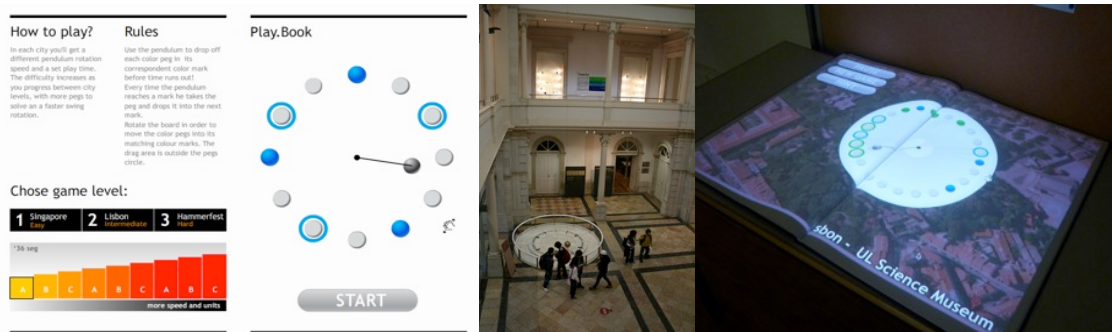# PlayBook's Foucault game

Dimitar Nikolov[1], Tiago Ribeiro[2], Beatriz Vieira da Silva[1]

[1]Faculdade de Belas Artes da Universidade de Lisboa, [2]Instituto Superior Técnico

mitashkimitko@gmail.com, tiagrib@gmail.com, beatriz.vs@fba.ul.pt

Abstract: By developing a digital game based on the Foucault pendulum we aim to provide a rich and contextualized game experience that, conveying validated scientific content, maintains its main objective of being fun and still engage the visitor/player with the nature of the physical device, installed in the Museum of Science, University of Lisbon. The demo presented is a casual digital game whose mechanics explores the temporal, rhythmic dimension of a pendulum movement combined with a possible variable of the Foucault demonstration (angular rotation change with the latitude).

Keywords: game design, cultural heritage, museum communication.

Introduction. By developing a digital game based on the Foucault pendulum we aim to provide a rich and contextualized game experience that, conveying validated scientific content, maintains its main objective of being fun and still engage the visitor/player with the nature of the physical device, installed in the Museum of Science, University of Lisbon. The objective is to express the temporal, rhythmic dimension of a pendulum movement and associate the possible variables of the Foucault demonstration (angular rotation change with the latitude).

Game Concept. *PlayBook's Foucault* is a digital game that challenges both the reflexes and the speed of response of the player, as well as his capacity to observe and predict the movement of the pendulum in every specific course it takes. Presented in a clear graphic style, the game echoes the clarity of the Pendulum itself as an object installed in the Museum of Science of Lisbon University providing sufficient information to the player on how it behaves, trough a recreational character that is meant to enrich the real object demonstration even more. It's a challenge of skills with an interactive puzzle. Through the rotation of the board the player has to reach the solution, for the shortest

time possible. Assessing the pendulum swing rotation the player mission is to move successfully every color peg in its correspondent color mark before the time runs out. Three levels represent the pendulum behavior in cities at different latitudes: all share the same playtime and bob velocity, varying the apparent pendulum angular rotation speed and the amount of pieces to combine. Both the pin and pendulum sizes change between levels. The first level corresponds to Singapore, a city near the equator (zero latitude) where the pendulum oscillation plane doesn't rotate: the game pendulum maintains it's trajectory between two fixed points. The second level corresponds to Lisbon, a city where the Earth rotation makes the pendulum plane of oscillation appear to rotate at a rate of 9.4º per hour, taking 38 hours (and twenty minutes) to complete a full circle. In this level the game pendulum traces a trajectory of a 38 point-star, where each oscillation corresponds to an hour. The third level corresponds to Hammerfest (Norway), which claims to be the northernmost city in the world. Here the game pendulum movement traces a trajectory of a 25 point-star (near the north pole)**.** By progressing through city levels towards the poles the player apprehends the variation in the game pendulum movement, with an increasing rotation speed making it more difficult to follow the trajectory. The game was designed to be played by everyone, from children to adults, depending on the difficulty level chosen.

User Experience . Two different setups of the game are projected, one to be played onsite (PlayBook), in the museum main building hall and other online accessible through the museum website.

Onsite, the game is projected onto a blank book spread, with the dimensions of 80 x 60 cm. The game interaction is controlled via an infrared (IR) marker pointed to the surface of the pages on which the game is projected. With the IR marker the user can easily point the interaction area, and, by pressing a button, drag the board for its rotation. Visual and audio signals provide an output of the gameplay progression.

The online version is played directly in a web browser and controlled with a mouse input.

Technology. The game was developed using Adobe Flash platform as its versatility and flexibility allows the game to be easily exported for different platforms. The Flash technology also provides an extremely efficient development and prototyping environment, with simple integration between design, animation and scripting. It has proved its effectiveness as a support for interactive games, especially 2D games across the web. Compatibility with Wii Remote controller was also mandatory.