Novel Classifier of Neural Impairment

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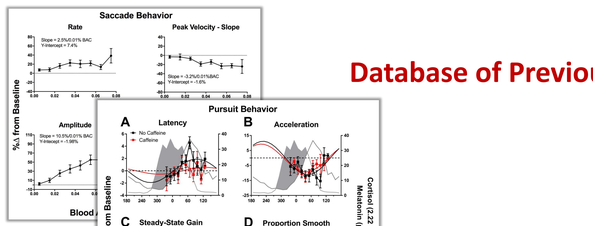
Overview

Impairments that affect cognitive function and visuomotor capabilities could introduce human errors that can endanger crew safety.

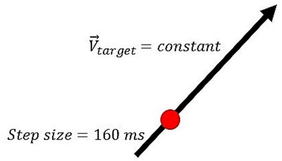
Ames developed a novel field-applicable oculometric technology that could be used in less than 5 minutes to determine impairment and its sources (e.g., sleep deprivation, alcohol use, etc.)

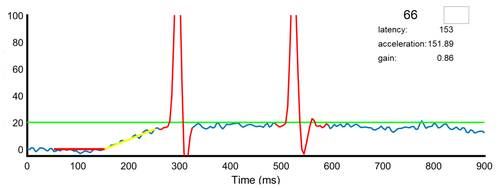


Database of Previously Studied Impairments

Oculometric Technology

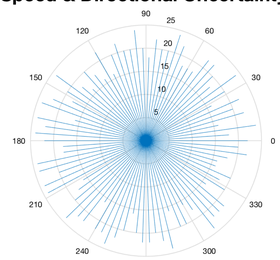
Simple Ocular Tracking Task



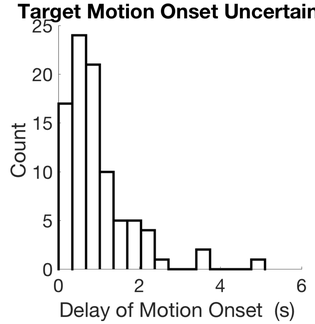


High Spatiotemporal Uncertainty

Speed & Directional Uncertainty



Target Motion Onset Uncertainty

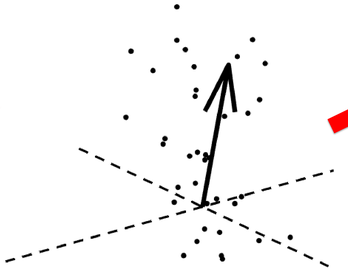


Simple yet hard to predict makes for a robust test battery for impairment detection and classification.

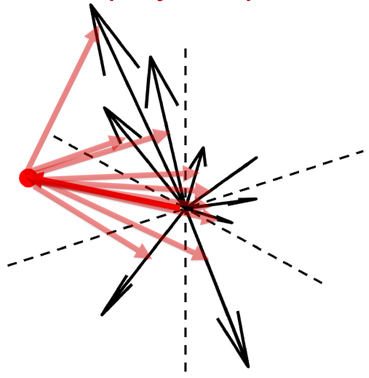
Impairment Detection & Specificity Algorithm (IDSA) Architecture

Subject Runs 5-minute Eye-tracking Test

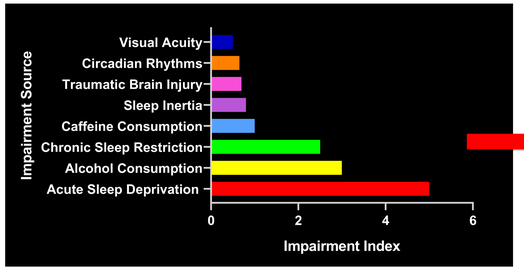
Impairment Vector Computation (Averaging)



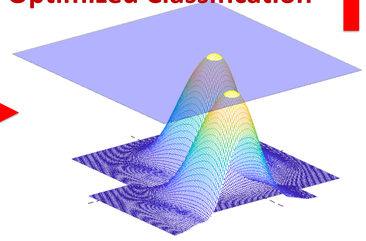
Impairment Index Computation (Projection)



Raw Impairment Indices

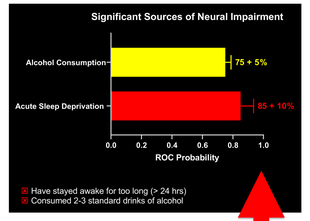


Optimized Classification



Diagnostic Aide

- Can compute relative probabilities
- Can rule out certain causes



The human operator is a critical element of crew safety and should be evaluated to mitigate potential off-nominal situations propagated from human error. Flagged deficits in oculomotor performance could act as an alert signal for crewmembers to opt out of cognitively demanding tasks or to prevent irreversible compromise in crewmember health.