Flight Simulation Development: X-Plane Rotorcraft

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NASA AMES RESEARCH 2014
Why Simulations?

• Low risk
• Comparatively low operation of cost
• New skills learned
  • Alternative to physical training
• Must be realistic
• Quick testing methods
  • Current method at Ames is the Vertical Motion Simulator (VMS)

VMS visual model of the Large Civil Tilt Rotor 2
Physical Initial Set Up

PHYSICAL

• Set up for airplane flight
  • Control column
  • Rudder pedals
  • Throttle control

• Keyboard for programing

• Seat low to the ground

• Small office
  • No enclosure
Program Set Up

PROGRAM

• X-Plane graphical renderings
  • FAA approved

• Utilized Matlab/Simulink for flight dynamic models
  • Shared memory

• Extended desktop over six screens

• Plane flight controls
Additions

PHYSICAL

• Implement helicopter controls
  • Cyclic
  • Collective
  • Anti-torque pedals

• Raise Chair

• Build Enclosure
Additions (cont.)

PROGRAM

• Implement helicopter controls
• Change rendering options
• Make new control panel display
• Converting new models from VMS

View of X-Plane model during flight

View from X-Plane cockpit at start up
Converting New Models

PROBLEMS

• X-Plane requires X-Plane specific .acf file
• X-Plane specific .acf files can *only* be compiled in Plane-Maker
• Plane-Maker *only* imports X-Plane specific .obj files
• Plane-Maker only imports as objects

MORE PROBLEMS

• VMS models came as .obj files (not X-Plane compatible)
• Rhino does not export to X-Plane specific files
• AC3D only opens 3ds files
• AC3D only exports files with one texture per geometry
Integrating New Models (cont.)

- Models were obtained from the VMS
  - .obj
  - .3ds
  - .flt
- Textures
  - .tiff
  - .tiff.attr
- Convert .tiff files to .png files
Integrating New Models (cont.)

Rhino .3ds

AC3D .obj
Integrating New Models (cont.)
Integrating New Models (cont.)

• Convert novel aircraft to test handling capabilities

• This process is less than ideal
  • Started a plug-in to make this process simpler
Future Work

• Plug-in for graphics
• Radio controller integration
• Documentation
Thank you!

• Oregon Space Grant

• Kyle Flenar for his on this project throughout this internship

• To my mentors: Dr. Colin Theodore, Dr. Ben Lawrence, Eduardo Solis

• To the VMS staff, specifically Emily Lewis and Boris Rabin