# SIMULATED FLIGHT OVER EL HIERRO ISLAND

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**ABSTRACT**

This work presents a virtual flight simulator that allows a precise and smooth real-time experience on the "El Hierro" island (Canary Islands). Development tasks and results are presented that demonstrate the stages of the project with the major features developed within the work.

**KEYWORDS**

Virtual flight simulator, Cristal Space, 3D terrain programming.

## 1. INTRODUCTION

The main goal of this project[1] has been the development of an application that allows flying virtually over El Hierro Island (Canary Islands), showing the building structures of a hydroelectric power station that is in construction. Input data consisted of:

- Aerial photos at 1:5.000 scale of the island surface (1 m2 each pixel).
- Height map of the island, with a value each 10 meters.
- Planes and designs of buildings and structures of the power station (including one new harbour).

## 2. DEVELOPMENT

Crystal Space was the development kit used for this project. It is a free and portable game development kit that supports funcionality to handle large poligonal meshes, moving around a 3D world, and show atmospheric and light effects to make the scene more realistic.

A triangle mesh that covers the whole island was created from the input height map. This mesh was composed of 66 simple meshes (see Figure 1). Every one consisted of 250x250 triangles (approx. 62 thousand). Totaly the island was made of more than 4 million of triangles. A LOD (Level Of Detail) algorithm was used in each simple mesh (see Luebke-2003), in order to simplify those meshes that are far away the point of view.

The aerial photos were texture mapped on the mesh. Every simple mesh had a 2.048x2.048 texture associated, using mip-map format, in order to show it at a different scale depending of the distance to the camera.

A single large polygon was created to represent the sea. That polygon was texture mapped with a synthetic sea photo. Next, every aerial photo that include sea areas was processed using Photoshop, in order to blur the real sea to avoid the visual discontinuity between both kind of seas.

[1] This project has been supported by the Technological Institute of Canary Islands (I.T.C.).

A semisphere was used to represent the sky. A synthetic sky with clouds was generated and texture mapped on the semisphere. In areas close to horizon, the sky was blurred to achieve a more realistic effect.

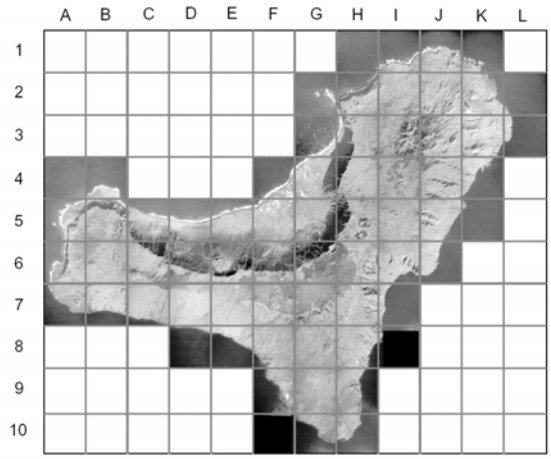


Figure 1. The 66 meshes that cover the island

Later, every structure of the power station was designed with a 3D modeller software and located in the exact position over the island. Also, some natural structures (as Bonanza Rock close to coast (see figure 2)) was designed. It achieves a 3D effect when the camera approach, much better that using just the 2D photo viewed from the top.


Figure 2. Flying over Bonanza Rock, a natural structure modeled in 3D

Finally, an interface was designed and developed to control the application. Moreover, all the tasks needed to handle the flight were created. Most importants were:

- Collision detection with the terrain,
- Pre-recorded flights generation,
- Automatic flights between two points over the island,
- Visualization of names of populations and interest places over their exact location on the island,
- Generation of information panels (with photo and text like figures 2 and 3). The application must show the suitable panel in every moment, depending on the place flown over.

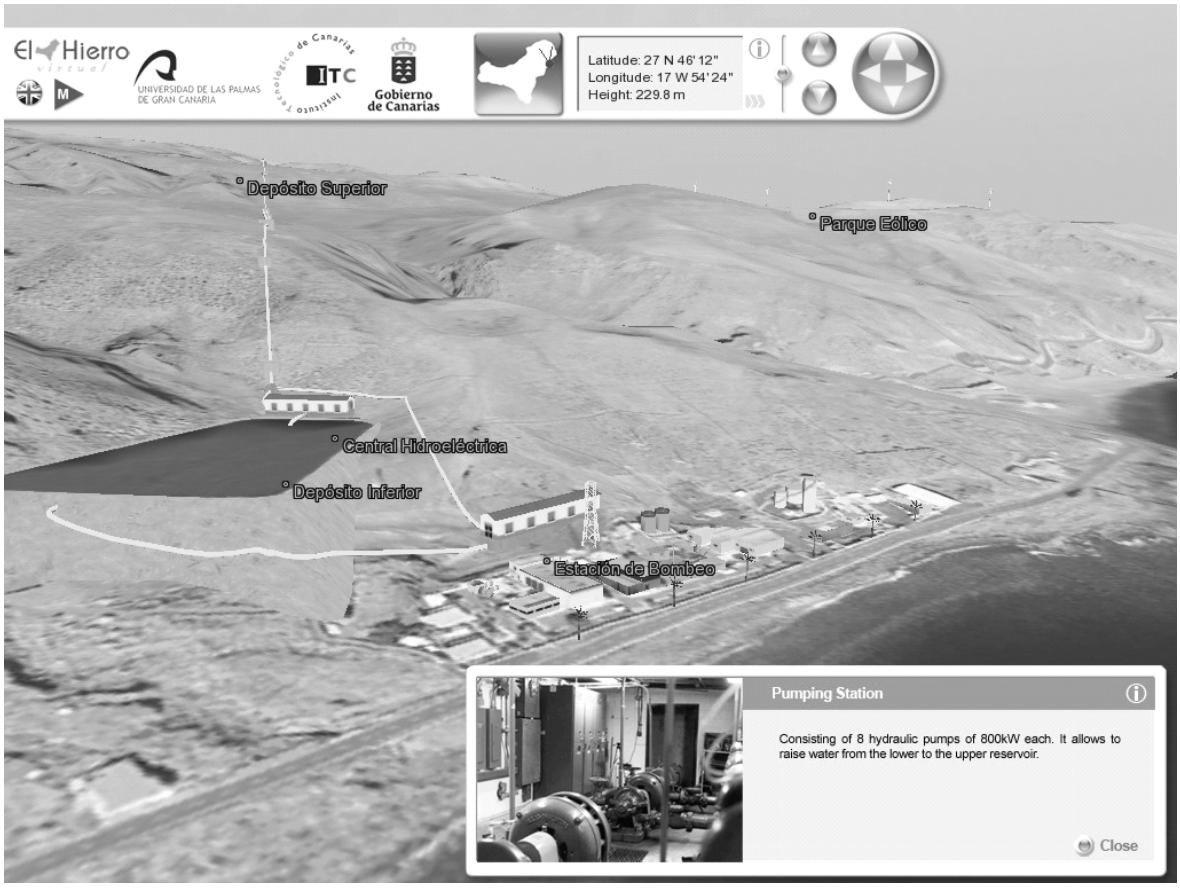


Figure 3. Panoramic view of the power station currently in construction

## 3. CONCLUSION

A flight simulator development experience has been presented, developed in the University of Las Palmas de Gran Canaria, and supported by the Technological Institute of Canary Islands (I.T.C.). This is the first of a set of future projects, oriented to visualize 3D geographical content in the Canary Islands in a realistic way.

## REFERENCES

Luebke, D. et al, 2003. *Level of Detail for 3D Graphics.* Morgan Kaufmann Publishers, San Francisco, USA.