

Mr. Planet

Software of augmented reality



Planet project

Augmented Collaborative Plataform

for content distribution and advanced training



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User Manual

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1. Introduction

For understand this document, we will explain the basic concepts used to develop this application. Firstly, we will detail the several possibilities that exist between the real world to virtual world, and what technology is used to work with virtual elements.

A virtual work is a three-dimensional environment generated by a computer, this world is named “virtual reality”. We have different manners for live a virtual world depend of that as much immersive is this system. An immersive application is a system to permit at user to submerge in a three-dimensional world using gadgets like a 3D glasses or motion sensors in different parts of body. Other form to visualize this world is by means of screen of television or computer. We differentiated the built of virtual world according to the presence of the real world elements:



In augmented reality few virtual elements are integrated in real world, to make this effect we proposed to capture a sequence of video in real-time by means of camera connected to the computer, this application recognized a group of images that permit to system place virtual models and convert the sequence of video visualized by user in an authentic augmented reality world.

Mr.Planet is augmented reality software with a simple interface for users. The user is able to link 3D models with his favourite CAD editor (AutoCad, 3D Studio Max,...) with a great variety of Augmented Reality (AR) patterns. This tool allows to modify the scale, to rotate the model and to translate it in relation to the pattern with a simple menu of options. In addition, these models also can contain animations that will be able to reproduce from the application.

2. Installation

The Mr.Planet installer are available in <http://planet.urv.es/planetrv>, you can install this software in any path, the installation generate a folder that contains Mr.Planet viewer and console, also we will see the folders “examples” and “patterns” that we will use later.

3. Mr.Planet viewer

You can execute Mr.Planet viewer from the menu of programs, where you have a shortcut called “Mr. Planet v2.0”, this shortcut will open a configuration panel and later it will execute script of configuration explained in the previous section.

3.1 Ogre's configuration panel

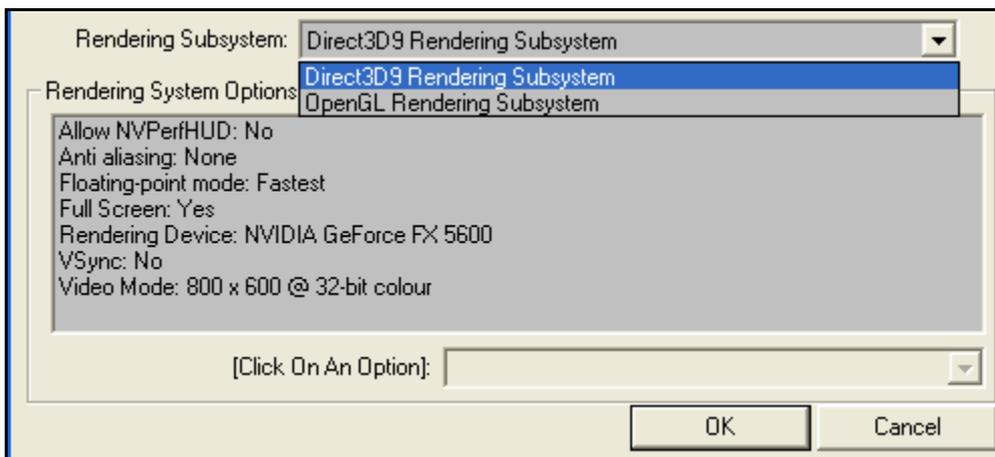


Figure 1. Ogre's configuration panel

This first panel allows to configure the visualization options about the viewer. For beginning we should select a render subsystem, in this version you can choose Direct3D or OpenGL subsystems, then will appear a parameters list that you can change clicking one and change the value on drop-down list.

We advised change two parameters to work correctly. Firstly, if you want work with console, you need change “Full Screen” parameter to “No” and then you can select a size of window in “Video Mode” parameter that depends of your screen resolution. Note that you can pulse “d” to hide the debug information in viewer.

4. Console



Figure 2. Console

For manage the 3D models generated from graphical design applications, we use a console that allow to load this kind of resource, this resource is linked to a pattern, the image captured by camera, using it like a origin of coordinates to paint resource. When you have created this connection you can translate, rotate, scale and play the animations of your model. The console in addition allows load and save your project by means of a compressed file (ZIP format), with it you can regenerate the entire scene in any machine (whenever we have available a camera and the patterns that the viewer will recognize).

4.1 Import a resource

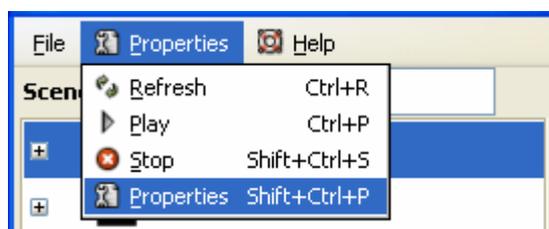


Figure 4. Menu of properties

To create a new resource you should select in the last option of “Properties” menu, also you can access to this panel with the keys [Shift + Control + P].

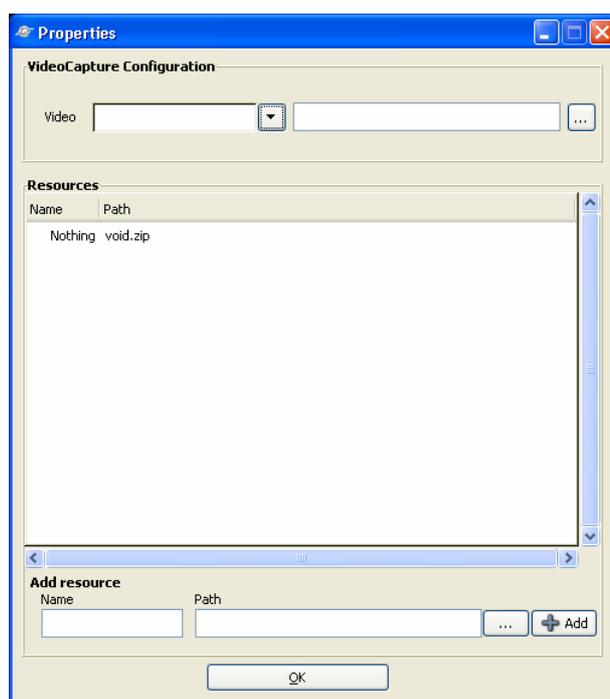


Figure 5. Window of properties

To import a resource you should assign a name to resource and find the zip file to get his path, if all as well your resource was imported to the list of resources clicking the button [+Add].

4.2 Create a resource

Un recurso es todo aquello que puede enlazarse a un patrón, normalmente se trata de un modelo 3D creado por una aplicación de diseño gráfico, por ejemplo ficheros 3DS de 3D Studio Max, pero existen otros tipos de recursos que Mr.Planet permite importar como son las luces que afectan a toda la escena, cualquier tipo de fichero que su sistema operativo pueda ejecutar por defecto y enlaces a páginas Web.

Dependiendo del tipo de recurso, Mr.Planet tiene asociadas distintas opciones como por ejemplo mover, rotar y escalar un modelo 3D, reproducir una animación, abrir un enlace a página web, etc.

4.2.1 Create a MESH type resource

A resource of mesh type can be obtained by means of plugins offered from the OGRE web (www.ogre3d.org) in the link of “Downloads/Tools”. For example the plugin “[3D Studio Max Mesh & Animation Exporter v1.2.2](#)” is a good option, for more information about this format you can read a manual that is included with plugin. When you have all files generated by graphical design application, you should compress these in zip format, since it is the type supported by Mr.Planet

4.2.2 Create an OSM type resource

For generate complete scenes with a several 3D models, lights, textures and animations the option that we recommended is the OFusion plugin (www.ofusiontechnologies.com) that, when you install it in 3D Studio Max, it allows to export a complete scene of OSM type from File Menu of 3DSMAX, all generated files by the exporter should be compressed in a ZIP file, then you can load this kind of resource, is important that you included inside file all textures used by scene.

