

## Designing the User Interface of a Logic Game

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**Abstract:** *The article presents the steps needed to build the user interface of a logic game of the physics simulator type, inspired by "Crazy Machines", the favorite game of many players. The theme is formulated and a choice of the development environment has been made. The game has three main views: initial, a choice of levels and a game view; it also has two secondary views - one for recording a level and another for output controls. The design of the objects in the game is presented, as well as the creation of auxiliary views in Adobe Photoshop. A manual for use of the developed prototype has been included, incorporating the display of different views in different modes.*

**Keywords:** *Design of game objects, Logical computer games, User Interface*

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### I. Introduction

Computer games have changed a lot since they were first created [1]. They began as simple exercises done by students to support research and have grown in a single industry.

Existing solutions:

- The incredible Machine [2, 3]. The game is of the puzzle type. The player is provided a set of objects such as boards, balloons, ropes, etc. With their help, he needs to complete a preliminary level so as to undertake a task such as lighting a bulb or putting the ball into the basket. The game provides the user the option to choose from pre-made puzzles (story line) or create his own, being given all the objects in the game (sand box). The progress of players is kept by a standard version as a password, which is given after the successful completion of the level. The password is entered from the home screen, which takes the player to the desired level. Characteristic of the game is the fact that real physics simulations are used rather than randomly generated events, as was common then. Thanks to this, the uniformity of access to each new level is guaranteed. The game quickly gained popularity and became one of the favorite games of that generation and an inspiration for many other games.
- Crazy Machines [4, 5]. The game is also of the puzzle type. Most of the ideas in it are drawn from the already reviewed "The incredible Machine". They added new objects and puzzles in combination with clear graphics and handling the objects. What is innovative is the addition of various profiles of players, which makes it easier the same copy of the game to be used by different users. The game was released for Windows, Macintosh, Nintendo DS, iOS and Wii.

The purpose of the development presented in the article is to design a user interface of a logic game of the puzzle type, designed to develop the critical thinking of the player.

### II. Theme

The theme unites all objects in the game by a common, general criterion, making it coherent and complete. At startup, the user will first see the interpretation of the chosen theme embedded in the game menu. It is extremely important the topic to be selected carefully and reasonably because the first impression may be the crucial factor for the user to choose the proposed game. The theme of the developed application creates the illusion that the objects are created in oil paints.

### III. Choice of Development Environment

Now there are many environments for processing graphic images. Raster graphics uses a set of points to describe an image. It does not support any large increase due to loss of quality, but this can be compensated by zooming the resolution. It is preferred by photographers and artists because it allows relatively easy image processing, smooth transition of color, freedom in painting with graphical devices (pen).

Adobe Photoshop is one of the most famous media to manipulate bitmaps with multiple functions, filters, layers and tools. It has the ability to create and process videos and later versions (CS6) also allow work in a 3D environment. Adobe Photoshop is intensively used for post photograph processing of digital images - it has many tools and filters to manipulate the image [6, 7]. This makes it a priority choice of many photographers. Also, it makes it relatively easy to create original images and graphics, and therefore it is preferred by some

traditional artists in their transition to digital graphics. Multiple formats of preservation are possible, starting from the standard .PSD format, which keeps the entire project with all layers, transformations, and folders, and continuing with the widely known .JPEG (multiple versions), .PNG, .TIFF, to some types of studio "Pixar" and others. Through it can be created and exported animated pictures (GIF) and some video formats (MOV (QuickTime), AVI, MPEG-4, FLV ...). From version "CS5 Extended" further on, it has the ability to create 3D shapes protruding from 2D ones ("3D extrusion") such as text and even combine two or more images into one. Later versions (e.g. CS6 or CC) maintain a complete environment to work on pre-made 3D models - namely the creation of textures and animations for them. Generally, Adobe Photoshop is a very rich medium for image processing [8].

#### **IV. Building The User Interface**

After specifying the subject theme and in the presence of certain basic functions of the game, the interface can be created. The particular game has three main views: initial, a choice of levels and game view, and, also, it has two secondary views for recording the level and output controls.

**Initial view** - This is the view that a user sees at the start of the game and that provides the following buttons for interaction with the environment.

- "Start" button takes the user to the form of selecting levels.
- "Create" button takes the user to an alternative form of the game view, allowing him to establish his own level.
- Button "Controls" takes the user into a submenu leading out the controls of the game.
- Button "Exit" is to leave the application.

##### **View selection level.**

From this view, the user can select the level he wants to play and can choose between self-created or pre-set ones. The buttons available at this level are:

- A button to select the level. It loads the level selected and transfers the player to play form.
- Key "Back". Returns the player to the previous view.

**Game view.** This is the main view in which the game takes place. Depending on whether the player plays some level or creates their own, the following buttons are available.

