An Investigative Study into the Human Factors of an Air Traffic Control Officer with the Adoption of Eye-Tracking Technology

Did you know...?
The present Air Traffic Management (ATM) system is projected to reach its capacity limits, and may not be able to accommodate the predicted increase in air traffic.

Objective:
- Utilise eye-tracking technology to study the performance behaviour of air traffic control officers (ATCOs).
- Understand how the eye-tracking data can be tapped to better prepare the ATCOs in their daily tasks.
- Provide meaningful results and conclusions that can further enhance the modernisation of ATM.

Approach
A 60 min experiment was designed to track the eye movements of the participants during the handling of a real-time simulation. 3 key primary parameters were highlighted in the data analysis process:
1. Area of Interest (AOI): Terminal Manoeuvring Area (TMA) and Enroute scenarios.
2. Fixation Count: A stabilisation of a fixation with a time length of more than 250ms. More fixation on an AOI indicates its importance.
3. Gaze Duration: The processing time required for monitoring. (Total Gaze = Summation of successive fixations on an AOI)

Results and Discussion
- Instrument Landing Systems (ILS) hotspot AOIs have higher fixation counts and longer gaze duration.
- If there is merging at ILS hotspot, the tendency is to fixate more at it.
- If there is merging at Initial Approach Fix hotspot, the tendency is to fixate at the flight path after, to plan and execute them.
- If holding is available, novice ATCs will tend to utilise it. This is evidently seen with the high fixation count and longer gaze duration.
- For en-route scenarios, more time is spent in information processing at non-hotspot AOIs for conflict detection.

Conclusion:
The use of eye-tracking technology to evaluate the strengths and weaknesses of the ATCOs could be adopted.