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Long-endurance UAS operations translated to neuroergonomics

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Long-endurance UAS operations translated to neuroergonomics

Introduction

Mental fatigue is developing into an ever more pressing issue as operating complex systems is shifting away from operating towards monitoring systems. Hardly any domain represents this as well as

Long-endurance UAV missions (1)

- 🕒 Over 24h operations
- 📺 Prolonged missions
- 🌙 Night shifts



Objective

Investigate how long endurance UAS missions effect the operators cognition

Methods

3 Interviews with current and former French UAV operators (MQ9 Reaper System)

Results

Cognitive Flexibility

the ability to flexibly switch between tasks (2)

"Changes in mission objective occur as frequent as 2-3 times a week"

"Difficulties with reprioritizing ."

"Not mentally prepared for the change in objective"

Vigilance decrement

decreased cognitive efficiency in response to monotonous stimuli (3)

"Strategies to divert attention away from fatigue"

Cognitive Fatigue

temporary decrease in mental resources over time due to sustained cognitive effort (reaction time & accuracy, 4)

"Sluggishness after intense mission phases"

Situational Awareness

the perception of environmental elements and events with respect to time or space (5)

" Difficulties with reprioritizing ."

"Not mentally prepared for the change in objective"

Top Down Attention

the voluntary allocation of attention to certain features, objects, or regions in space. (7)

"Forgetting to check systems"

" Not reacting to or not attending radio messages "

Errors

(6)

Commission

Incorrect execution of a task

"Fingertrouble"

Omission

not doing a task

"difficulties with following checklists entirely"

"Forgetting to check systems"

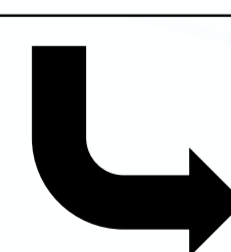
"Not reacting to or not attending radio messages"

Legend

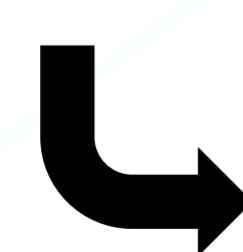
- Mental States
- Aspects of Cognition
- Behavior