- "Save" button calls up the supporting view to record levels. Also, this button is available only if the user creates levels.
- Button "Load". The button transfers the user to the view of selecting a level of where the user can select the desired level of charge. Just like the "Save" button, this button is only available when creating their own level.
- Button "Play / Pause". The button serves to start a level and also to stop it when needed.
- Button "Restart". The button reloads the level as it returns to the last change that is made.
- Key "Back". Depending on whether the user creates the game, or plays it, the button transfers the user to the initial view of the game or to the selection level.

**View of recording a level.** It is a small dialog where the user enters the desired name of the level created. The view has two buttons.

- Button "Save" is used for storing the level of the user in a file and to return the user to the game view.
- Key "Cancel". The button returns the user to the game view and does not store the level in a file.

**View controls.** A brief description of all keys that are used to manage the objects in the game. The main controls available in the game:

- Mouse - used to navigate menus in the game and allows moving objects in the game by pressing the left key on them.
- "A" and "D" - These keys make it possible to keep the objects in the game.
- "Delete" - the key allows deleting the selected object.
- "S" - serves to select, what pieces of the puzzle will miss when playing at the established level.

#### **V. Designing The Objects in the Game**

Before starting the actual implementation of the application, the game objects are created. The game provides ten objects that the user can control. The design of each can be divided down its main features and the craftsmanship of its appearance (textures). Each object has multiple textures, depending on the state in which it is: a standard one, a selected one, and at the wrong location.

**A ball.** This is the main object of the game that must be present at every level and that interacts with all the objects. The textures of the object can be seen in Fig. 1.



Fig.1. Textures of the ball

**A heavy cube.** It is a cube with a large mass used as a barrier or in combination with a catapult. The textures of the object can be seen in Fig. 2.



Fig.2 Textures of the cube

**Fixed platform.** It provides a way to move the ball. The object can be rotated 360 degrees. The textures of the object can be seen in Fig. 3.



Fig 3 Textures of the fixed platform

**Movable platform.** Acts as a barrier to the ball. The platform can be moved in any direction without restriction on the distance, including the rotation of 360 degrees. The textures of the object can be seen in Fig. 4.



Fig.4 Textures of the movable platform

**Lift.** Allows single movement of an object from one position to another. The textures of the object can be seen in Fig. 5.



Fig.5 Textures of a lift

**Spring.** Allows launching an object to a certain height. The object can be rotated 360 degrees. The textures of the object can be seen in Fig. 6.



Fig.6 Textures of a spring

**Teleport.** Allows teleporting certain objects in the game. Teleport consists of two components - the input and output that can switch roles. The object can be rotated 360 degrees. The textures of the object can be seen in Fig. 7.

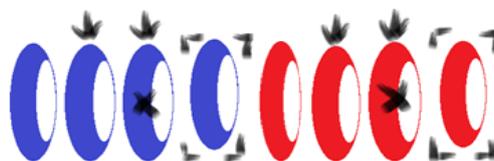


Fig.7 Textures of teleport

**Fan.** The object allows creating wind, which causes movement in some of the objects. The object can be switched on and off and rotate. The textures of the object can be seen in Fig. 8.

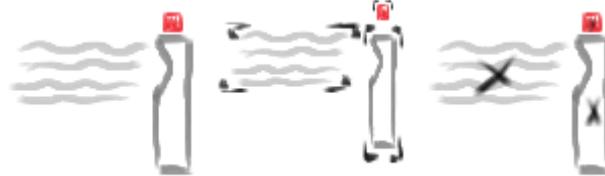


Fig.8 Textures of a fan

**Tile for dominoes.** The site is a small rectangular domino tile, used to create the eponymous domino effect. The object can be rotated 360 degrees and interacts with all the objects. The textures of the object can be seen in Fig. 9.

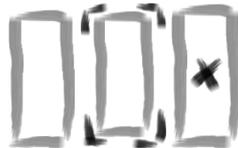


Fig. 9 Textures of a domino tile

**Pendulum.** The object is a cube hung on a rope to give further impetus to objects. The length of the rope can be resized. The textures of the object can be seen in Fig. 10.

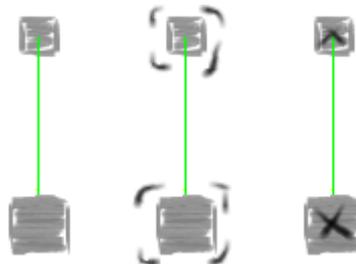


Fig 10. Textures of a pendulum

**Catapult.** The object allows launching another object of the principle of the lever and is typically used in combination with another object. The catapult can be rotated mirror like. The textures of the object can be seen in Fig. 11.



Fig.11 textures of a catapult

**Container.** The object serves to intercept the ball and is its ultimate target. Allows rotation of 360 degrees. The textures of the object can be seen in Fig. 12.



Fig.12 Textures of a container

## VI. Creating Auxiliary Views

All auxiliary views are created by the type of dialogue (Fig. 13 and Fig. 14) - the user cannot handle the application while the dialogue is open.

