AR-media™ Plugin v2.3
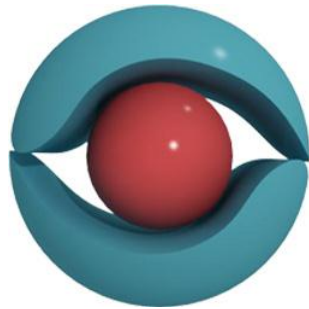
for Trimble™ SketchUp™

INSTALLATION & USER GUIDE
(September, 2013)

(Windows XP/Vista/7)

Copyright

Contents

Foreword

AR-media™ Plugin technology allows you to bring your models from your favourite 3D modelling tool straight into reality just in a click. Once installed and configured the plug-in allows you to visualize any model in Augmented Reality and experience a totally new way to interact with your digital content and show it to your customers.

The *AR-media™ Plugin* for SketchUp™ allows you to enhance the world wide 3D modeller by with Augmented Reality capabilities, bringing the power of the AR-media™ platform on your desktop. The bundle comprises the AR-media™ Viewer and the AR-media™ Exporter: the former allows you to start your Augmented Reality experience inside the creative and design process, whereas the latter allows you to export your models and distribute them to your clients that will be able to experience your models in Augmented Reality even without SketchUp™ installed.

Requirements

Hardware

Minimum Hardware: 1 GHz Processor, 512 MB Ram, 100% Compliant OpenGL Video Card with 128 MB Ram, 50 MB of available Hard Disk space, USB 2.0 Webcam.

Recommended Hardware: 2 GHz Processor, 2 GB Ram, 100% Compliant OpenGL Video Card with 512 MB Ram, 50 MB of available Hard Disk space, USB 2.0 Webcam with 30FPS @ 640x480 resolution.

Software

Required Software: Microsoft Windows® XP/Vista/7, Latest Video Drivers, SketchUp™ 6 or later. Apple QuickTime™[1], DirectX10[2] or later.

Software Versions

Currently, three software versions are available to end users: "Free" and "Professional". Please refer to the licensing section to discover how to register your software.

Free Version

The Free version allows you to start experimenting with Augmented Reality with Trimble SketchUp™. Once activated, ARPlugin permits to use all features of the Professional version but with a AR-media™ watermark always visible.

Professional version

The professional version doesn't show the AR-media™ logo on screen. You can freely view your 3D scenes with multiple markers support and customize some visualization options as well as the possibility to export models for viewing outside of SketchUp™ using the AR-media™ Player (Standard and for iOS/Android devices).

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[1] Required for the marker creation utility and video textures' support.
[2] DirectSound required for audio support.

Introduction

Augmented Reality

Augmented Reality refers to the real-time view of the physical world whose elements are augmented by computer generated items. Thanks to Augmented Reality, users can interact with 3D content directly in the environment where they live and work, by means of a suitable computer interface. Augmented Reality helps users to put any virtual content in context thus assisting them in solving real world tasks in a completely new way.

AR-media™ Platform

AR-media™ is the Augmented Reality Platform behind the line of products by Inglobe Technologies that goes under the name "AR-media™ Plugin". AR-media™ is a general purpose platform for the development of advanced Augmented Reality applications and solutions. It allows to create solutions ranging from stand alone, web and mobile as well as custom solutions targeted to meet complex requirements in a wide range of applications scenarios. It supports distinct tracking techniques and software technologies that are at the basis of any Augmented Reality solution designed and deployed by Inglobe Technologies.

AR-media™ Plugin for SketchUp™

"AR-media™ Plugin" is the name of a line of software products derived from AR-media™ and especially targeted to enhance specific 3rd parties software with Augmented Reality functionalities. The plugin implements only some of the features of the AR-media™ platform. The AR-media™ Plugin for SketchUp™ allows you to enhance the world famous content creation software by Trimble™ with Augmented Reality capabilities. Specifically, the AR-media™ Plugin for SketchUp™ allows users to create and manage Augmented Reality content out of 3D models created using SketchUp™ in a very simple and practical way. No programming capabilities are required. Using the AR-media™ Plugin for SketchUp™ you can create complex and high quality Augmented Reality scenes leveraging on the main features illustrated in the Product Sheet below.

Product Features

Markers Library

With AR-media™ Plugin you can create Augmented Reality scenes based on a pre-set library of markers. You are free to associate any 3D model to any predefined marker available.