Conclusion

Mental/Cognitive Fatigue



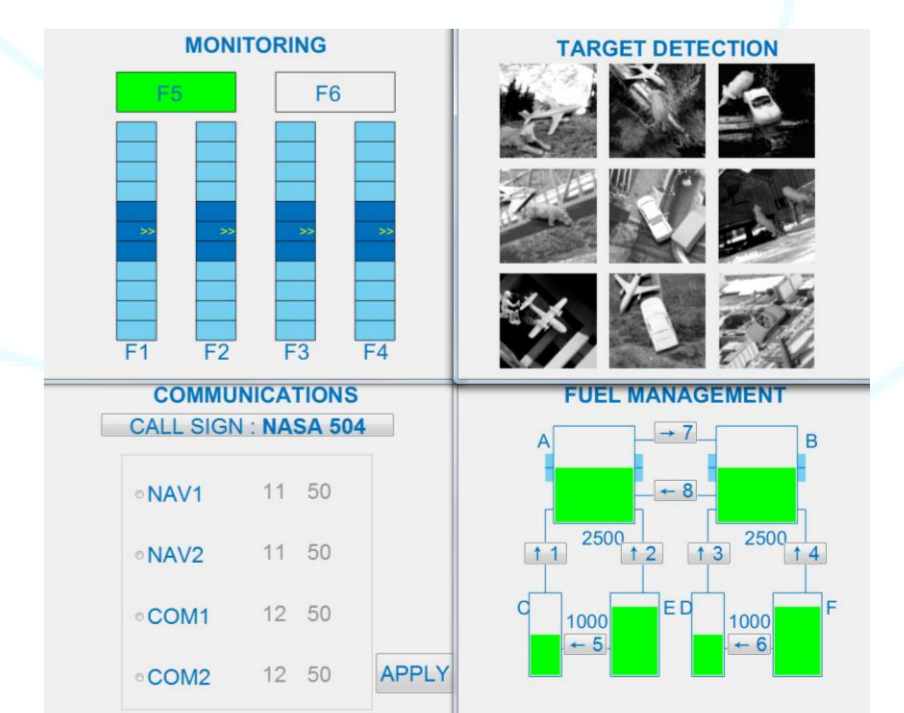
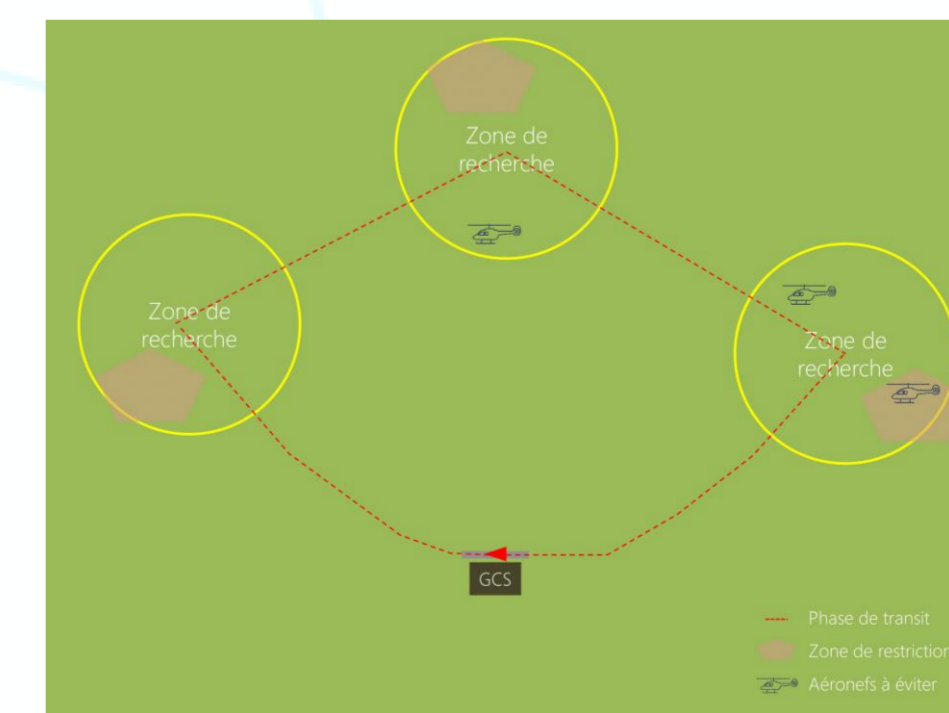
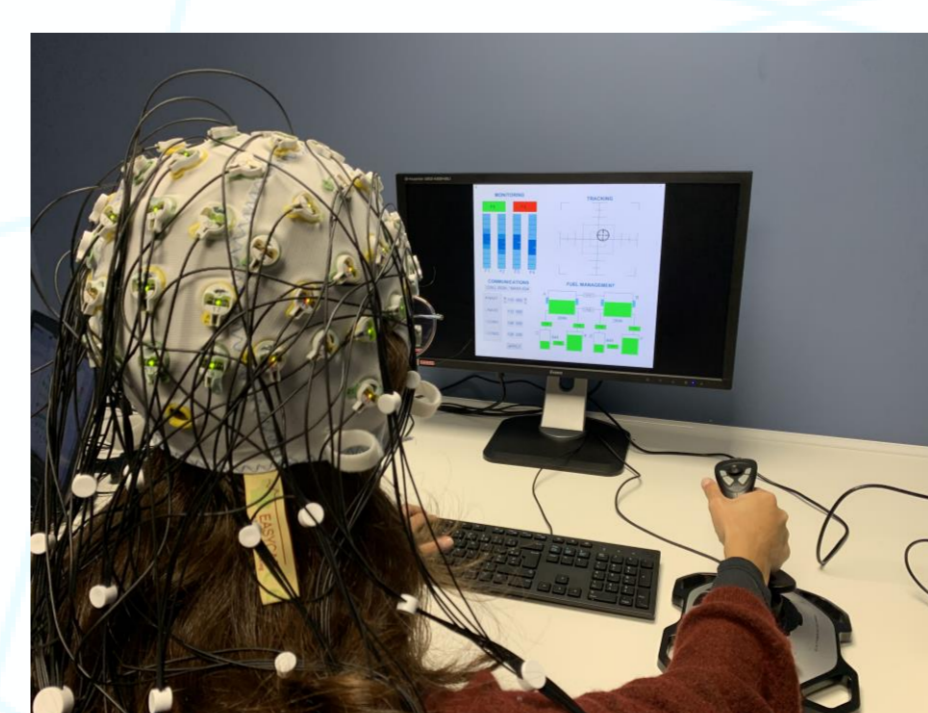
changed cognition



reduced performance

The operation of Long endurance UAV missions is expected to have a multitude of effects on cognition, that may increase the risk of mishaps

Perspectives



Experimental protocol to investigate cognitive/mental fatigue and its physiological markers (EEG, ECG & Eye-tracking) during Long-Endurance UAS missions