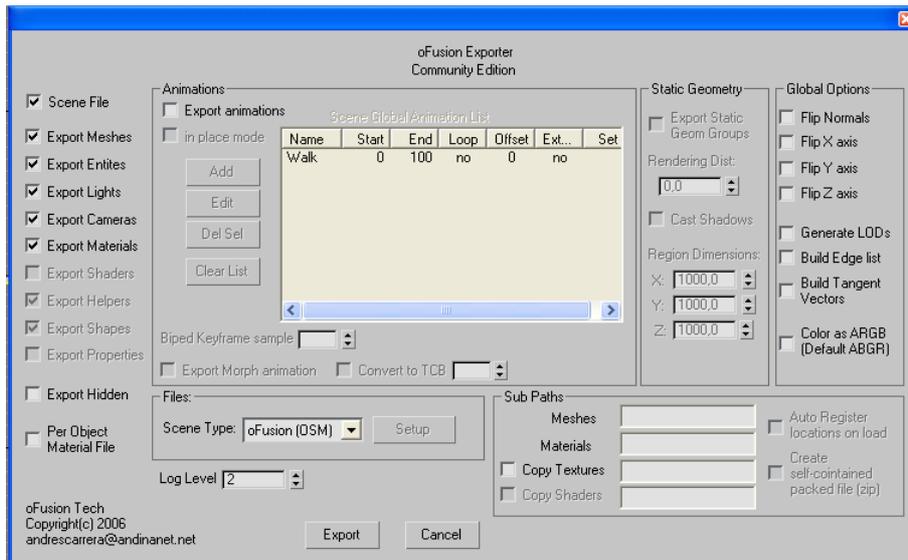


Figure 6. OFusion exporter for 3D Studio Max

The exporter allows you to export who you want of the scene, in this version Mr.Planet support the 3D models with textures and animations, also illumination implicit to scene.

4.2.3 Create an others files type resource

A resource of this type can contained anything that the operating system runs, so we can include, inside a zip file, text files, spreadsheet files, presentations, PDF files, etc. This type of resource will link with a “File Resource”, selecting the file that you want to activate.



4.3 Create an ARPattern

The ARPattern is the controller of a concrete pattern (a predefined image) state in the captured sequence of video, this pattern will be situated in the position and orientation respect to camera, and each pattern have a set of resources linked to it, then the resources situate his origin in the centre of pattern, it permits generate a virtual image integrated in real world correctly.

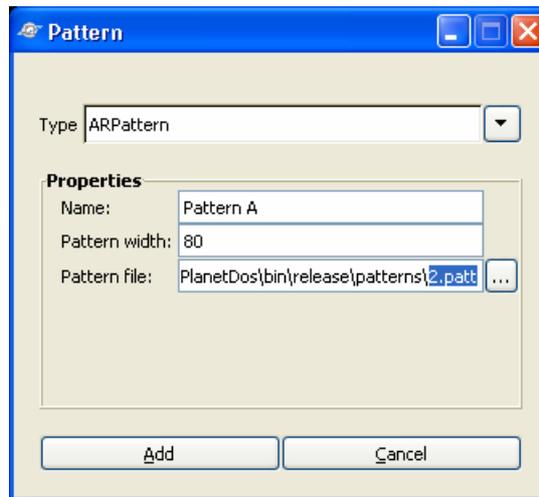


Figure 7. Panel to create new patterns

When you create a ARPattern is necessary to select one of patterns available in Mr.Planet “/<directory_MrPlanet>/patterns/*.patt” and define the size in millimetres of the pattern, since the image of the pattern can be printed in any size. The images of patterns are available in the annex of this user manual.

4.4 Link a resource

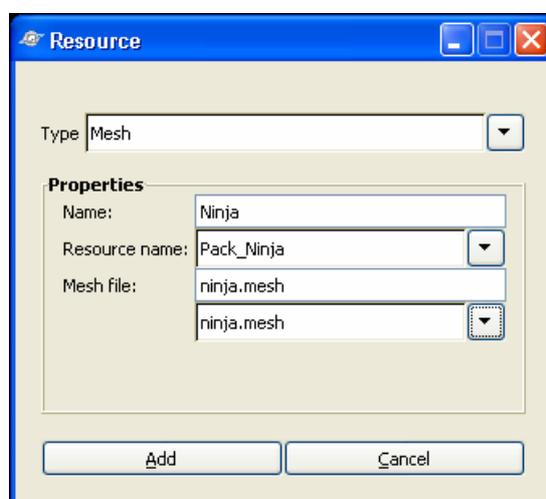


Figure 8. Panel to create new linked resources

Each resource contain a 3D models painted in scene, it situate his 3d models to the position and orientation specified by his pattern. For create a new resource you should to select the tracker to which it will belong, next you can choose a type of resource for example “Mesh”, all resources have an attribute named “resource name” where you choose one resource of all added in properties panel and you will select a mesh file that you want paint (Web and Light types don’t need to select any file).

4.4.1 Resource's types

The available resources in this version are detailed next with a screenshot of each scene that contain the type actor:

Mesh

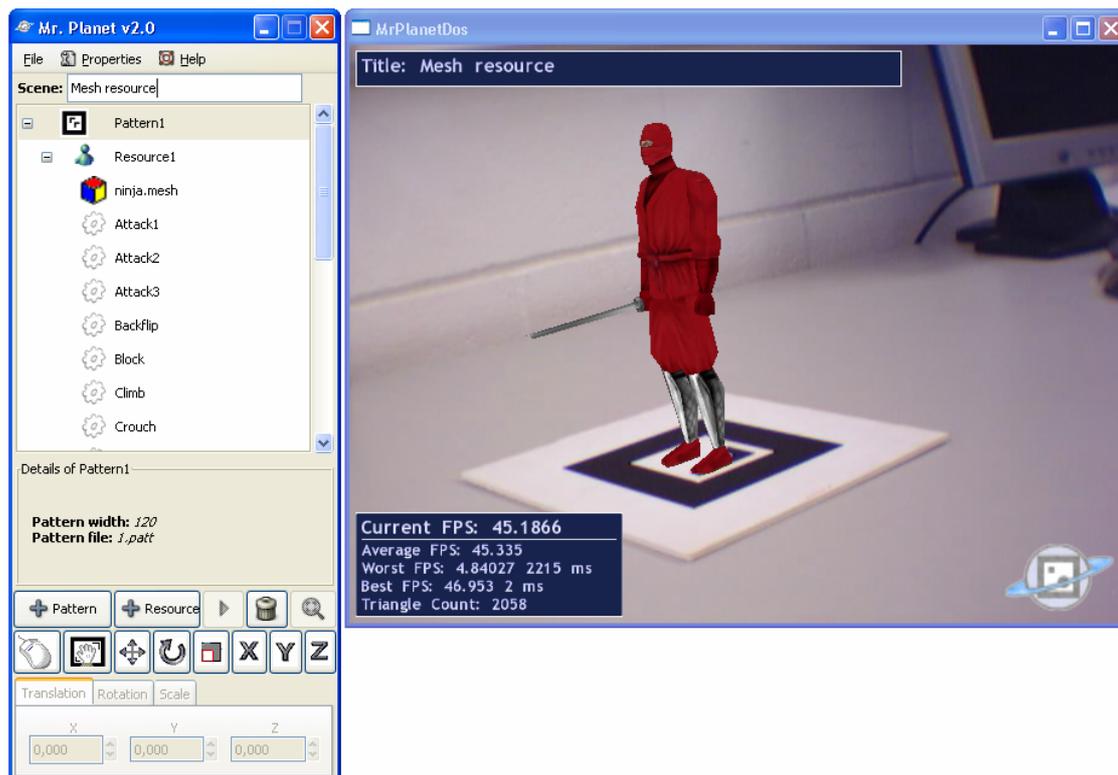


Figure 9. Scene of Mesh Resource

You can see that a resource of mesh type only have a mesh with texture, but this mesh also can to contain animations linked to it. In the bottom panel of console appears the mesh file linked to resource.

