



Interfacing ACT-R 5.0 to AFRL's Predator UAV STE

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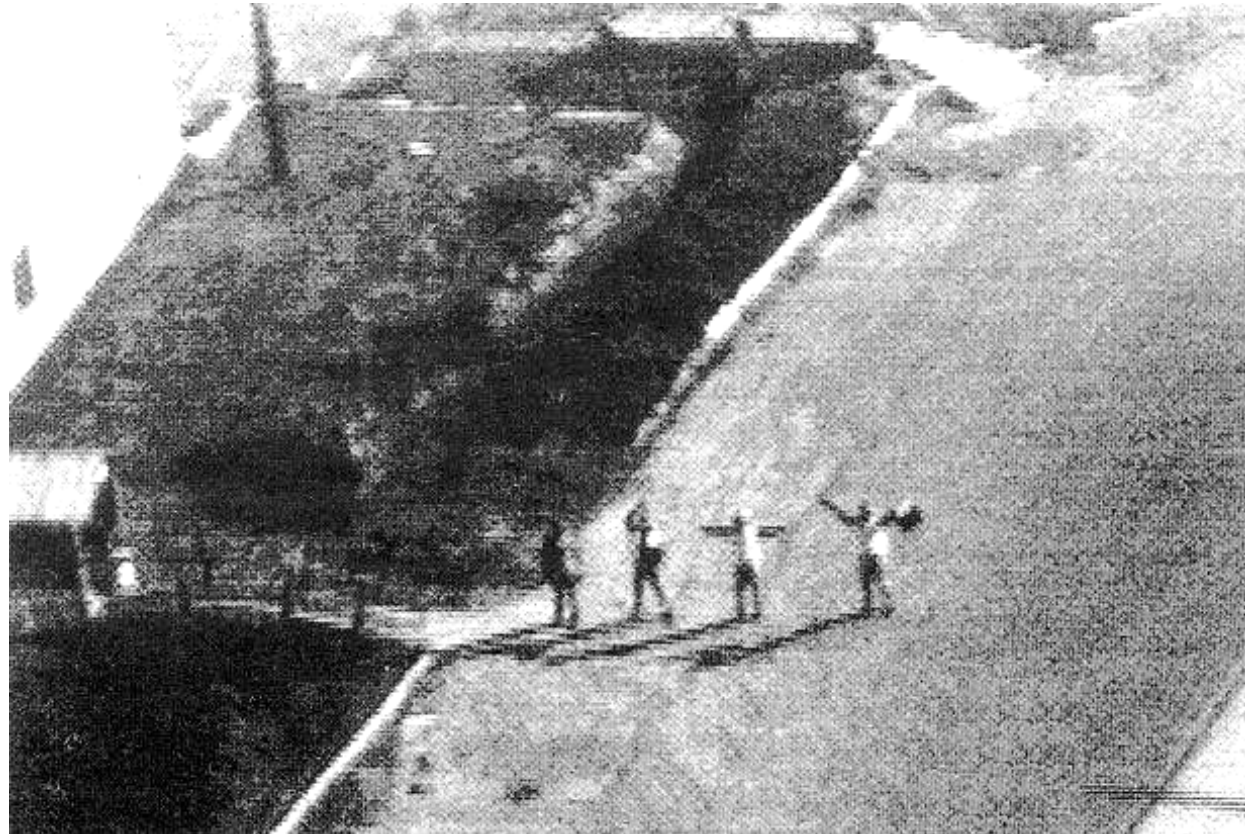


