UAV Human Factors Research within AFRL/HEC

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Unmanned Air Vehicles (UAV) are at the forefront of current battles and future thinking. Since 1997, AFRL/HEC has been conducting research to address various human factors issues associated with UAV and UCAV operator control stations. Using iterative evaluations, research is being conducted to optimize candidate interface and decision support technologies, quantify operator performance, and evaluate candidate applications for both current platforms and future envisioned UAV systems. This presentation will provide a brief overview of the following UAV operator interface research activities.

1) ***Multi-modal interfaces and advanced visualization techniques applied to current tele-operated UAV control stations.*** This research summarizes the relative benefits associated with head-mounted displays, haptic force-feedback control sticks, tactile displays, speech recognition systems, synthetic vision overlays, and simple symbology enhancements, as applied within a UAV Ground Control Station (GCS) simulation. The results of this research reveal several advantages and limitations of these technologies for tele-operated systems and suggest future research directions
2) ***Control/Display interface software and concepts enabling single-operator supervisory control over multiple UCAVs.*** This effort defines operator interface requirements and designs, prototypes, and evaluates UCAV mission control station operator interface concepts. Emphasis is also placed on the development of a standard, modular software framework along with the evaluation of low-risk graphical user interface techniques. The results of this work feed ongoing UCAV X-45 block upgrades and the decision support research described below.
3) ***Decision support interfaces for intelligent semi-autonomous vehicles.*** This recently initiated research program seeks to identify advanced and adaptable decision support interfaces and interaction guidelines to maximize flexible, fault-tolerant multi-UAV control for expanded missions. Cognitive engineering technologies for information fusion, visualization, and management will be combined with decision support tools and real-time operator state assessment metrics to optimize single-operator control of multiple vehicles. Operator situation awareness will be improved through situation-specific, intuitive information fusion and effective integration of human and automation. Crew size requirements will be reduced and mission set expanded through advanced interface technologies, the adaptive dynamic allocation of automation, and human-centered decision support systems. Human errors and automation faults will be made more visible and correctable, thus permitting active contingency management and preventing costly mishaps. In addition, warfighters transitioning to other future UAV systems will find familiar displays and functionality in each system, significantly reducing training time and expense. This effort is being coordinated with ongoing UAV autonomous control development efforts within AFRL to increase technology transition viability.