Scene

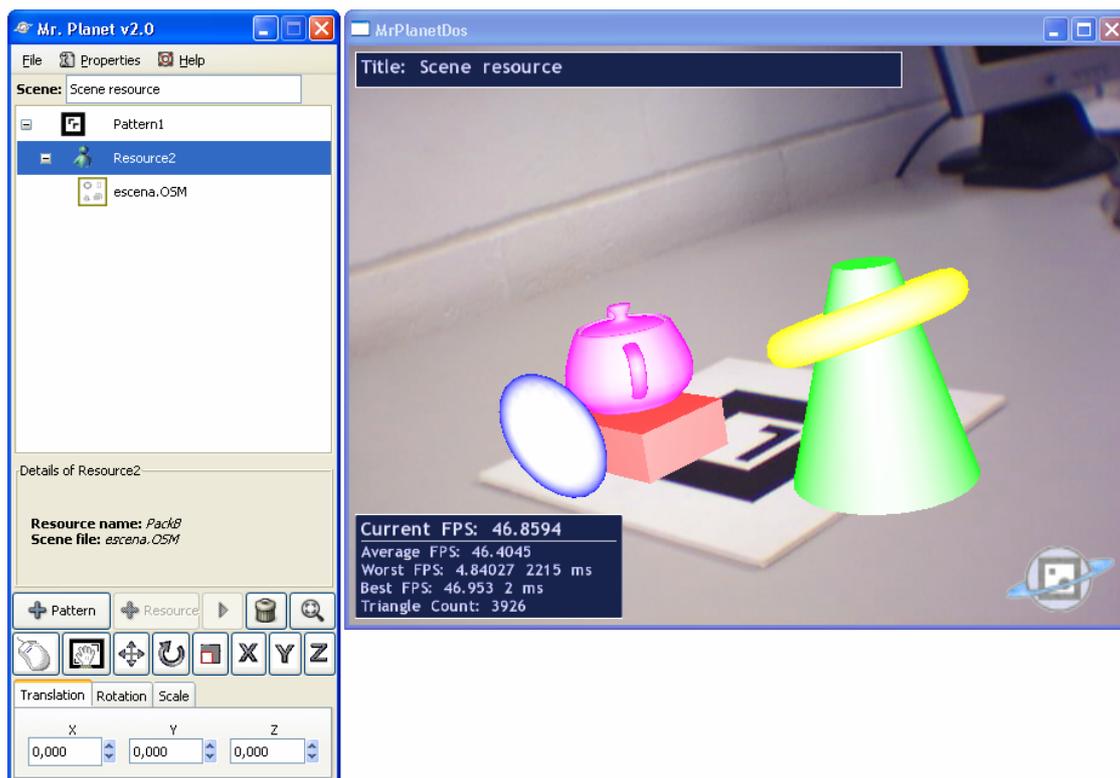


Figure 10. Scene of Scene Resource

The resource can contain a group of meshes with textures, lights and animations linked to set of meshes. This type of resource is suitable for imports from projects in CAD applications. Note that all meshes of Scene Resource depend of the same pattern, if we want to have several meshes in a scene that depend of different patterns, you can create a new resource by each set of meshes.

Light

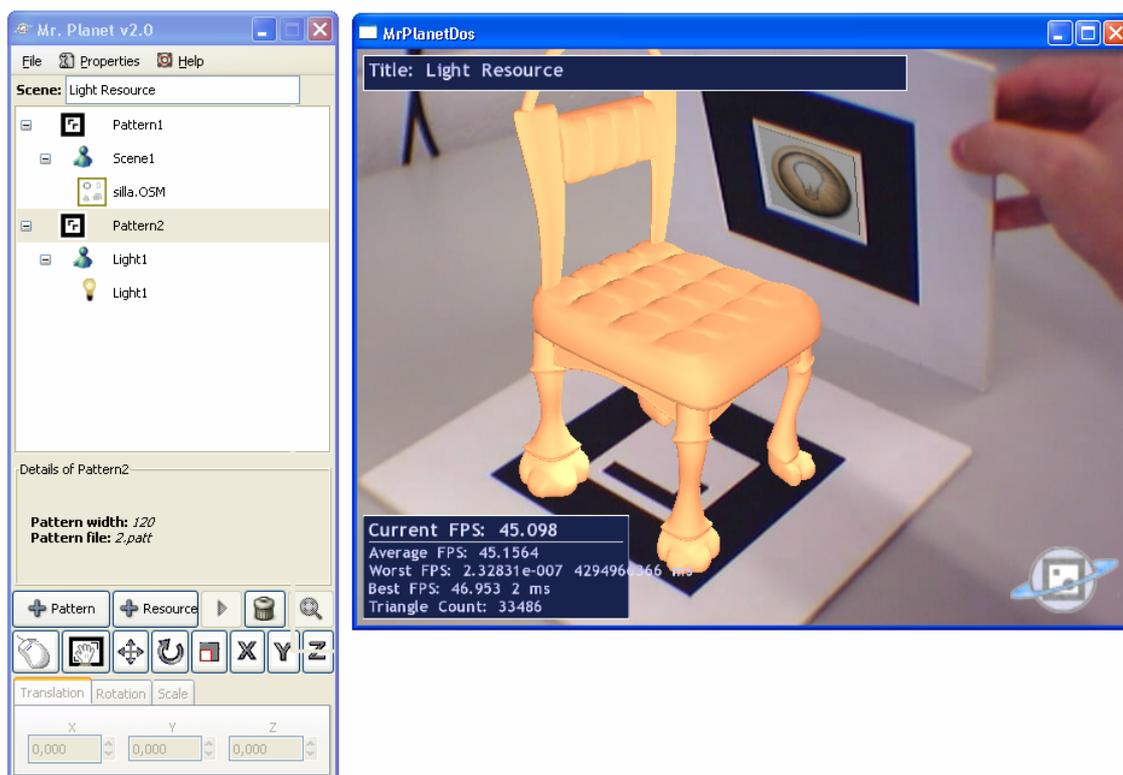


Figure 11. Scene of Light Resource

A resource of light type allows to illuminate with different form all models that coexist in the project, if you move the pattern linked to resource, the light in others models also change. If the pattern isn't visible, the light will be deactivate automatically.

File

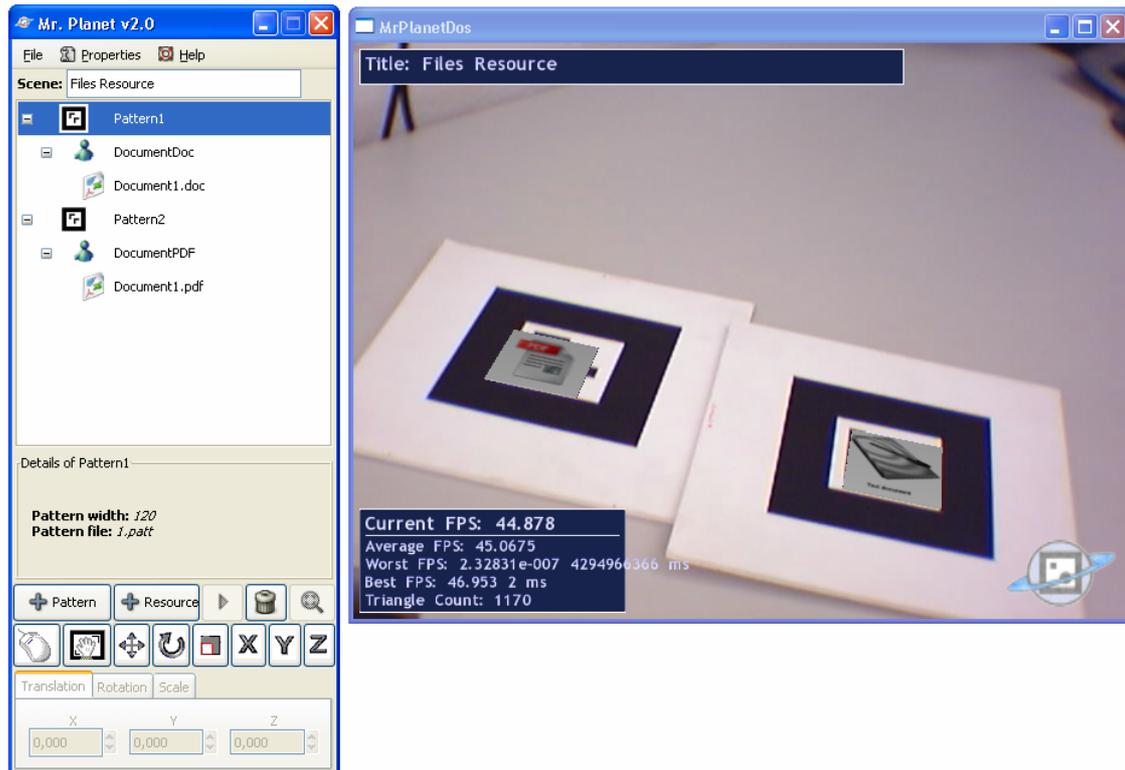


Figure 12. Scene of File Resource

This resource is used like a shortcut of any type files added inside a resource container, so for example we can link an actor with a PDF file that it shows information about the 3d model that we are visualizing. For open a file click “play” button of console, or pulse right button of your mouse when you have the resource selected (with left button of mouse).

