Fly faster? Fly shorter!
Technical Manual

The module for the exhibition is composed of a program and two groups of panels to be printed on a suitable support. The program has been made as a standard web page in order to ensure high portability. In the following, you will find detailed instruction about how to use the program in your exhibition or at home as well as advanced instructions in order to configure its behaviour. At the end there is a brief description of the panels as well as some suggestions about the placement and the printing.

Index

Hardware requirements

Minimum:
- 2 GHz dual-core processor
- 2 GB RAM
- 3D class video card with 128MB of memory
- resolution at least 1024x768
- keyboard

Recommended:
- 2.5+ GHz dual-core processor
- 4+ GB RAM
- 3D class video card with 512MB of memory or higher
- resolution 1920x1080
- keyboard or gamepads

The software automatically adapt to the available resolution, however the best quality is ensured at 1920x1080.

Software requirements

- Google Chrome 59 or higher, Firefox 53 or higher, Opera 46 or higher
- Windows XP or higher, Mac OS X 10.6 or higher, Linux

The program has been made, and is optimized and tested on Google Chrome. The operative system makes no difference provided that it is compatible with Google Chrome. When using the program make sure the browser is in "fullscreen mode" by clicking F11.

To start the program just open with Google Chrome the page "index.html" in the root.

How to play

Before the game starts

After the calibration of the gamepad, which appears once when you first open the program, the main part of the code begins. In the first screen you can choose the number of player.

You have then to choose the map where to play the current match. You can choose between Equirectangular, Mercator, Azimuthal equidistant, Gall-Peters, Cubic fuller and Sinusoidal projection.

After this final choice, and a countdown of three seconds, the game begins.
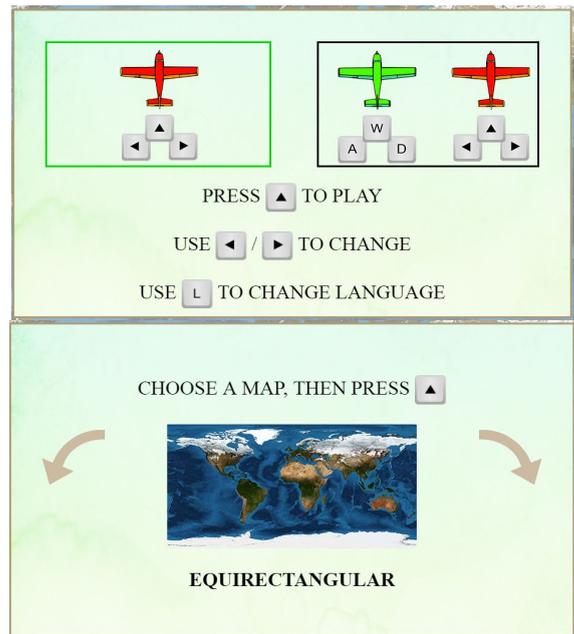
During the game
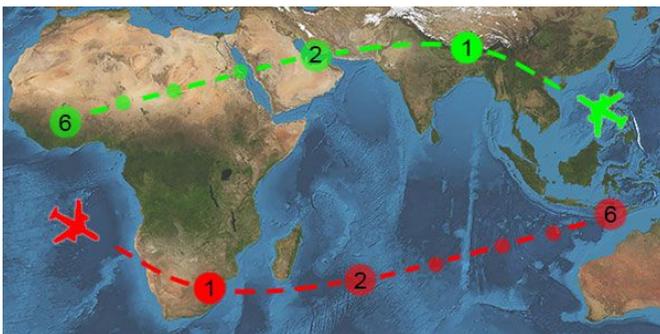
You are the pilot of an extremely fast plane which moves across the whole planet Earth. Such a plane moves with fixed velocity: you can't go faster or slower. In order to optimize your journey you shall choose the shorter routes: the geodesics!
Your aim is to pass through six checkpoints in the shortest - and so fastest - way.

In order to have time to plan your route, the game will automatically pause for three seconds after each checkpoint reached. The game ends when the itinerary is completed. The shorter the route, the better!
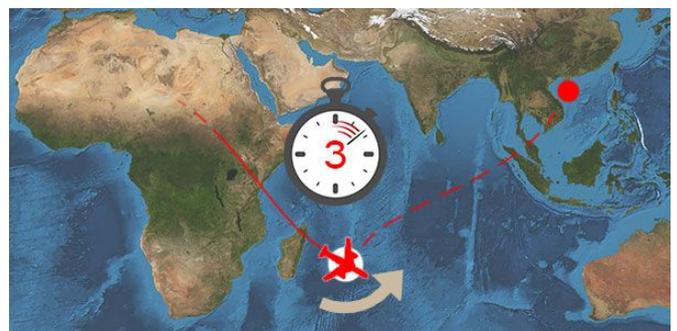
Some information and tricks
- The checkpoints are computed randomly, so your performance may vary from match to match. When you are in the 2-player mode, the different checkpoints are at the opposite side of the earth, so it is really a challenge to beat your friend
- The game begins with the plane already in the right route for the first checkpoint.