Predator UAV





Surrendering to a Predator





Ground Control Station





Predator UAV High Fidelity Sim

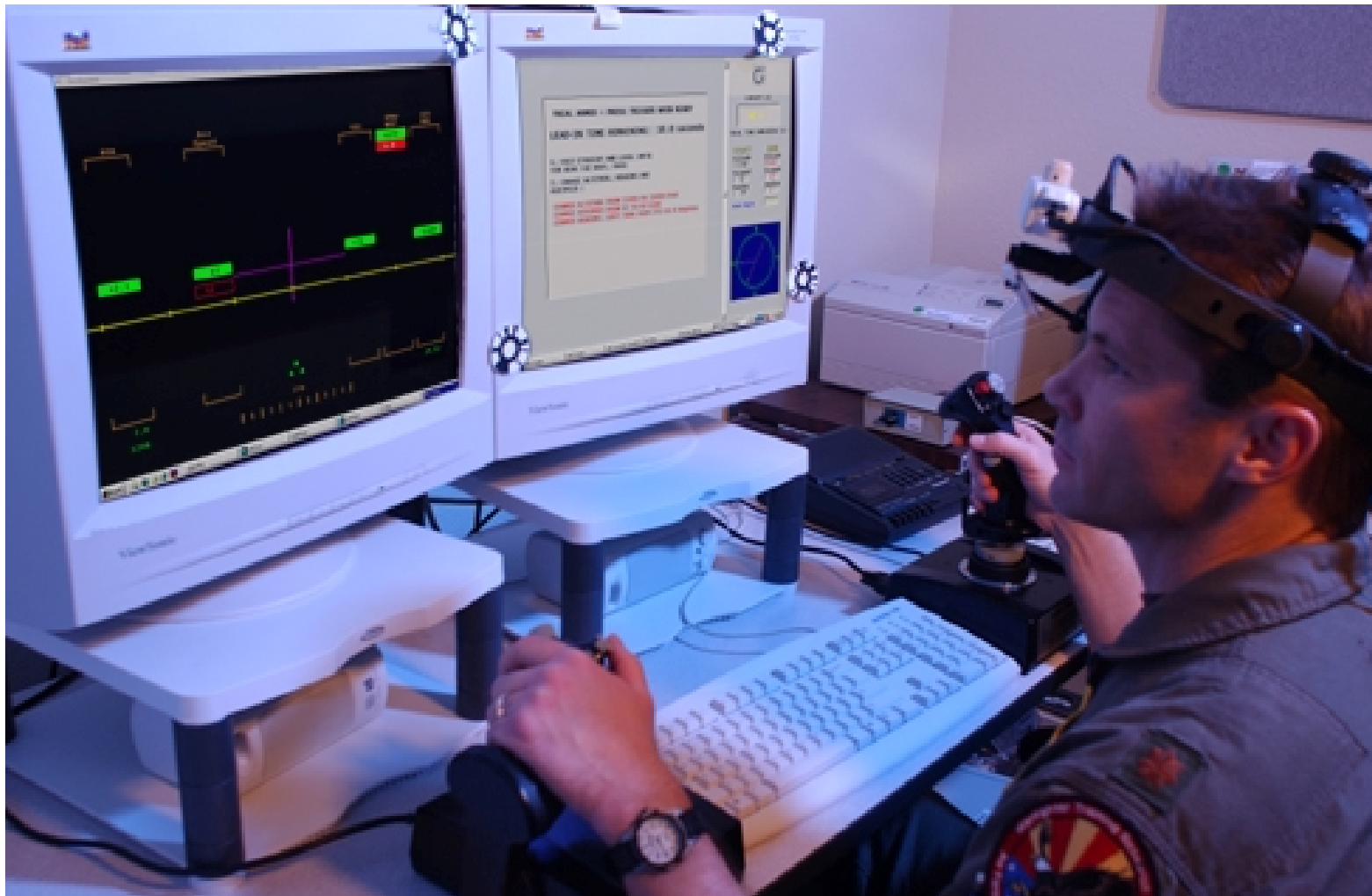




With what external system have you attached ACT-R?