Web

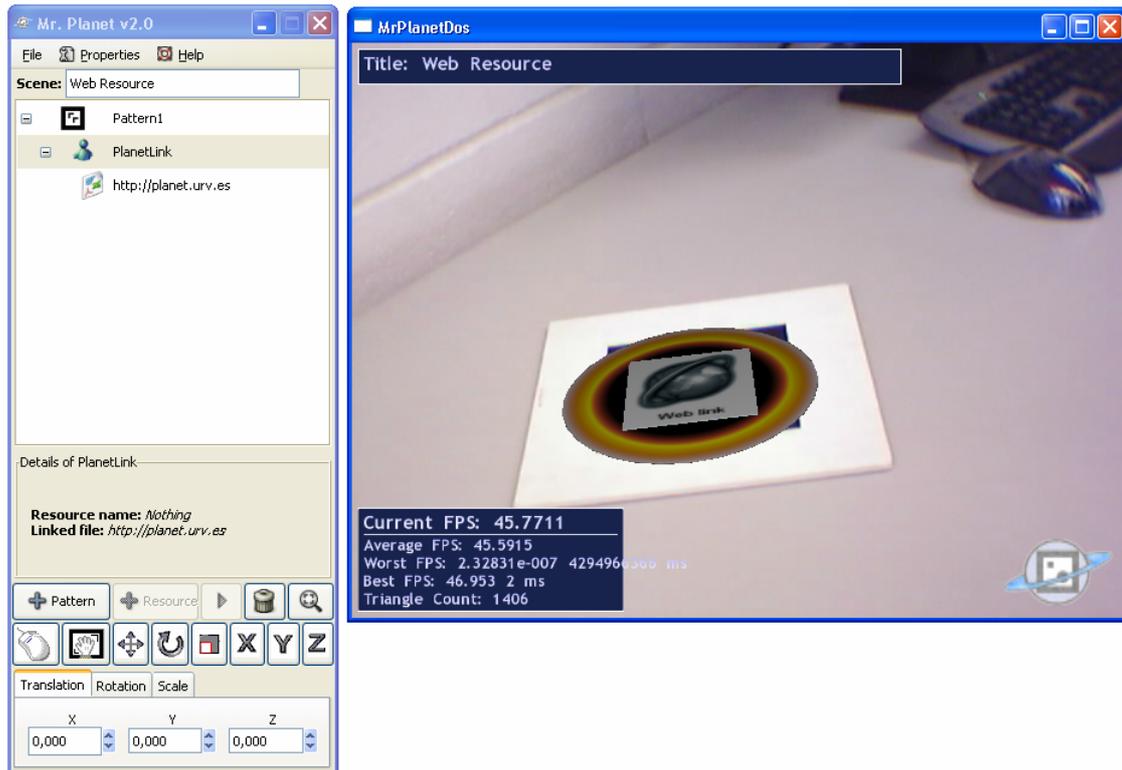


Figure 13. Scene of Web Resource

The same manner that a resource of file type, this resource allows to open a web page that contains relevant information to the project created.

4.5 Options of resource

The resource's options are available just below list of entities of the scene:

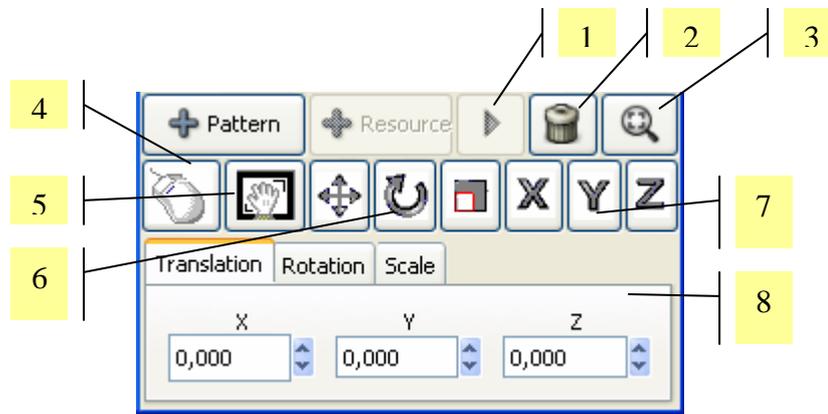


Figure 14. Interaction options from console

1. Play/Pause:

When you select any animation this button appear activated, it allows to reproduce the animation or pause it at any moment.

2. Remove Pattern/Resource:

Button that removes the pattern or resource selected in the list of elements in the scene.

3. Viewports:

If you want to view the selected actor from different view points, this button create views in the same manner of CAD applications (Top, Left and Front).

4. Enabled mouse:

For select a resource using mouse or put a transformation on it, you should have mouse enabled. When you clicking in this button a message appear in the Mr.Planet viewer, the message of confirmation is "Mouse Enabled".

5. Active hand-interaction:

This button enabled a new kind of interaction using your hand, when you put your hand on the pattern this disappear, if you hide de pattern in a period between 1-5 seconds, the linked resource activate his animation.

6. Transformations using mouse:

These transformations permit to modify the mesh resource (move, rotate and scale) using mouse, you only need one click on the 3D model and drag cursor to the wished position.

7. Axis of active transformation:

When you modify resource, if you select an axis for work on the mesh is easier.

8. Transformations using console:

When you want an exact transformation on your 3d model, this panel disposes the same options used to transformation by mouse, but you can specify the values that define each axis in three text boxes.

4.6 Save project

Finally, when you have designed your entire Augmented Reality Scene you can save the project in unique zip format file, so you can reload the scene in other moment or reload it on other machine. The zip file contains all resources used in scene, pattern files, all needed to rebuild the project that was save.

