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Reducing Cognitive Burden and Human Error in Aircraft Maintenance Using ...

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Reducing Cognitive Burden and Human Error in Aircraft Maintenance Using Augmented Reality Visualization

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Abstract

This study investigates the feasibility of using Augmented Reality (AR) for visualizing Aircraft Maintenance Manual (AMM) procedures by comparing task completion times and number of user errors. Traditional paper-based manuals are text-heavy and prone to misinterpretation, especially on complex aircraft systems. To address these issues, an Android-based application was developed using Unity and Vuforia that is designed to overlay a "ghost" 3D model of a turbine engine and provide step-by-step visual and text cues to assist users during specified assembly tasks. A comparative experiment was conducted that involved two groups of aircraft maintenance students: one using a paper-based manual and the other utilizing the AR application. The metrics that are being recorded are the time taken to complete each procedure and error rates done during each procedure. The outcome of this pilot study shows a significant improvement in task completion times using AR: 71%, 54% and 60% for each assigned tasks, and reduced number of errors per task where the AR group made only one error throughout all three tasks. Although the sample size was small, these findings suggest that AR can improve maintenance workflows and overall efficiency.

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