Predator UAV Synthetic Task Environment

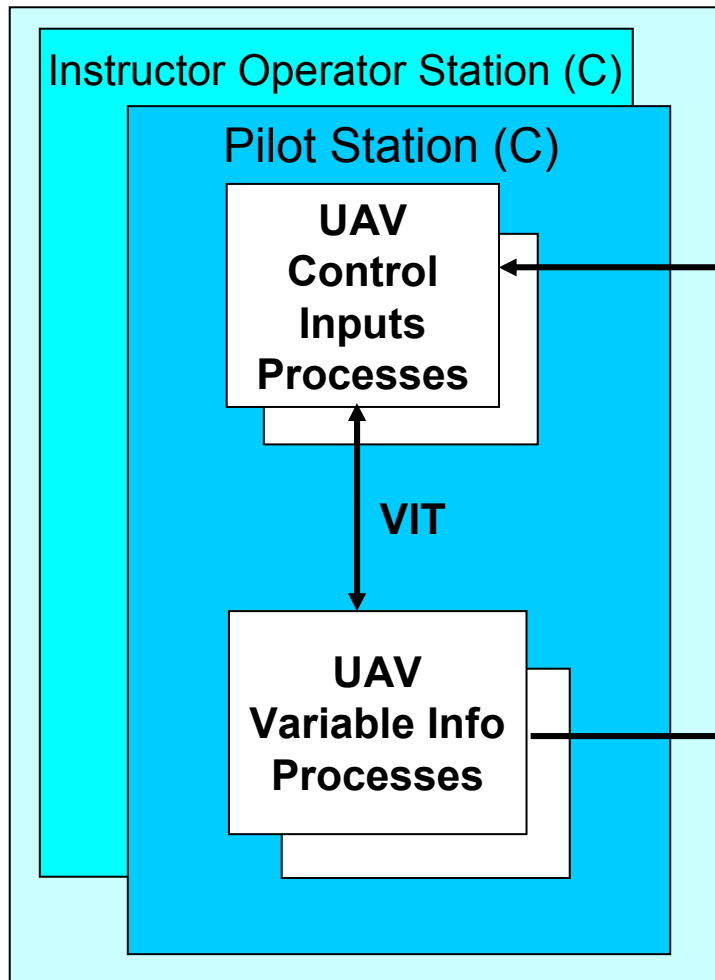




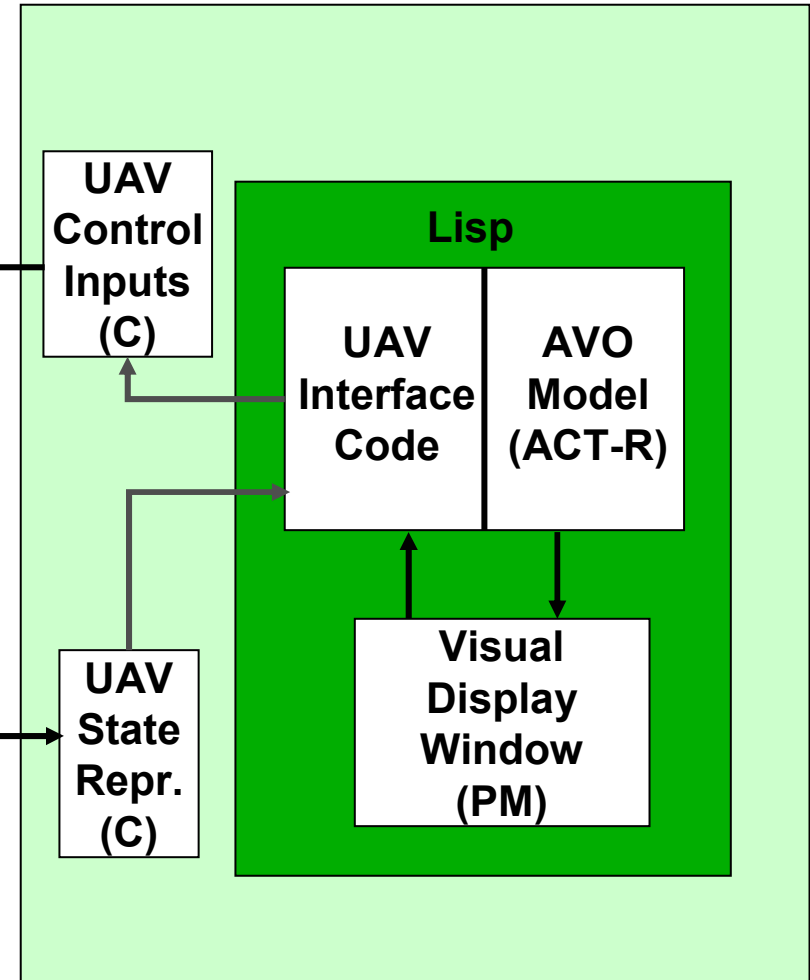
How was it done?