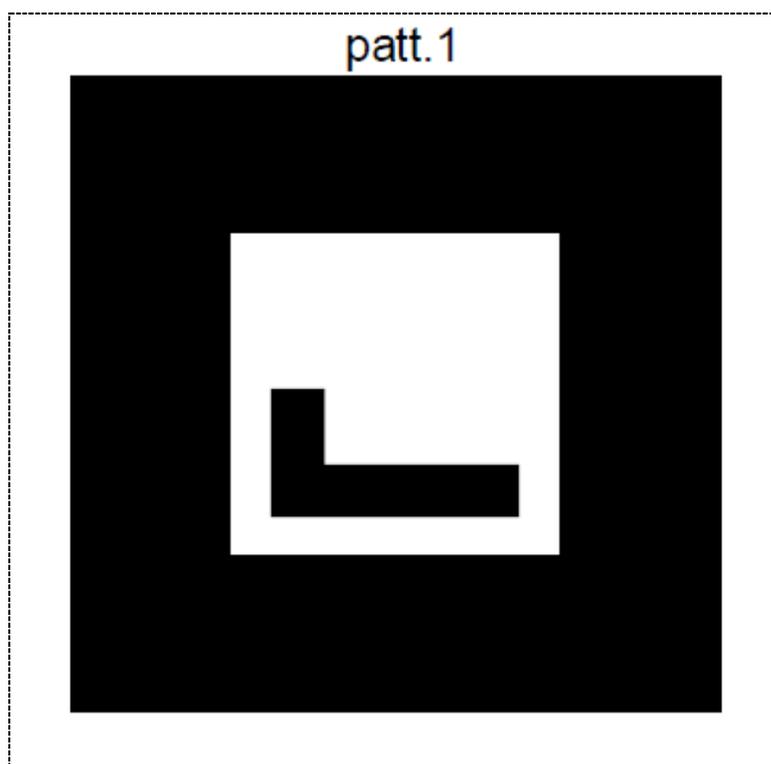
4.7 Load project

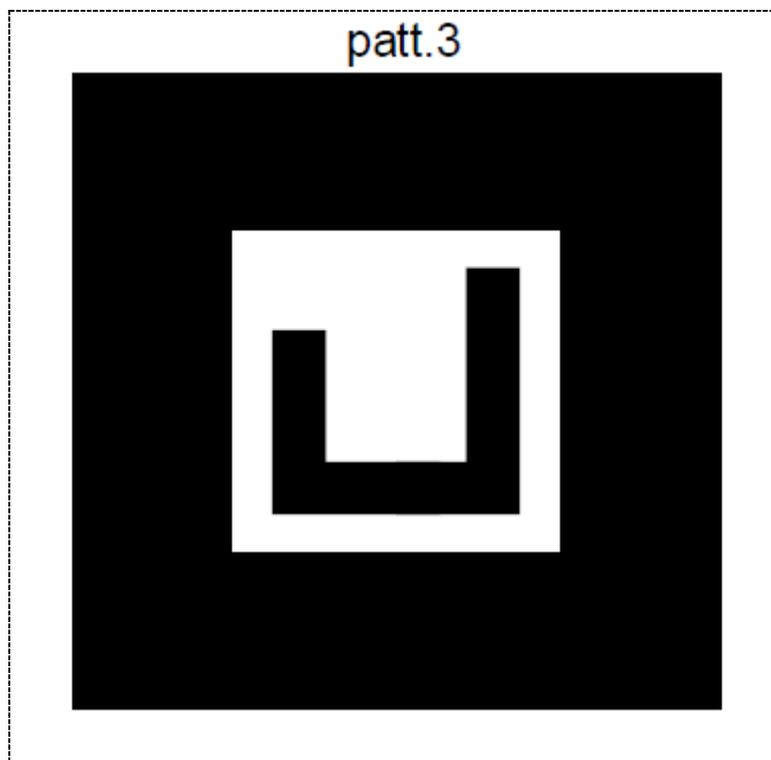
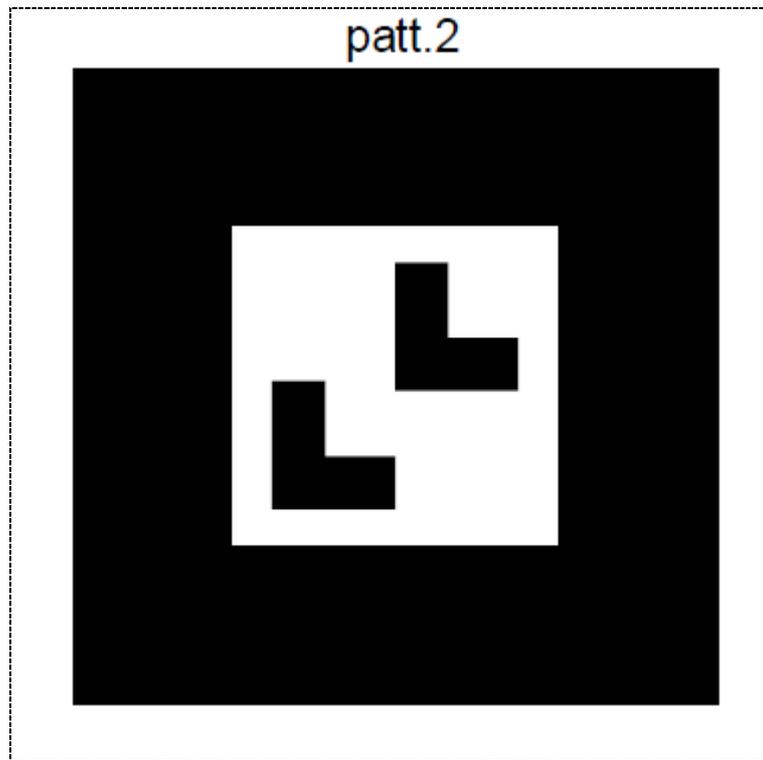
To load you will select the zip file that contain all necessary to reconstruct this project, we advise that the project load task will be realised immediately after the application was initialized.

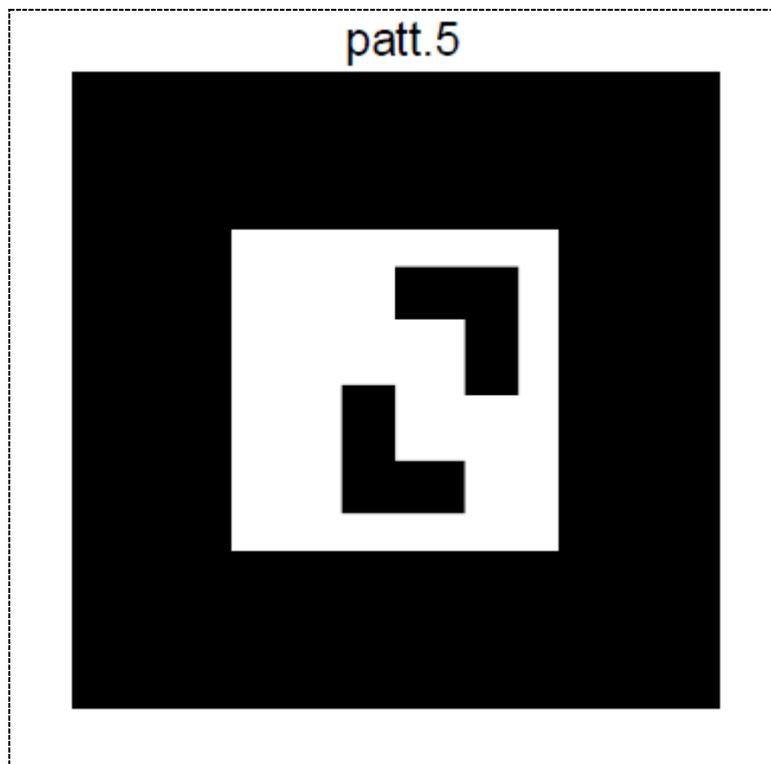
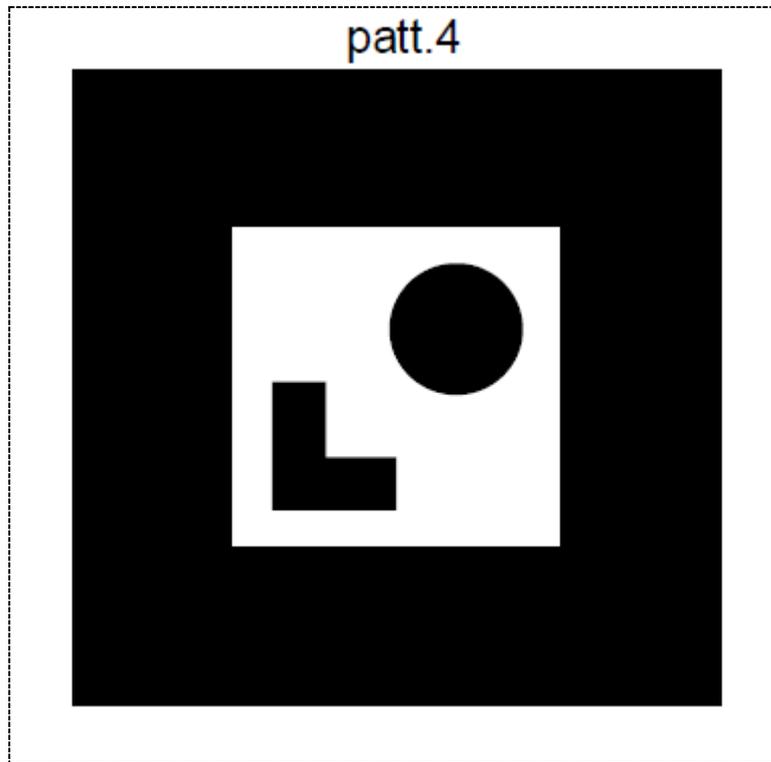
ANNEX