Keyboard-mode

The Keyboard mode is always enabled and allows up to two players to use the game, the first using the arrow keys and the second using "A" and "D" to turn. In the following a complete list of keys.
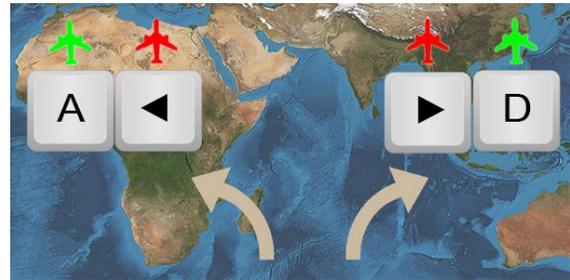
Left	Red plane turn left
Right	Red plane turn right
A	Green plane turn left
D	Green plane turn right
L	Change language, cycling between all the possible languages
G	Show and hide grid of meridians and parallels
V	Show tangent and normal vector instead of the planes
O	Reset the current game
P	Reset the game and enable colorblind mode-high contrast mode. The planes are substituted by two arrows with different shapes.

Advanced configuration: gamepad-mode

The game can be played also by using gamepads. This has been tested on "Xtreme force shock pad" and similar gamepads, but it should be compatible with all the gamepad supported by the Gamepad API. In particular if your gamepad is recognized by http://html5gamepad.com/, then it should work (up to remapping the buttons as explained in this section). Unfortunately such API is still inconsistent across browsers and OSes, for this reason the gamepad support is still in beta for the game.

How to enable the gamepad-mode

This can be done by modifying the config.js file in the "gamepad configuration" section. Here we go through the four possible options

- **Usegamepad**
  By setting Usegamepad=1; in the code, you enable the gamepad support. This means that the game will start with the recognition and calibration procedure and the graphic will use the gamepad logo instead of the keys. The keyboard is always enabled.

- **Id_axis**
  This identify the number of the axis used for turning. In order to find it you may use http://html5gamepad.com/, plugging in the gamepad, turning and putting the same number in the code.

- **GamepadButtonList**
  In order to improve the compatibility with different gamepads, and to allow you to change configuration you can select in this array the code of the button used for all the function of the game, always referring to http://html5gamepad.com/. The list of 5 numbers correspond to the functions
  [Show and hide grid, Show vectors instead of planes, Return, Reset game, Change language, Switch to colorblind mode].

- **GamepadVendor**
  It may happen that other peripherals are recognized as gamepad. In order to make the program list only for the gamepad you want to use you can put the Vendor ID in this variable. This can be found in http://html5gamepad.com/. Putting the number -1 disable this feature.

How to make the browser recognize the gamepad

Unfortunately this strongly depends on your OS and Browser, together with the type of gamepad you are using. Plugging in the gamepads and opening chrome should do the trick.

Why isn't my gamepad showing up? Some things to check:
- Is the device plugged in / connected via bluetooth?
- Press some buttons. On some devices, only certain buttons will wake up the gamepad API (the shapes on PS3 controllers, for instance)
- Close other apps that may be using the gamepad
- Check that the variable "Usegamepad" is set to 1 in the file "gamepad.js"
- Restart your web browser

In-game configuration

- **Step 1 - check**. When gamepad support is enabled, the first screen of the game can be used as a check that your gamepads are recognized. Press one of the buttons on the list until you see the text "Enabled" under both sides, then turn right with both the gamepads at the same time to go to step 2.

- **Step 2 - calibration**. On some old gamepads a calibration could be necessary. The only important thing to do in this step is not to turn with the gamepads. After three second the calibration is completed and the game will start.

Other advanced configuration

config.js file

In this file it is possible to set some configuration of the program.

- **ShowInstructions=1;**
  By setting this variable to 1, his enables the short tutorial which is shown at the beginning of each game.

- **FixedZoom=-1;**
  This allows to select a fixed zoom for the viewport of the program. "1" corresponds to 1920x1080, and any other number is just a multiplier for this viewport. "-1" enables the auto-resize of the viewport, to fit the screen of the viewer.

- **PlaneMode=0;**
  0 will show planes in the game, while 1 will show vectors. It is possible to change this setting by using the keyboard or the buttons on the pads.

- **Language=2;**
  This allows to set the default language in which the program will start.
  1 is English, 2 is Italian, 3 is French and 4 is Esperanto.

- **HighContrast=0;**
  This mode uses high-contrast planes and is designed for colorblind users. The planes are substituted by two different type of arrows.

- **LengthPath=6;**
  This allows you to change the number of checkpoints.

- **LowRes=0;**
  By setting this variable to 1, it allows you to enable the low resolution mode

- **SensTurn=1.2;**
  Sensibility of the steering of the plane (for both keyboard and gamepad). Higher is more sensible.

language.js file

In this file it is possible to easily add new languages to the program.

- **window.MapNames**
  This array contains the names of the map projections.

- **window.TranslateText**
  This array contains the short sentences appearing during tutorial.

- **window.Flags**
  This array contains URIs for the flag files appearing at the top right corner of the screen.

Panels and texts

There are two groups of texts that have been prepared in order to enhance the experience of the program.

The first group is a single panel (which has been prepared in two versions: in English and in Italian) which briefly explains why cartography and maths are related and which explains, in very simple terms, why we need more than one chart instead of only one. We suggest to print this poster in A3 format on a forex support of at least 3mm thickness.

The second group of texts is composed of a main panel which explains the main features and rules of the game and six other texts, each one related to one of the charts on which it is possible to play. In these panels is presented a brief description of each chart as well as what can be understood about the mathematical properties of the chart by simply playing the game.

We suggest to print the main panel of this group as well as the others in A4 format on forex support with at least 3mm thickness. All these panels have been prepared for printing in two versions: in English and in Italian.

We think that a good placement for the panels is as follows.
- Put the A3 panel on the right of the monitor on which the game is played.
- On the left of the monitor, put the main panel in the middle and the others around.

All the sources are included in the files uploaded: we have not prepared a version for other languages but, as soon as one translate the texts, it is really easy to change the source and to produce a new version of the panels.