

A Multisensory Space to Teach and Learn Astronomy

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Abstract

The approach to the Astronomy, their concepts, their findings and the development of the sense of wonder before the comprehension of the natural world is a Human right. The education for inclusion appeals to a range of educational and scientific insights that bring the sky to a palpable and sensitive space by generating specific resources. This work presents the development and implementation of new resources and tools for dissemination of science in general and astronomy in particular, for people with disabilities. The impact in general audiences is also studied.

1. Introduction

This project proposes the design of educational strategies based on the creation of interactive models, tools and resources to provide the people with special educational needs or people with visual, hearing and / or motor disabilities, a learning and participative space, accessible, interesting and educational, without neglecting the base of scientific dissemination, ensuring interaction in a playful contexts is the goal of the project that we are presenting , which was developed by Scientist, Engineers and Designers at ITeDA-Mendoza.

1.1 Objectives

- Generate interest, motivation and enthusiasm while learn Astronomy, providing an authentic, unique and sensitive space, enabling multi-sensory learning experiences.
- Transform all systems in accessible.
- Develop especial hardware and interface software that allows linking touch-modules with the computer, which provides adequate information for blind and deaf.

2. The models

2.1 Mars Tactile

This module was though on the base of a real map of Mars. It has embedded touch sensors activated by hand. These sensors are placed in special locations, such as Olympus Mons or Valles Marineris, between others. By touching, the sensors send a signal to a PIC microcontroller and this will communicate the ID sensor to a computer. The PC decodes the signal to produce image and audio. The PC works under a Python based program continuously waiting for data from the control board. At the time of receiving some data, a video explaining this place to which refers the sensor initially touched is released (Fig. 1) A person (blind or not) who traverses the surface of the model (Fig. 2), may recognize the names and characteristics of the accidents on the Planet on the screen or using headphones.

2.2 Gravity effect

A commercial balance was modified and connected to a control board based on a microcontroller. The device has a keypad to select the planet where we want to know the weight. The control board manages the delivery of information from the balance and send the data to the PC, which interprets the data from the micro and display the weight and detailed information about the planet, on the screen and through the speakers, specially thought for blind. It is also possible to use the device on wheel chair (se Fig. 3).



Figure 1: Mars for all.



Figure 2: Tactile Mars.

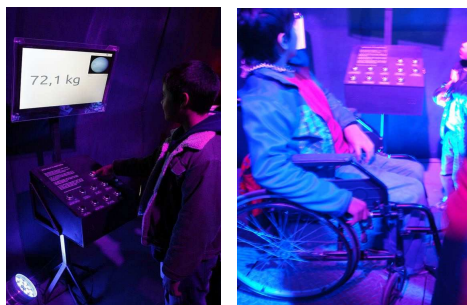


Figure 3: My weight in other world.

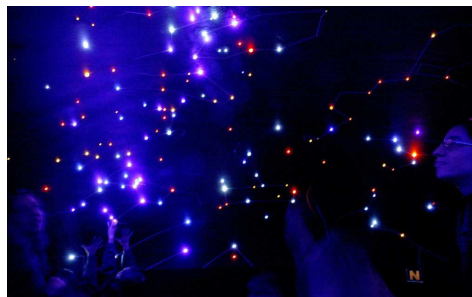


Figure 4: Touching the sky with the hands.

2.3 Planetarium for all audiences

The Planetarium for Blind (and deaf and motor disable) is an space which simulates the outdoor night environment (because the low temperature, the sound of night insects and the perfume of the grass) and aims the perception of the starry night as really it is: with the stars above our head. The stars are represented by LEDs with different sizes (to simulate magnitudes) and colors (to explain temperature). The visitors can "touch" the stars and recognize the constellations and the use of its for orientation on Earth. The idea is activate all senses and transmit the blind people the idea of the Celestial Sphere from inside it. (see Fig. 4). The information is also available for deaf, through a magnetic ring (which interacts with the headphones) and displays.

6. Summary and Conclusions

This proposal is intended for the general audiences, but especially designed for people with any type of disability. The number of visitors to such facilities

depends exclusively on the devoted space for exhibition. It should be noted the interest in this type of resources, not been developed in a wide range, but which respond (or should do) to a social undeniable demand. From this experience which means the design, implementation and commissioning progress of this project, it is clear that it integrates disciplines, allowed the cooperative work and mutual learning.

While this proposal is aimed at the general public, reports benefits in the case of special schools, as well as the educational establishments with people with disabilities integrated into their classrooms. The content of this project and auxiliary material, required as part of the production (such as texts, brochures, workshop materials), could be included between supplies of different Equality Training Programs.

This exhibition in Argentina was visited by more than 3 million people.