491 - 516: SPACECRAFT, A VIRTUAL REALITY ‘SANDBOX’ ENVIRONMENT

Our Grand Challenge

Engineering the Tools of Scientific Discovery and Enhancing Virtual Reality are two of The National Academy of Engineering’s (NAE) Grand Challenges for the 21st Century.

SpaceCRAFT is a Virtual Reality (VR) ‘Sandbox’ environment designed to enable government, university and commercial entities to collaborate in the design, use and evaluation of technology for future operations in space. Taking advantage of high speed parallel computing, virtual reality systems and open source software platforms, SpaceCRAFT aims to enable any person or institution to contribute to humanity’s future in space.

Project Goals

SpaceCRAFT has already been used to simulate various mission concepts including space vehicle designs, surface habitats, robotic teleoperation, spacesuits and so on. The goal now is to build the on-line multi-user space VR platform that anyone can use. Seamless integration with other 3D design and mathematical modeling tools is also essential. In May 2018 we will launch a Space VR Design Competition with NASA using SpaceCRAFT as the platform. In addition to building the simulated ‘universe’ and system engineering tools into SpaceCRAFT, the goal is to be ready to launch the platform publicly in May 2018.

Key challenges:

- An integrated approach to system modeling and communication between models.
- Multi-user distributed architecture for real-time VR collaboration.
- Seamless compatibility with 3D modeling and engineering simulation tools.
- Space vehicle and system demonstrations that can be used as templates for others to build upon.

Impact to Society

Current space missions take incredible resources and large distributed teams to design, plan and fly. As the technology of the space industry expands to enable lower cost missions and equipment, there is a need for remote collaboration and detailed mission VR evaluation prior to spending the resources on future missions.

SpaceCRAFT is the step forward in this direction by allowing researchers a flexible, unified and VR-enabled platform to create and test the myriad possible space missions. This platform enables society to take full advantage of the technological improvements of the 21st century to access the opportunities of space.

Desired Engineering Majors

Including but not limited to: Aerospace (AERO), Electrical (ECEN), Computer Science (CSEN), Visualization (VIZA), Mechanical (MEEN), GeoScience (GEOG/GEOS), Atmospheric Sciences (ATMO) and more.

Mentors

Professor: Greg Chamitoff, Director ASTRO Center, Former NASA Astronaut Grad Students: Mauricio Coen, Neil McHenry, Robert Hogan, Matthew Holub NASA JSC: Eddie Paddock, Dr. George James, Mark McDonald, Chris Kennedy