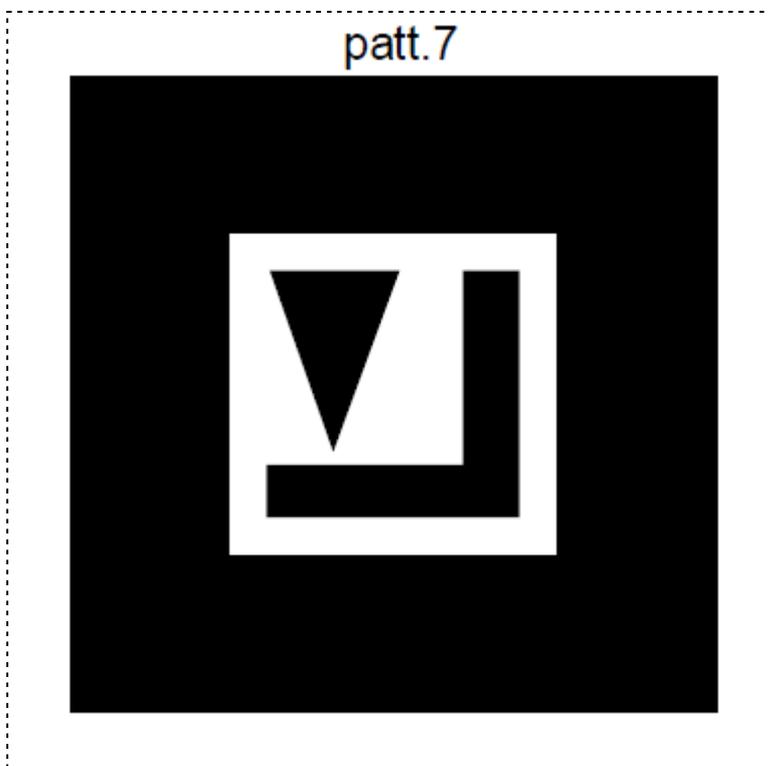
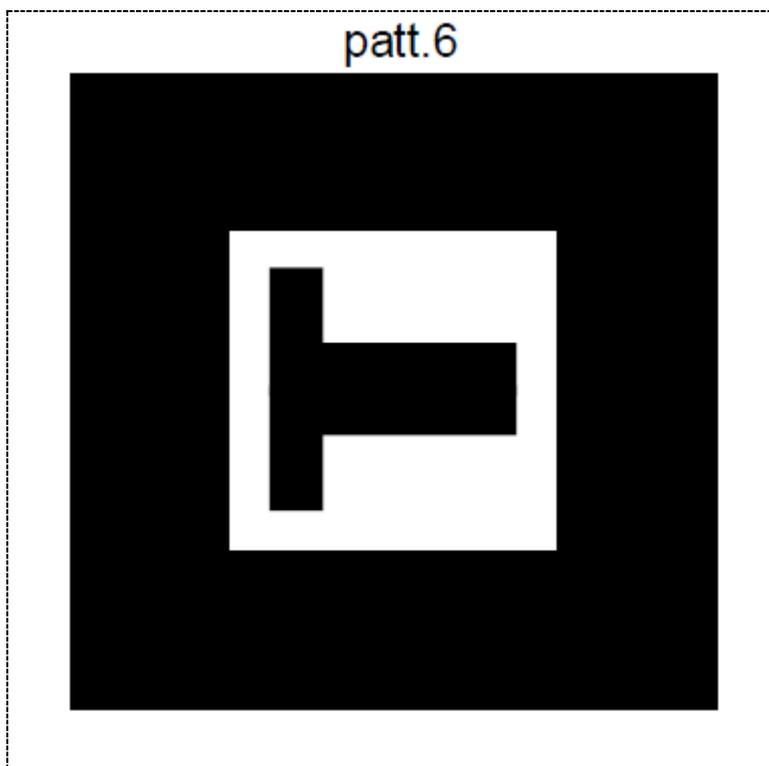
Patterns

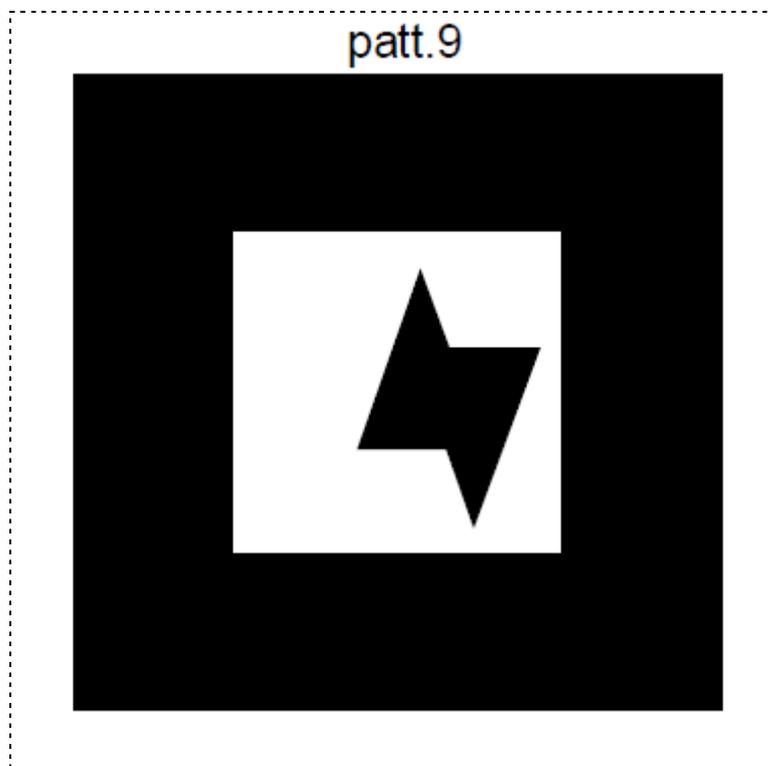
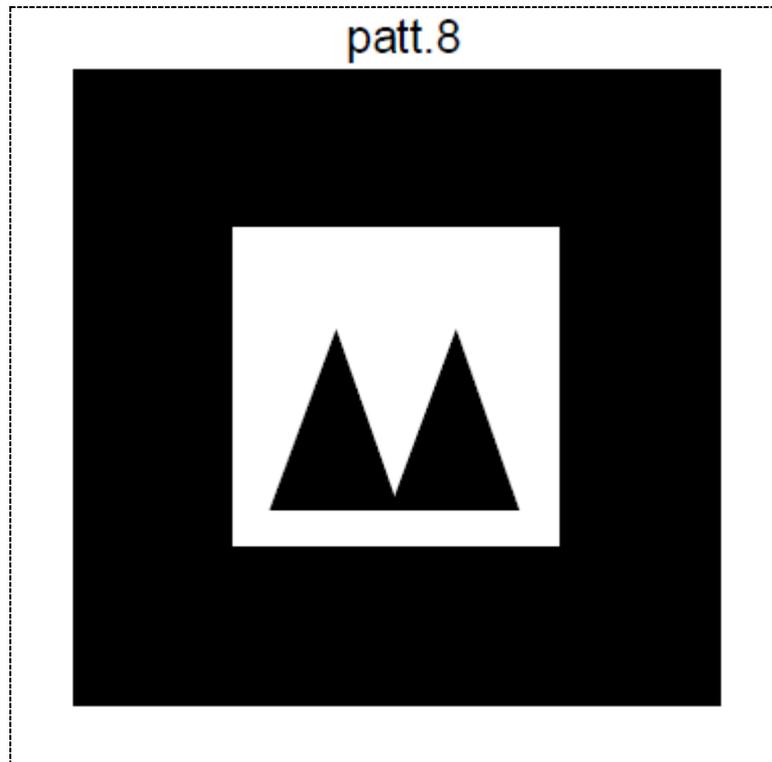
These images are recognized in Mr.Planet by means of files attached inside “patterns” folder, when a you create a pattern is important you specify the size of printed pattern.