Multiple Markers

With AR-media™ Plugin you can create multiple markers scenes, thus associating different 3d models in a scene to different markers selected out of the available list of targets.

Linked Markers

With AR-media™ Plugin you can group different markers together, thus forming a Linked Marker. A Linked Marker is a special kind of marker that groups together two or more targets and it is used to associate the same 3D objects to different markers at the same time. Each single target in a Linked Marker has a specific position in the 3D scene, which will be used to correctly display the same 3D object during the AR visualization. Once a link between markers has been established and each marker has been placed in the 3D scene, you are supposed to move those markers all together during the AR visualization; otherwise, 3D objects will not be correctly shown.

Exporter

With AR-media™ Plugin you can create independent Augmented Reality files with extension .armedia and let other users enjoy them using the free AR-media™ Player (Standard and for iOS/Android devices). You are free to distribute this content at no charge for most uses in compliance with the License Agreement.

Marker Generator

With AR-media™ Plugin you can create your own markers. Creating your own markers you will be able to provide users with highly personalized Augmented Reality content.

Video/Audio Objects

AR-media™ Plugin allows you to embed media files inside peculiar 3D objects. You can easily create objects with video textures or audio and control its playback during the Augmented Reality experience.

Soundtracks

Create more involving scenes by setting up audio tracks that will play in background during the Augmented Reality experience.

Occluders Objects

With AR-media™ Plugin you will be able to create complex Augmented Reality scenes that include occluder objects. In other standard Augmented Reality tools when a 3D model passes behind another object in the real world, it will always be displayed superimposed to that same object, even though this object should be hiding it in the observer's view. By creating "Occluders" objects in AR-media™ Plugin you will be able to create invisible virtual objects (the so called occluders) to mirror the structure of your real-world scene in order to deal with real world occluders and thus use some real objects to hide virtual content in the observer view.

Customizable Interactions

Every 3D object has a set of default events and related actions that defines how it interacts with other objects during the Augmented Reality experience. Advanced users can also customize the way interactions are carried on and, thus, create really complex Augmented Reality applications.

"Lighting Debug" Mode

Light is an important factor in Augmented Reality applications as it affects strongly the performance and stability of the AR visualization specifically for what concerns the tracking of the markers. With AR-media™ Plugin you have better control on the tracking algorithms, thus being able to adjust important parameters as a function of the real lighting conditions of your real world scene. Moreover you are able to adjust tracking parameters with useful visual feedback. This is what we call the "Lighting Debug" Mode.

Layers' Management

3D objects attached to a marker can now be placed in different layers and you can easily manage them during the AR visualization.

Timed Slideshow Mode

You can now organize the AR visualization to behave just like a slideshow: each layer will be visible for a chosen time interval and at the end it will be hidden and the next layer will be shown.

Shadows[3]

You can now put a light in your scene which will allow objects attached to selected markers to cast and receive shadows.

Clipping/Sectioning

During the Augmented Reality visualization, you can enable the Clipping mode which permits you to view sections and clipping planes of the selected 3D objects.

Antialiasing

The Antialiasing function allows users to minimize some visual artifacts of the 3D content in the Augmented Reality view.

Real-time Rendering

During the Augmented Reality visualization AR-media™ Plugin performs real-time rendering in a way that is compatible with the standard SketchUp™ rendering engine.

HD Support

AR-media™ Plugin supports a wide range of HD webcams and cameras. A suitable frame grabber could be required.

Tracking Technology

Even though AR-media™ platform is not limited to a given tracking technology, AR-media™ Plugin is based on a marker tracking technique.

Head Mounted Displays

A variety of Head Mounted Displays is supported by AR-media™ Plugin. AR-media™ Plugin supports, but is not limited to, eMagin Z800 3D Visor, I-O Display Systems i-Glasses, VR ProAR.

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[3] Currently, only one light can cast shadows during the AR visualization. Other lights will only affect the illumination of the objects.

