Project Summary for IAL Website

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Project Title:	Neurophysiological Measures for Task Handling Complexity
Project Number:	GA20-04
Year of Approval:	2021
Funding Source:	WDARF
Objectives and intended outcomes of the project:	Objective: The aim is to investigate and possibly develop a new evaluation measure of "capability-task quotient". Through the measure, both short and sustained level of neurophysiological activities and characteristics of the operator can be analysed over a period of time when handling various task complexities in a certain work environment setting. Intended Outcome: i) Provide better insights into a person's inherent monitoring abilities via the use of neurophysiological measures. ii) Establish an initial benchmark where the capability task quotient needed to undertake various task handling/monitoring complexity in a given working environment. A new task handling/monitoring score or grade can be formulated. Task complexity planning can be better designed, sequenced and allocated to better match and optimise the inherent monitoring abilities of the operator. iii) The work could provide insights as to the likely inherent abilities of the operator to cope with new task handling complexity challenges and where more appropriate alert safety check systems to be developed. iv) A more self-regulating regime whilst maintaining high motivation levels can be achieved thereby reducing human errors and oversights.
Project Team	
Principal Investigator:	Professor Lye Sun Woh
Summary of Project (up to 300 words)	
The rapid development of various industrial sectors needs often vigilance, monitoring, surveillance and communication by operators to perform various tasks. Such tasks mainly involve various levels of handling complexity, particularly in the aviation sector. A highly complex task performed by a lower level skilled individual resulting in low performance efficiency, low productivity. This highly complex task involves tactical planning and monitoring of dynamic objects (e.g. In current settings, such human-task matching and assessment is done via educational attainment and subjective measures such as completing questionnaires that seek to answer various monitoring task observations and traits, response time measures or number of steps needed to complete a given task, use of instructor/user feedback tools to indicate the degree of satisfaction and productivity level performed by the operators. The main limitation of such measures is that	

it does not directly and accurately reflect the inherent monitoring task capability/ability of the person. Besides with an exponentially increasing number of automation tools and systems being developed, such monitoring tasks would undergo new changes required of the operators as well as the need to deal with expected increase in task handling complexity. Monitoring inherent task capability using physiological signals such as electroencephalogram (EEG), electrocardiogram (ECG), galvanic skin resistance (GSR), respiration rate (RR), eye tracking metrics, and input devices has received more and more attention from researchers during last years. In this proposal, we seek to investigate and possibly develop a new evaluation measure known as the “capability-task quotient” using neurophysiological characteristics of the operator over a time period when handling various task complexities. This is because a high degree of human input responses to a task is based on one’s neuro-physiological output responses.