

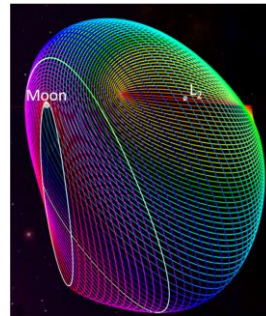
Master Thesis Offer

Analyse und Implementierung von Near Rectilinear Halo Orbits (NRHO) in einem Virtual Reality Simulator für die Lunar Gateway (LOP-G)

Analysis and implementation of Near Rectilinear Halo Orbits (NRHO) in a Virtual Reality simulator for the Lunar Gateway (LOP-G)

Motivation:

The Institute of Space Systems is currently developing a new virtual reality simulator based on the future Russian spacecraft Federation, which is meant to support human missions to the Moon during the next decades. The current simulator is simulating the orbital mechanics and spacecraft trajectories with the use of Orbiter Space Flight Simulator. The data is then streamed to Unity, which is in charge of the visual effects and the user's cockpit interaction. In order to develop a fully standalone simulator, this work's intention is to implement the orbital mechanics directly in Unity and focuses in the simulation of the Near Rectilinear Halo Orbits around the Earth-Moon L2.



Pictures: NRHO - left
Oculus Rift S VR Goggles – right

Requirements:

- The candidate should have previous programming experience with C++ and, if possible, C#.
- A basic knowledge of orbital mechanics is required.

List of tasks:

- Review of orbital mechanics, perturbations and three-body problem orbits.
- Analysis of real-time simulation requirements and characteristics.
- Review of the current status of the VR simulator (Orbiter, Unity).
- Development and implementation of a realistic orbital physics interface in Unity.
- Verification of the obtained results with existing software (MATLAB, Astos,...).
- Analysis of the results obtained and proposal of modifications and improvements.

Supervisor: Prof. Dr. Reinhold Ewald, Dipl. Ing. - Miquel Bosch Bruguera

Starting date: As soon as possible

Submission until: six-months Thesis

Acknowledgement of receipt:

I hereby confirm that I read and understood the task of the master thesis, the juridical regulations as well as the study- and exam regulations.

Prof. Dr. Reinhold Ewald
(Responsible Professor)

Signature of the student

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