Installation

The installation procedure requires full administrative rights, so be sure to have the required privileges before trying to install the software. The installation process will install the following components:

- AR-media™ Viewer for SketchUp™
- AR-media™ Exporter for SketchUp™
- AR-media™ Configuration Utility
- AR-media™ Marker Generator
- AR-media™ License Manager
- Help and Documentation files

To start the installation process, execute the *AR-media™ Plugin* setup and follow on screen instructions from the installation wizard. At the end of the installation process the installer will search your system for any installed version of SketchUp™ and will configure itself for the latest version found. The installer will look for the latest version available of SketchUp™, if you want to install the plugin for another version or if the installer doesn't manage to find SketchUp™ on your system you can manually choose the corresponding directory.

Configuration

You can configure[4] the Plugin and Exporter using the *AR-media™ Configuration Utility* installed with the AR-media™ software. The Configuration Utility window is shown in the following figure:
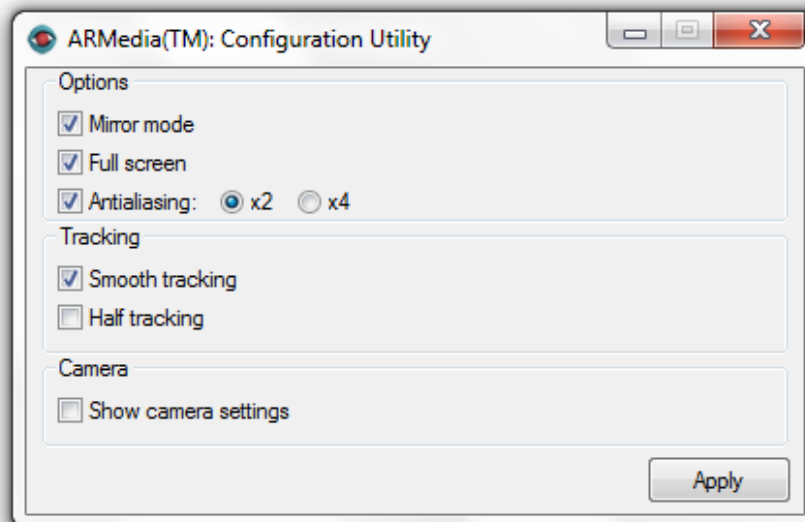
In the configuration window you can choose many options each of which is described in the following section.

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[4] Please note that you must have full administrative rights to configure the plugin.

Configuration Options

Mirror mode: if enabled, the video stream will be horizontally flipped like in front of a mirror (this mode is suitable for cameras mounted in a fixed position and facing the user); if disabled the video stream will be not flipped (this mode is suitable for head mounted displays and in those scenarios where the user can move the camera around).

Full screen: allows to choose to run Augmented Reality in full screen or windowed mode.

Antialiasing: allows to enable antialiasing and set the corresponding value. The higher the multiplier the better your 3D models will appear but at the expense of frame rates. Video quality is not affected by this parameter.

Smooth tracking: allows to configure the tracker for using either a smooth or precise technique; if smooth tracking is enabled then objects will follow the marker in a soft manner and with a little delay, if smooth tracking is disabled then objects will be glued to the marker.

Half tracking: allows to configure the tracker for tracking a video with half the resolution of the video from the camera. This mode is useful especially when tracking high resolution images to improve the frame rate (but at the expense of a lower tracking quality).

Show camera settings: allows to adjust camera's parameters before starting the Augmented Reality experience.

When you click the *Apply* button any change you've made will be applied.

Usage

Printing Markers

The very first step to experience Augmented Reality with AR-media™ tools is to print the provided markers and possibly fix each one of them on a rigid, flat surface. You can print markers from the Plugin program group by opening the "Markers" sub-group where all the PDF files are available for printing. Additionally, in the sub-group you can find two JPEG file that can be used as a template to build your own custom markers (see "Marker Creation Utility" section).

During execution point your webcam towards the printed marker to visualize your 3D content on it; be sure to have a well-lit environment without reflections and highlights on the marker surface in order to have the best possible experience.

Please note that among all the standard markers provided by the *AR-media™ Plugin*, the one called "AR-media" is considered the default marker.

Using the Plugin

When *AR-media™ Plugin* is installed and configured, SketchUp™ interface will be enhanced with:

1. a new menu called "*Plug-in*" (in case you don't have any other plug-in already installed)

2. a new menu item called "*ARPlugin*" in the "*Plugin*" menu and

3. a new toolbar. In case you do not visualize the toolbar, just check the "*ARPlugin*" entry in the Toolbar submenu found in the "View" menu.