UAV STE Computer



Cognitive Model Computer

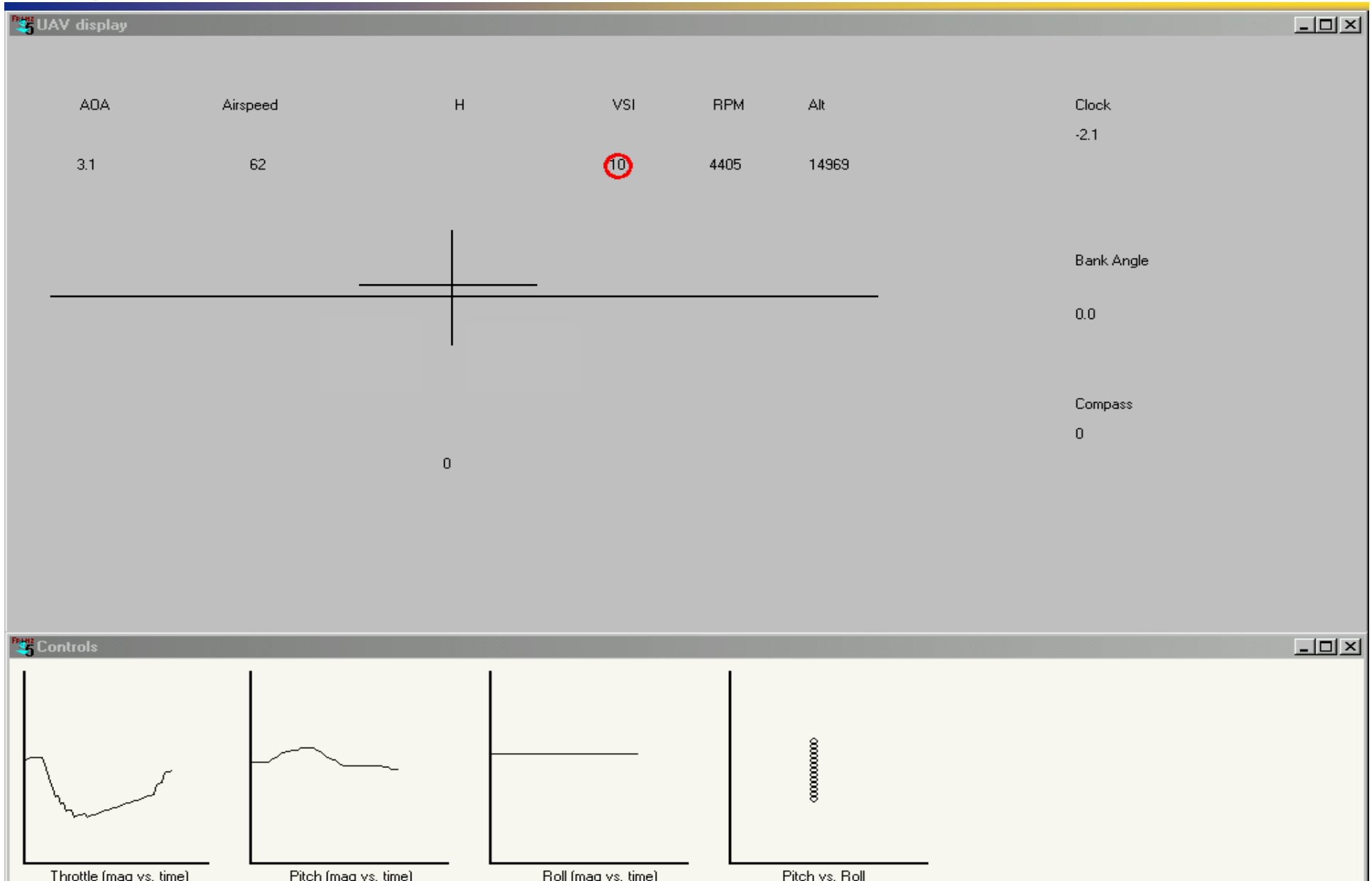


control inputs

variable info
table
(VIT)



Lisp-based Heads-Up Display





How is communication over the network handled?



- Communication is handled via non-blocking datagram sockets.



What information is communicated back and forth?



- All VIT data are available on the network at every 20 msec update
- **Getting state data from STE ...**
 - Used ACL's foreign function interface to allow a C-based process on the cognitive model computer to provide instrument data to the Lisp-based HUD
 - Most instrument values on the HUD are digital. Created new visual object classes for horizon line and reticle
- **Sending control inputs to STE ...**
 - Implemented new "hand on throttle" and "hand on stick" virtual device representations by adapting existing representation for keyboard
 - Another C-based process on the cognitive model computer accepts device movement commands from the model and send them to the STE's control inputs process



How do you handle time synchronization?



- **We don't.**
 - The STE runs in real-time (only) and the model runs in real-time (with the appropriate parameter turned on).
- **We do coordinate trial starts, however**
 - Occasionally, the “start-trial” communications between the model and the STE aren’t successful and we get a bogus trial.
 - This remains an issue.



What didn't work?

How did we fix it?



- **Model slower than humans**

- Graphics processing issue in ACL 5.0.1 (Lisp HUD)
- Created a “jump-through-time” production that re-synched every time the model selected a new instrument to attend – not satisfactory
- Upgrade to ACL 6.2 and more efficient graphics code from Dan Bothell solved the problem
- Now we turn on the “real time” flag in ACT-R, to slow it down to wall-clock time

- **Batch run buffer overloads**

- Model used to grind to a near stop after 20-25 trials
- Turned out to be caused by buffer overloads in the Debug Window in ACL
- The fix was simple: stop printing to the Debug Window
- Now we can run 1000's of trials without a memory issue



Questions?