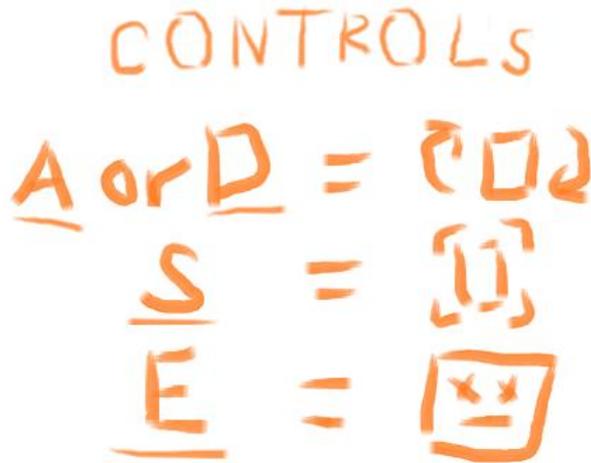


Fig.13 Aux. view of controls



Fig.14. Aux view of recording a file

## VII. Manual

When you start the game the user can choose either to create a new level or to play with the ready ones.

- Selecting a game.

The player is offered a choice of one of the already established levels (Figure 15), then it is generated and the game starts. The goal is the player to complete pre-built route so that the protagonist (the ball) could get from the beginning to the end position (object container). A limited number of the available objects should be used, which indirectly influences the direction of the ball. To finish the puzzles the user must create a platform (Fig. 16).

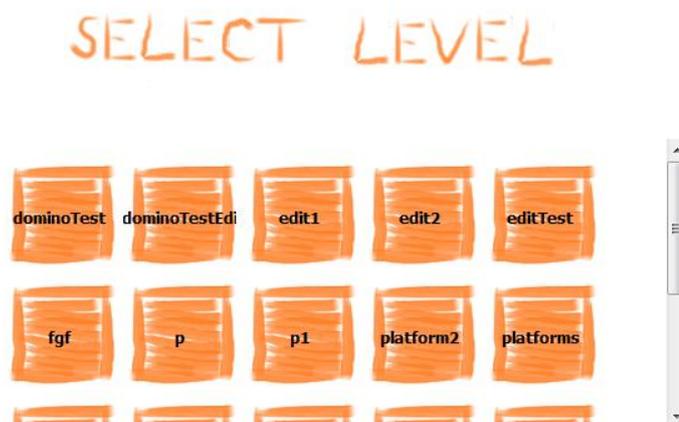
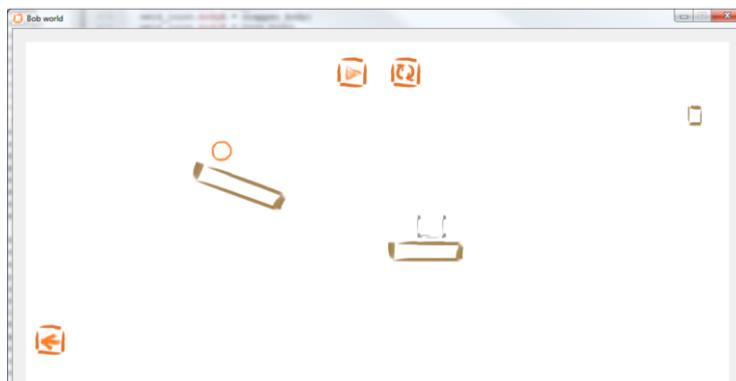


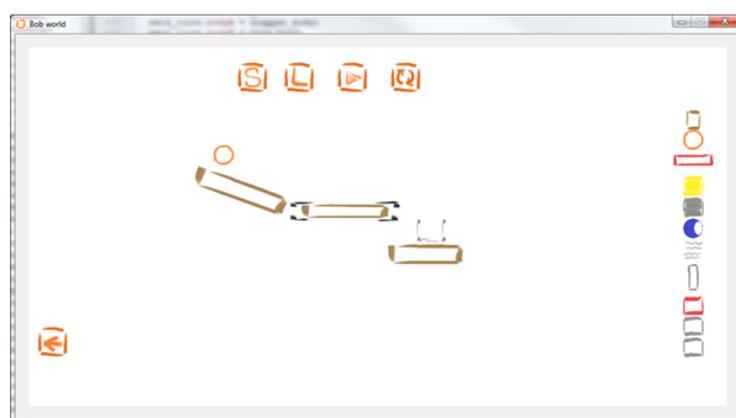
Fig.15. View of selecting a level

- Choosing how to create a level.

The player is provided an empty field, and all the available game objects. He can start building his own level or to edit some of the already established ones. As shown in Fig. 17, the constructed level consists of the basic element - the ball, and the final element -the container; deliberately, the level has one missing piece - a stationary platform.



**Fig.16.** View of the play in action



**Fig.17.** View of the play in creating a level mode

### **VIII. Conclusion**

The game is in the early stages of development with only its basic functionalities created so far. There have been tests on all its basic functions, with different resolutions and different machines. It has been trialed successfully while running in a configuration with more than one monitor. An increase in the number of objects is envisaged; sound, more levels, and an installer will be added.

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