Every time SketchUp™ is executed and every time the AR-media™ Plugin is started, it will check if other existing versions of the same plugin exist. If other versions are detected the AR-media™ Plugin will not be able to start and will issue a warning to the user. In order to correctly start the Plugin you must first uninstall any other version. Please note that the Professional version contains all the features of the Free version, so there's absolutely no need to have other versions installed on your machine if you have the Professional version already installed.

Also, every time the Plugin is started, it will initialize itself by filling the Marker library and creating the Plugin Toolbar.

Marker management

The main entities that you have to use to correctly use the Plugin are "markers". A marker, as defined in the Plugin, is the image (defining a pattern) on which you can view your models during Augmeted Reality experiences.

The Plugin essentially models a marker as a plane that has some features and can be attached to one or more 3D objects. All markers supposed to be used in the Augmented Reality experience are contained in the Active Markers' list.

In order to be able to correctly use the Plugin, you must first understand the possible states in which a marker can be.

- INACTIVE: a marker that is not in the Active Markers' list.

- ENABLED: a marker is enabled when it is firstly added to the Active Markers' list. In this state, you can configure it properly, accessing its Marker configuration dialog.

- DISABLED: a disabled marker will not be analyzed during the View or Export processes. In this state you cannot access its configuration dialog and its properties will be freezed.

- VALID: markers in this state will be analyzed and used during the View or Export processes. A marker that is enabled and has at least one visible object attached to it is considered to be valid.

Both ENABLED and DISABLED Markers can be grouped together to form a Linked Marker. Please note that it is not possible to link a marker in more than one group.

Further in this document, it will be explained how to use the Plugin to correctly setup markers and how to interact with the Active Markers' list in order to correctly setup the 3D scenes.

Main interface overview

The following figure shows an overview of the main interface, which can be logically divided into three sections: Available markers, Scene configuration and Actions.
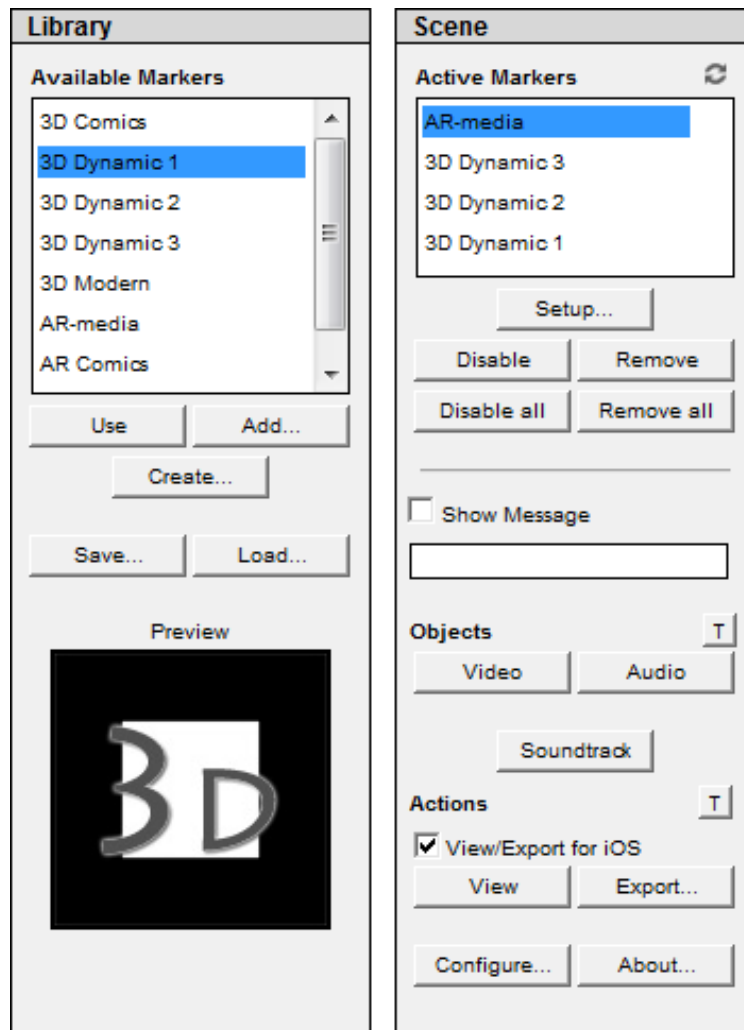

Figure 1 - AR-media™ Plugin main interface overview

In the following parts of this document, these three sections will be described to give an overview of the features of the Plugin.

