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Next Generation Universal Ground Control System HMI Design

Cory Anderson, Arianna Efaw, Edward Emery, John Mueller, and James Schreiner

United States Military Academy West Point, New York

Corresponding author's Email: Cory.anderson@usma.edu, Arianna.efaw@usma.edu, Edward.emery@usma.edu, John.mueller@usma.edu, James.schreiner@usma.edu

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Abstract: The existing Human Machine Interface (HMI) for the Army's Universal Ground Control Station (UGCS) represents a 1980s, windows-based technology which is neither intuitive nor scalable for operators. It creates high levels of cognitive load on the operators, and its closed architecture limits its adaptability for UAS missions as technologies evolve. This research presents a methodology for creating and evaluating next generation HMI designs while leveraging GNU Image Manipulation Program (GIMP) and TELLUS flight simulation software in the creation of five HMI prototype designs. A proof of concept approach in the evaluation of prototypes was performed with five UAS Aircraft Operators (15W MOS) and five USMA cadets; examination of the impact of age and experience on the perceived value of new HMI designs will influence recommendations on full experimental design. The value-focused approach to design presented in this paper and prototype designs provide a basis for full prototype development and experimental testing through PM UAS with the Intelligence and Maneuver Centers of Excellence. Results include a trade space and sensitivity analysis towards development of improved HMI designs. The methodology and high performing prototypes for HMI design will be integrated by the PM UAS CSI Project Office for further development and full experimental analysis.

Keywords: Universal Ground Control System, Human Machine Interface, Unmanned Aircraft Systems