Electroencephalogram-Based Workload Evaluation in Air Traffic Control

Did you know...?
According to the Changi Airport Group (CAG), an increase in current numbers of air freight movements and commercial aircraft movements increase safety risks.

Objective:
- Determine the relative reliability of an Electroencephalogram (EEG)-based workload evaluation method.
- Analyse the EEG-recognised workload of the participants and draw any conclusions pertaining to the effects of automation aids on mental workload.

Approach
- 36 air traffic controllers were distributed equally to 3 set-ups: non-display, vertical display and trajectory prediction.
- Conflict Resolution Aid (CRA) was provided to test its effectiveness.
- The EEG method was compared with the 2 more established SPAM and NASA-TLX methods using the analysis of variance method.

Results and Discussion
- Most participants had high workload classification accuracies proving that EEG can be as accurate as the two other methods.
- The complexity of trajectory prediction has resulted in a higher workload compared to other display aids in all time points and the reliability of CRA has minimal effect on workload.

Time Dependency:
- Time dependency of data collected throughout the experiment as workload at different time points were statistically significant.
- This is because the stress factor was decreased as the controllers began familiarising with the system and became more comfortable with it.

Conclusion:
This method of workload evaluation is able to provide much more information and accuracy as compared to subjective workload evaluation methods and other objective workload evaluation methods.