

Empowering the Next Generation of Space Explorers (15)  
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Author: Mrs. Lucia Nicotera  
Uruguay

Mr. Gastón Ibarburu  
Uruguay

Mr. Rodrigo López  
Uruguay

VIRTUAL PLANETARIUM: A DYNAMIC IMMERSIVE TOOL FOR THE EXPLORATION OF  
POSSIBLE EXOPLANET SURFACES AND ATMOSPHERES.

**Abstract**

The presented project is an interactive interface that offers a parametric high quality immersive visualization of prefigured exoplanet environments, based on the NASA Exoplanet Archive. This desktop environment is a phenomenological approach to the current state of the art of the exploration of our galaxy and exoplanet studies. Since the information available comes from distant observations, it is based on indirect conclusions derived from advanced procedures, usually unknown by the general public. Therefore, the developed interface has the objective of closing the gap between the fascination of the subject and the scientific methods and discoveries behind it.

The user can freely navigate through a 3D representation of our galaxy, coming across all the stars that host a confirmed exoplanet. The user can choose to dive into each of the hosted planets and walk through its surface or clouds, which are recreated according to the available information, interacting with the environment and accessing the scientific information and methods that support it.

The project, which could be developed for AR and VR, is an open tool that can be further enhanced by incorporating new and more precise correlations between the environment characteristics and available data. Aspects such as surface gravity of the planet, its size, composition, equilibrium temperature, and the characteristics of its host star are transformed into a set of parameters, such as atmospherical or topographic properties, that configure different landscapes to be explored by anyone who ventures. To achieve this, an environment was created using Unreal Engine 5 and inferred heightmaps, designed in such a way that the asset size, materials, dynamic skies, and the aspect in general of the scenario depended on a given list of parameters constructed with information taken from NASA's Planetary Systems Composite Table.

Although its correlations with the known exoplanet data are yet to be explored, this parametric environment is a powerful tool that can help experts in the field to visualize the systems they work with and trigger discussions about them. At the same time, it can approach the general public to the wonders of exoplanets, reinforcing the role of science to prove the existence of these worlds. Although the images are fictional, in the sense that they are one of the infinite possibilities in the frame of the available data and experiments, they intend to reveal a simple yet powerful truth: our galaxy is filled with wonderful worlds waiting to be discovered.