SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
Calling Planet Earth - Space Outreach to the General Public (6)

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VIRTUAL REALITY MULTI-USER SPACE SYSTEM MISSION DESIGN AND SIMULATION: ENGAGING THE PUBLIC THROUGH OPEN-SOURCE COLLABORATION

Abstract

At Texas A&M University a multi-user virtual reality space mission simulation platform has been developed with an aim to allow anyone to contribute to humanity's future in space. Named 'spaceCRAFT', the platform can be found at [**www.spacecraft-vr.com**]. SpaceCRAFT is a new concept for collaborative space system and mission design. In other words, it is a Virtual Reality (VR) Sandbox environment designed to enable public, government, university, and commercial entities to collaborate in the design, use and evaluation of technology for future operations in space. Taking advantage of the latest technology, our future among the stars can be designed, simulated, and tested here on Earth.

The development of spaceCRAFT began in 2016 with over 75 students contributing to the system architecture, physics models, plug-in capability, and demonstration missions. Although this platform originally only included students in a multi-disciplinary research course at Texas A&M University, it expanded to include students from the University of Sydney, technical advisors from NASA, and later the general public. The initial teams worked together on system and mission designs that included an operational Mars habitat, rendezvous and docking with an asteroid, tele-operation of a robot on Mars, spacesuit model, rescue spacecraft using atmospheric drag and lift for orbital targeting, navigation for a free-flying robot outside the International Space Station, simulation of an artificial gravity space habitat, and the Starshot mission to Alpha Centauri. Each of these projects contributed core modules to the spaceCRAFT platform, such as atmospheric models, orbital mechanics, planetary surface models from actual data, and dynamic control system models presently integrated in the software.

The platform is an environment for simulating integrated space systems in which users can share their models publicly (for worldwide testing and improvement) or privately (for collaborative work between specific entities). SpaceCRAFT provides the essential abilities to collaborate online, run VR simulations, and integrate models from a wide range of tools (such as AutoCAD, Blender, SolidWorks, SketchUp, and GIS, among many others).

This paper focuses on discussing strategies to include the general public in the open-source development of spaceCRAFT. Unlike the traditional methods of space education including studying textbooks, reading research papers, and working through math problems, spaceCRAFT allows for the general public to experience specific scenarios and discover new lands within a virtual reality head mounted display. Video fly-throughs of the virtual environments and pictures of mission scenarios can be presented as slides and included in the paper.