

OBLIVION

Interactive Black Hole Visualization and Artistic Sonorization

Description

OBLIVION is an interactive artistic installation which simulates the visual appearance of a black hole. The installation could be integrated in museums and exhibitions related to space. The main goal is gathering the attention of people and making them passionate about space, in particular attracting students that could be the researchers of the future on this kind of topics.

The simulation parameters can be controlled through a dedicated web application and the visual scene is enriched by a soundscape modulated by these parameters. The user can navigate inside the scene by moving a spaceship with the aid of a controller. The web application should run on a separated totem screen, to allow for customization of the parameters without interfering with the visual scene.

Challenges, accomplishment and lessons learned

The project presented quite a few challenges, since we had little to none previous familiarity with UE5 (Unreal Engine 5) and the HLSL language for shading. Additionally, despite being a powerful engine, the documentation for UE5 is often incomplete and not clear, thus making it difficult to develop and debug new features. In particular, great effort was required to set up a stable and proper connection between the various components through the OSC protocol.

Despite this, we accomplished to make a scene which is already visually appealing, and it offers the basic features which were intended for the installation (parameters controllable through a web application and soundscape generated through OSC communication).

The project's development was definitely a learning experience, offering opportunities to acquaint ourselves with new tools like UE5, deepen our grasp of computer graphic concepts, and master the difficulties of setting up OSC communications between different objects. Additionally, it provided a chance to explore the fascinating realm of black hole physics.

Moreover, excellent teamworking and high quality organization allowed us to reach the final goal of the project with a lot of satisfaction. Also, this was a great opportunity for us to broaden our mind and grow our strong passion for science and engineering even more.

Technology

- **Space Scene Simulation:**
 - Software and technologies: Unreal Engine 5, HLSL (High Level Shader Language), OSC Protocol
 - Concepts: ray marching, volumetric rendering
- **Audio:**
 - Software and technologies: SuperCollider, OSC Protocol
- **Web Application:**
 - Software and technologies: Vue.js, Vue CLI, Node.js, OSC Communication Protocol, osc.js and osc-js libraries, WebSocket, UDP

Students

- **Riccardo Di Bella** contributed mainly to the black hole rendering in Unreal Engine 5
- **Marco Muraro** contributed mainly to the development of the web app and the implementation and setup of the OSC Communication between the three modules of the creative installation project
- **Stefano Ravasi** contributed mainly to the soundscape generation in SuperCollider

Links

- Github Repository: [OBLIVION](#)
- Demo Video: [YouTube](#)
- Builds and other assets: [GoogleDrive](#)