

Effect of Input Control Device on Performance During Training To Operate a Simulated Micro Aerial Vehicle. Durlach, P.¹ & Neumann, J.²; U.S. Army Research Institute¹, Dell Inc².

Seventy-two participants were trained to pilot a simulated micro aerial vehicle (MAV). The simulated MAV was modeled to have vertical lift and land, and hover capabilities. The MAV had two fixed cameras facing forward and downward, which could send streaming video to the operator via the display on the operator control unit (OCU). Three aspects of the OCU were manipulated in order to assess the impact on ease of training and performance during training exercises. The three factors each had two levels, and were crossed, resulting in eight between-group conditions (2 x 2 x 2). The factors were input control device (mouse vs. game controller), input control display (analog vs. digital), and number of sensor views available at a time (one camera view vs. two).

Training involved an initial explanation of the OCU and the MAV, followed by some drills which had to be completed within a temporal criterion. All participants then repeatedly flew two flight paths till they could complete them without any collisions and within a set amount of time. These paths were marked out by poles placed in the synthetic environment, and by waypoints illustrated on an electronic map. During this portion of the training, the waypoints could be used to guide flight, as the position of the MAV was shown dynamically on the map. Subsequently participants repeated these paths twice each; but in the absence of the waypoints. In addition to these flight paths, participants complete two more tactical missions. One required using the MAV to fly a reconnaissance mission around a designated building to determine who was inside. The other required using the MAV to fly around a village and take pictures of mounted and dismounted targets. Participants had a set amount of time for this mission, but were unaware of this until they were told to return the MAV to the start point.

Of the manipulated factors, the input device had the most consistent effects across missions. Participants using the game controller completed missions more quickly and photographed more targets in the reconnaissance mission compared with participants using the mouse. We hypothesize that one reason for this result was that participants using the game controller were able to focus their attention almost completely on the sensor imagery, whereas participants using the mouse had to continually shift their attention between the sensor imagery and the input control display (because they had to look at where they clicked). Another reason for the superior performance with the game controller may have been the ability it provided to control multiple directions of movement simultaneously (e.g., upward and forward). With the mouse, a change in a multiple directions required multiple clicks). We also found that habitual video game players performed better than non-players; but this was true whether they were assigned to the mouse or the game controller condition. In general, workload was rated about the same, regardless of input device, though more experienced gamers reported lower workload than less experienced gamers.