

Measured Response to UAS Pilot Commands

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Introduction

- “There is an increasing need to fly UAS in the NAS to perform missions of vital importance to National Security and Defense, Emergency Management, Science, and to enable Commercial Applications”

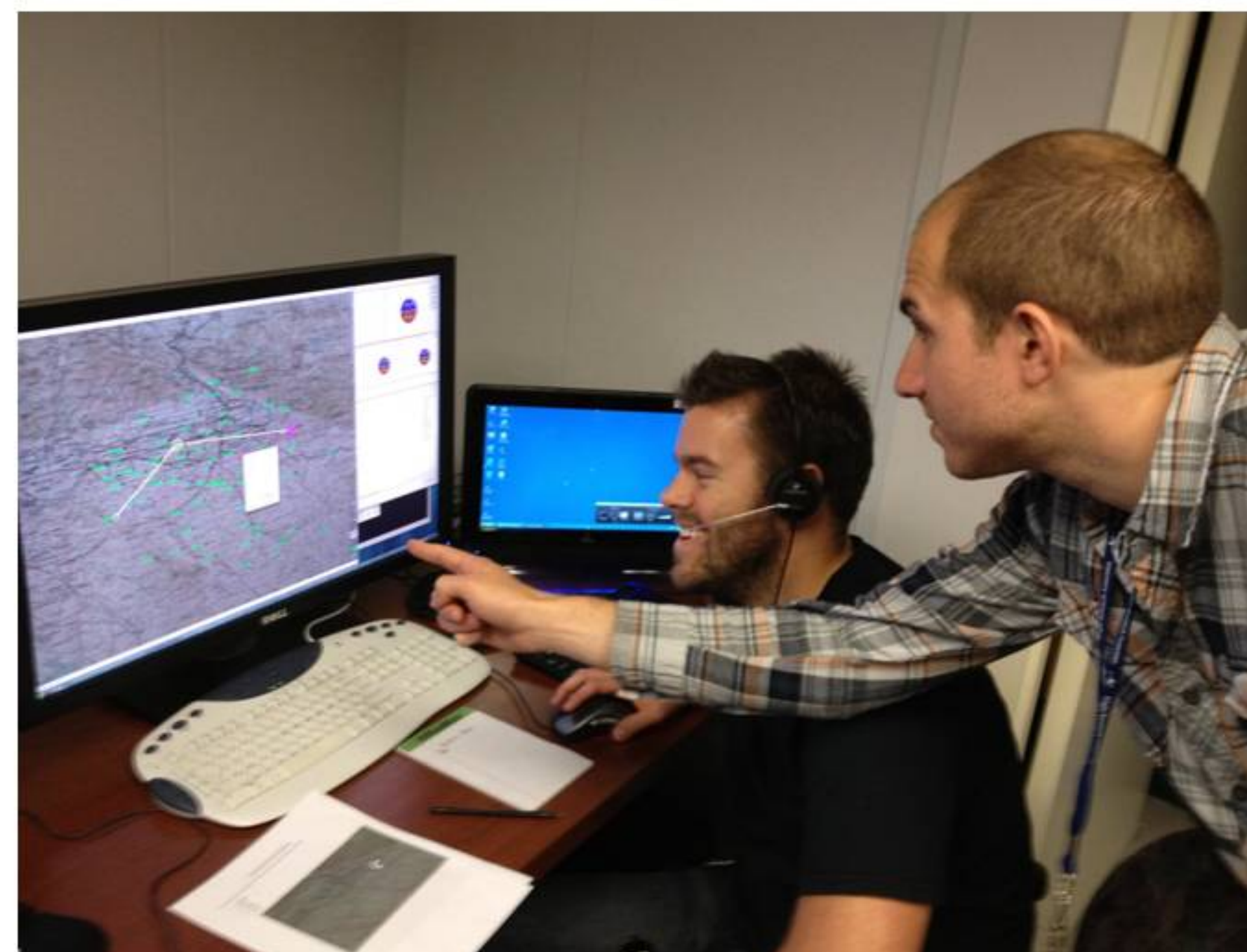
-Jay Shively, ISRP Presentation

- Measurement of UAS response times to air traffic controller (ATCo) commands is an area of research that is needed for UAS access to the National Airspace System (NAS)
- The “measured response” will contribute to data related to:
 - UAS Pilot Workload
 - ATC Acceptability
- **This study measures components of UAS pilot response to common ATCo commands**
 - Time for pilot in command of UAS to verbally respond to ATCo instruction
 - Time for UAS pilot to initiate action after ATCo instruction (also time to complete action)
 - After each command, pilots rate their workload and ATCo rate the acceptability of pilot response time
- This study contributes to the “Human Systems Integration” technology development area specified in the UAS in the NAS project goal



The Study

- Data is being collected from 8-12 IFR-rated pilots
- The MUSIM ground control station is used as the UAS test bed
- A simulated air traffic environment in ZLA is used
- UAS pilots are asked to **respond to and execute ATC commands as quickly as possible**



Example Commands from ATCos to UAS Pilots

- “PD-1, cross GAREY at one-four-thousand”
- “PD-1 turn left heading two-four-zero, proceed direct ZIGGY, then resume own navigation”
- “PD-1 climb and maintain one-five-thousand, traffic 12 o’clock, five-zero miles, westbound one-three-thousand”
- “PD-1 contact approach 126.3”

Apparatus

The following equipment is being used:

- MUSIM Simulation Environment (Pilot)
- MACS Simulation Environment (ATCo)
- Push-to-talk voice communication
- CAMTASIA video recorder
- Voice audio and transmission logger



Capturing the Measured Response

- Synchronized video and audio recordings will be used to extract measured response components
- Mean response time, and response time ranges, will be reported for different clearance types

Future UAS in the NAS Research

- This preliminary study will exercise our method for capturing components of the measured response.
- Future studies should examine the aggregate (end-to-end) measured response, and determine factors that influence the time delay for component parts.