Cognitive Measure of Workload in Multimodal User Interfaces

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Overview

Every day, humans are constantly getting work done and information transmitted and communicated through the use of computers, smart phones, tablets, etc. To get any task done, there are a series of other tasks that need to be executed in order to reach the ultimate goal. Decreasing the number of those tasks would increase efficiency and user satisfaction. But what affects one's ability and preference to use an interface? When executing commands, the user would want the easiest, fastest, and most convenient way of getting things done. In this experiment, two modes of input are utilized: gesture-based commands and voice commands. The cognitive workload of the gesture-based mode and a combination of the two are measured with an EEG to determine which mode has a lower workload.

Experiment

Using 3D gloves to capture motion, participants play a video game created by the Army Research Lab. In the game, a series of gestures are required to keep the game going for as long as possible. Similarly, participants play the game another time except voice commands are now enabled along with gestures giving participants an option to use either or both. Both options of input are assigned in random order and the workload is measured and interpreted for both. The hypothesis for this particular experiment is that having voice commands as well as gesture-based commands would have a lower cognitive workload in brain activity.

Results & Impact

Participants in this experiment heavily indicated that after both modes of input, the workload was slightly lighter after incorporating voice input. Although the workload was measured, participants expressed emotions such as relief and frustration and even suggested new 3D gestures as well. Future uses of this technology could potentially permanently alter the way we as humans work and go about life thus, being utilized in all industries, engineering disciplines, and astronauts.

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