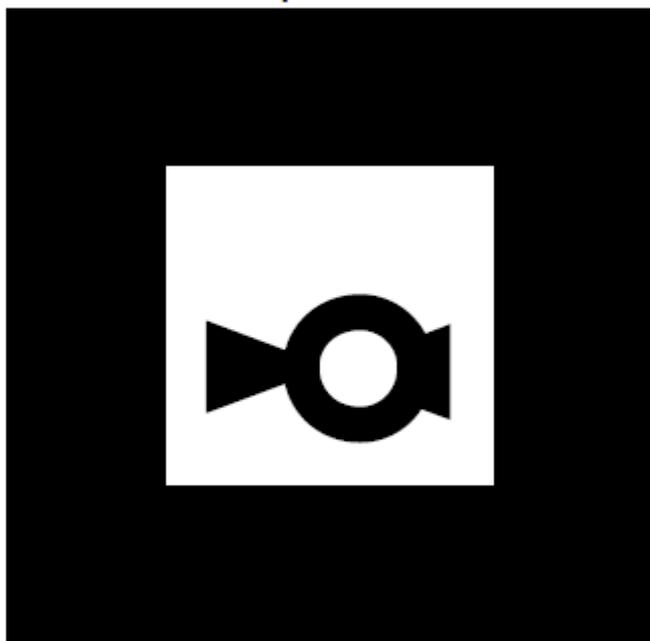




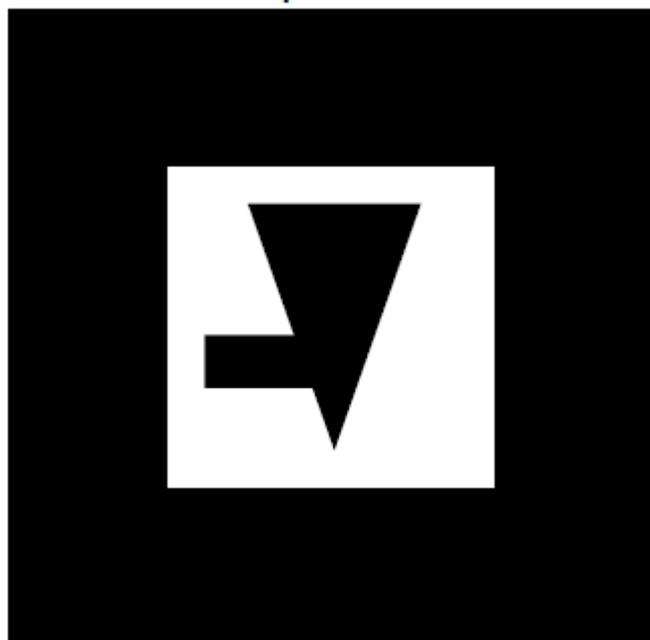




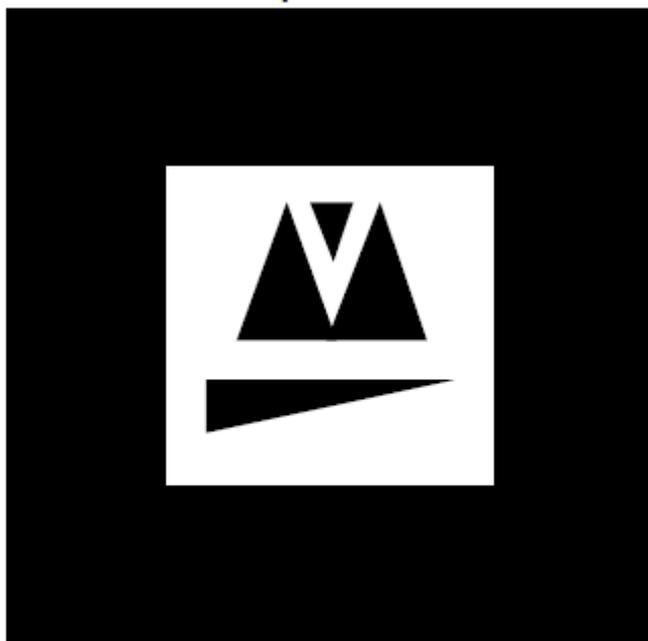
patt.10



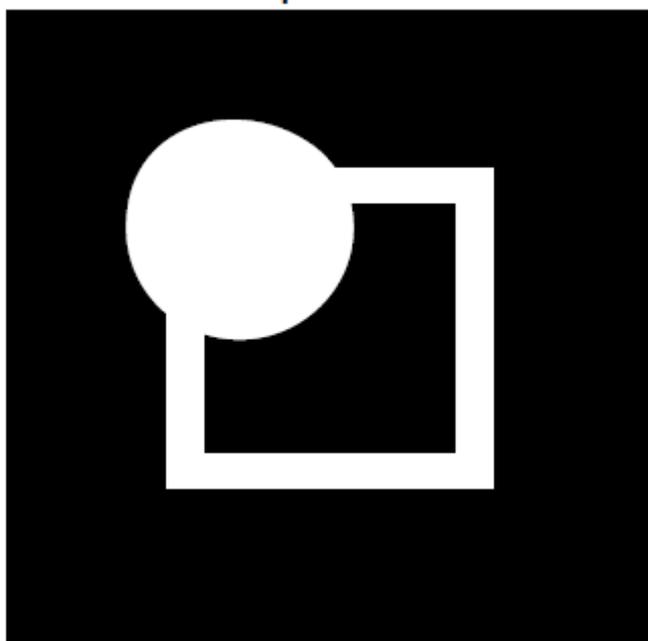
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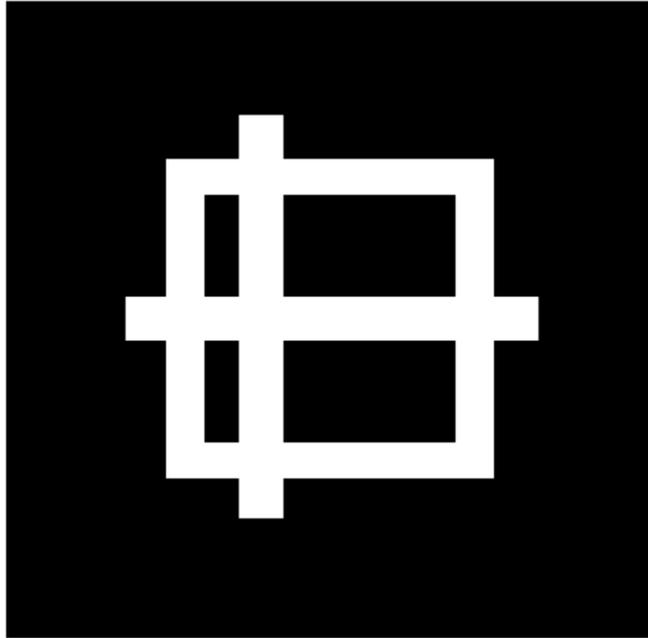
patt.12



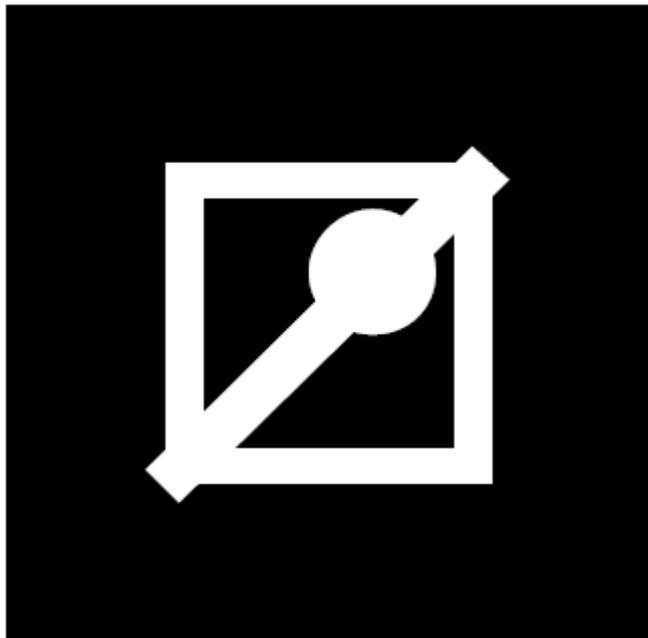
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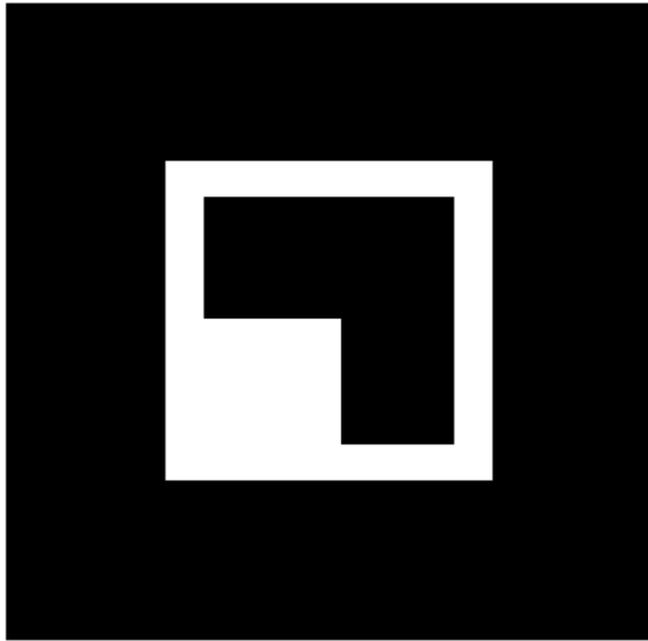
patt.14



