

## DISPLAY OF A THREE-DIMENSIONAL VIRTUAL SPACE GENERATED BY AN ELECTRONIC SIMULATION SYSTEM

Main Technological Area → Simulation

Keyword → Simulation | Camera | Scenery | POV | 3D | Pan | Tilt

The invention relates to an electronic system that allows the operator to control in a simple, fast and intuitive way the movement of a virtual video camera in a three-dimensional space and reproduction of its field of view in a simulation environment.

### TECHNICAL SPECIFICATIONS

During a training session on a simulator based on 3D models it may be necessary, from the instructor side, to display on the screen the scenario captured by a virtual camera, placed at any point within the simulated three-dimensional space. The simulation system allows the instructor the roto-translation of this virtual camera during the training session execution by mean of simple operations with a pointing device (e.g. mouse, trackball).

An example of functionality of the simulation system described in the invention is given in the following Figure 1.

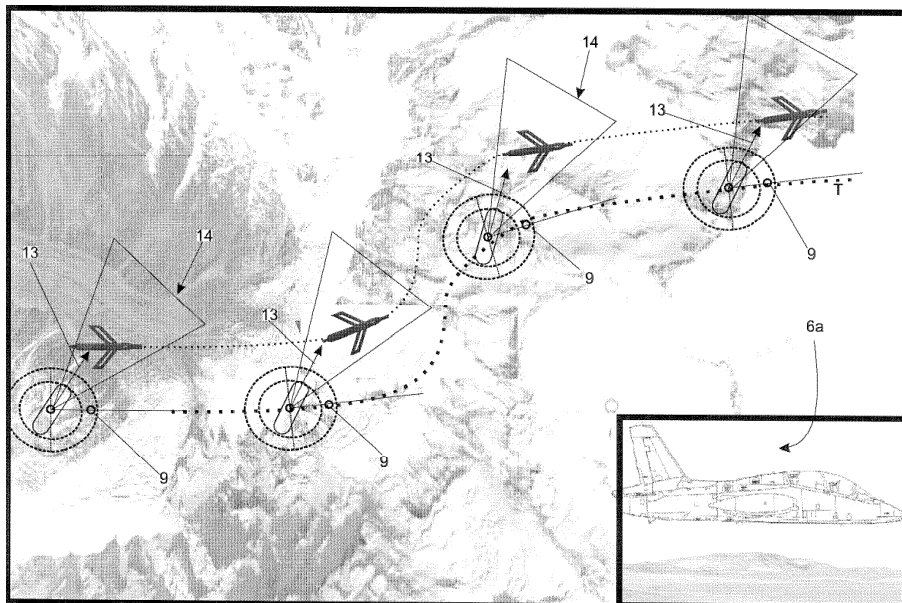


Figure 1 – Example of dragging in the imaginary plane of displacement

In the main part of the image are shown, respectively, the operational scenario on which the instructor displaced an aircraft, the relative position of the camera with respect to the aircraft (represented in the figure with a circle and a pointing direction indicator) and the motion track of the aircraft itself within the scenario. At the bottom right there is a box, generated by the simulator described in the patent, which represents the scene as it would be taken by the camera.

The novelty element introduced in the patent is a feature that allows the instructor to move, during the execution of the training session, the field of view of the video camera as a consequence of a roto-translation of the video camera implemented by simple movements of the pointing device. In correspondence with this camera movement, the system automatically determines the relative position of the camera with respect to the aircraft and consequently rebuilds the 3D scenario based on the new "virtual" position of the camera itself.

INNOVATION/ADVANTAGES

- The system enables an operator, such as for example a flight instructor, to impart on the virtual video camera a roto-translation through a simple and single operation of translation of the pointer on the display.
- The roto-translation can either be planned before the training session (as already made available from other simulation environments), or in the course of simulation (novelty introduced by this patent).

FIELDS OF APPLICATION

<b>Simulation</b>	Videogames: interactive scenarios Scenario simulation for driving courses Virtual reality aid in remote control of drones
<b>Geographic Information System</b>	Applicability to 3D scenario generation using GIS data
<b>Architecture, urbanistic</b>	Complex architectural projects: 3D simulation and real-time modification of virtual camera point of view Complex urban projects: simulation of traffic conditions, movement of vehicles and people within an area.

PATENT INFORMATION

**Priority Date** - 30/01/2009

**Priority Code** – IT TO2009A000058

**IPC Codes** - G06F 3/0481 | G06F 3/048

**Active worldwide applications**

EPO - EP2214092; **filing date:** 29/01/2010; **grant date:** 22/11/2017  
National Extensions: Italy – Germany – United Kingdom

Canada - CA2691320; **filing date:** 29/01/2010; **grant date:** 19/06/2018

USA - US8780105; **filing date:** 29/01/2010; **grant date:** 15/07/2014

ISRAELE - IL203629; **filing date:** 29/01/2010; **grant date:** 15/07/2014

**Leonardo internal code**

LDO-0299