasks.