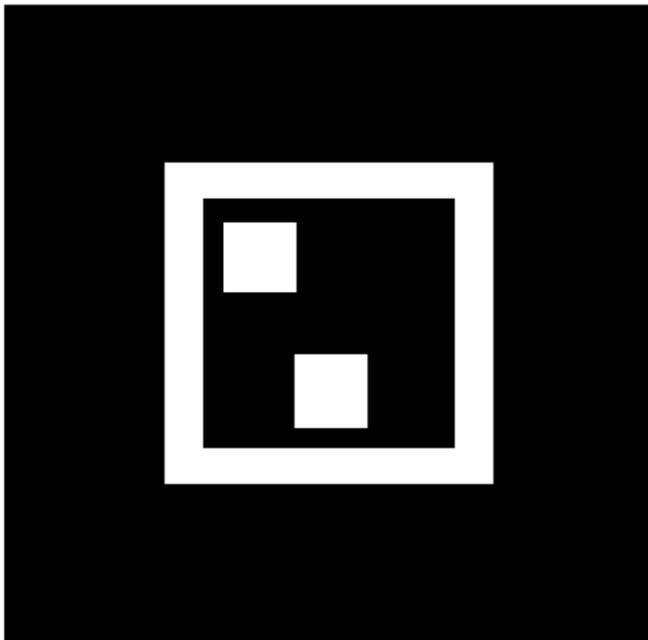
patt.15



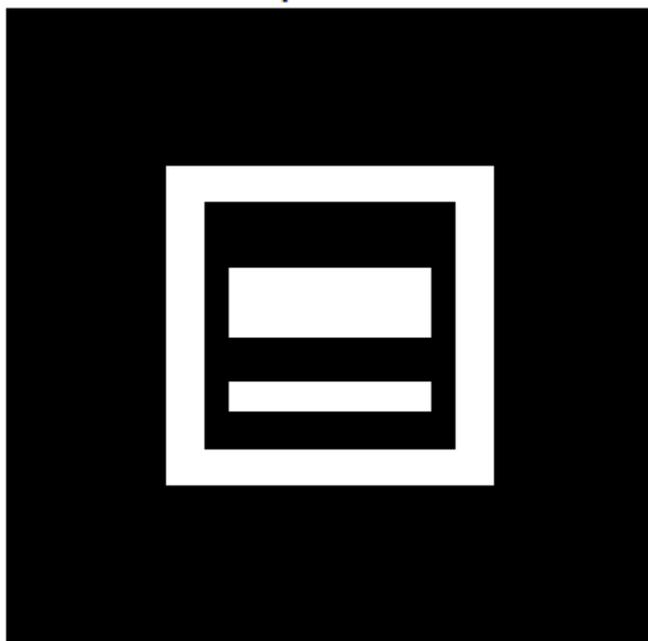
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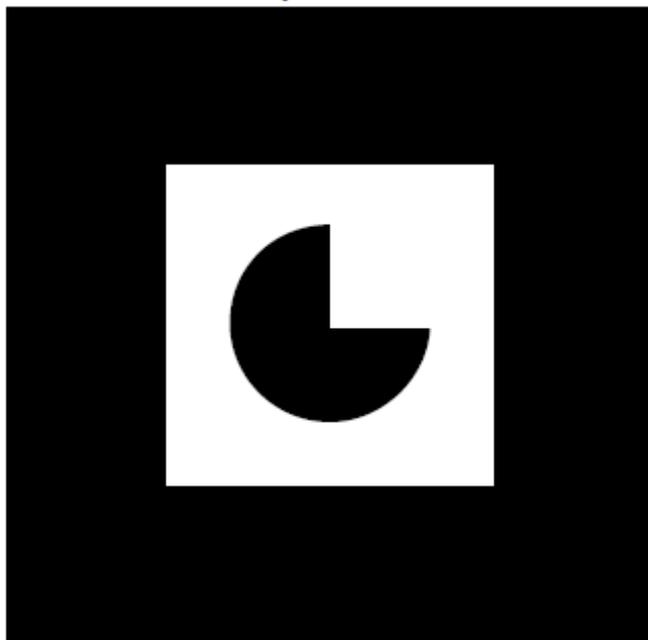
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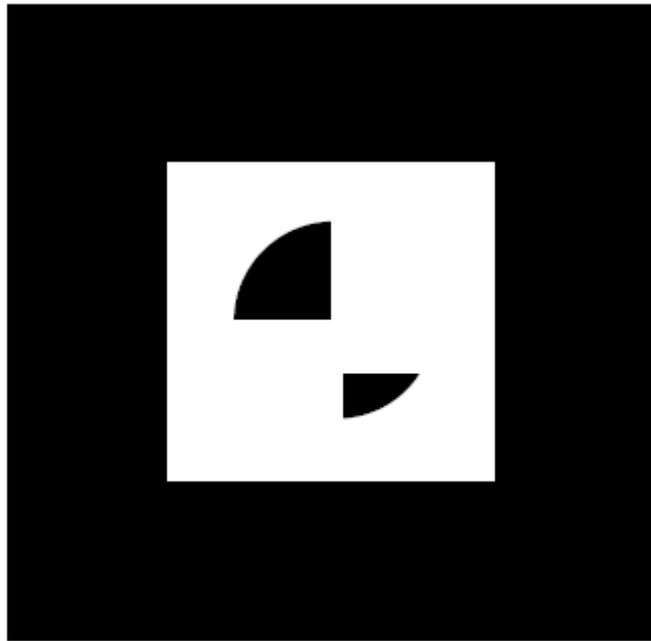
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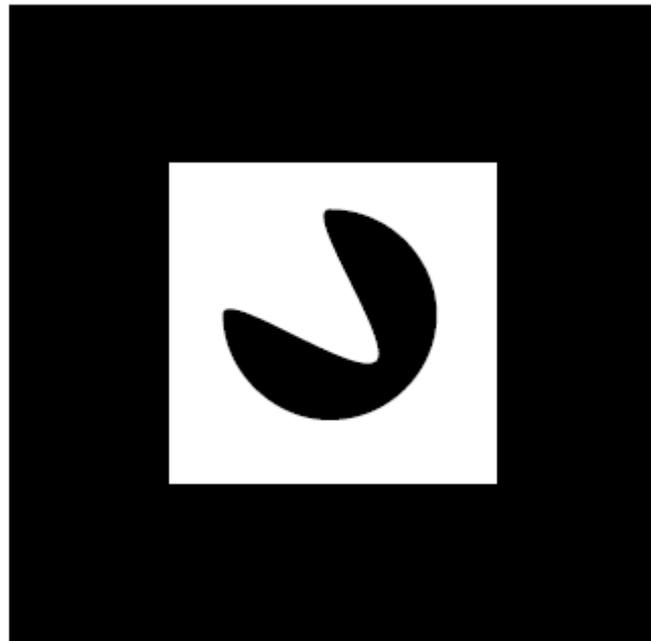
patt.19



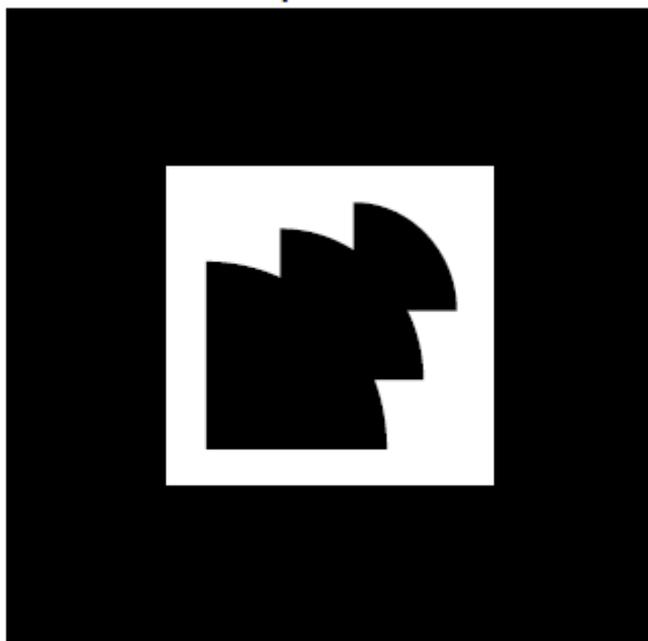
patt.20



patt.21



patt.22



patt.23