Available markers

This section of the main interface is used to manage the marker library. It will be filled by standard markers provided with the *AR-media™ Plugin* during the initialization process. Every marker that is in the library can be used in the scene and you can see a preview of the selected marker by clicking on an item of the list.
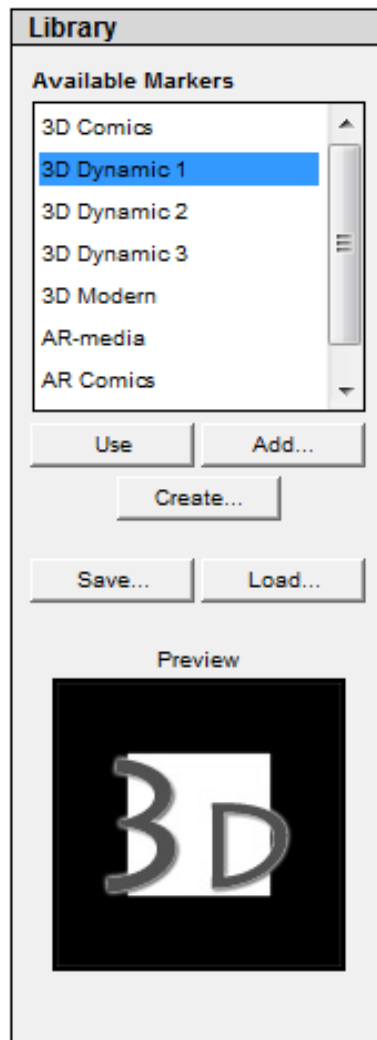

Figure 2 – Markers' library: Main interface's excerpt

Adding a new marker to the Active Markers' list

This action can be performed by clicking on the <u>Use</u> button or double-clicking on a list entry. The selected marker in the library will be added to the scene and will be visualized in the Active Markers' list. In this way, the selected marker will change its state to ENABLED in order to be configured.

Please note that it is not possible to add the same marker on the Active Markers' list more than once. Repeating this action will not yield to any results.

Customizing the Marker Library

This action permits to enlarge the marker library with new custom markers.

By clicking on the <u>Create...</u> button, the Marker Creation Utility will be executed and will guide the user through the marker creation process. For information on how to use the tool, please see "Marker Creation Utility" section of this document.

By clicking on the <u>Add...</u> button, you will be able to expand the marker library with one user-defined marker (for example those generated with the AR-media™ Marker Generator).

You will be prompted to choose an .arpattern file[5] from a dialog box. Once selected, the Plugin will check its integrity by searching for all the necessary files to complete the registration of the custom marker. Once the check has been performed, the chosen marker will be shown in the Marker library and will be available to use as any other marker. Check can fail for the following reasons:

- The custom marker has the same name as one of the markers in the library

- One or more of the necessary files found in the ARPattern specification has not been found.

- The specified .arpattern file is not a valid file.

Save the current ARPlugin configuration

By clicking on the <u>Save</u> button, you can save the current state of AR-media™ Plugin to an .arconfig file you choose. You can also select which preferences to save from the proposed panel:

- **Save message**: save the current message as configured in the main panel's section.

- **Save library**: save the entire current Markers' Library. This option is particularly useful when you want to often use custom markers which have been created by means of AR-media™ Marker Generator and then added to the library.

- **Save scene**: save the entire Active Markers' List and all 3D objects' properties. Please note that, in order for the scene to be correctly saved, all 3D objects attached to any active marker must have a unique name. Otherwise, the saving process will fail.

- **Save tracks**: save the entire background music as configured.

At the end of the saving process, the .arconfig file will be created.

Load a custom ARPlugin configuration

By clicking on the <u>Load</u> button, you can load a previously saved ARPlugin configuration by specifying an .arconfig file. To ensure more flexibility, you can select which preferences to load from the proposed panel:

- **Load message**: load the message configuration as specified.

- **Load library**: clear the current Markers' Library and load the one specified in the file. If the selected file does not contain any library information, you will be asked to clear your current library or not.

- **Load scene**: load the entire Active Markers' List as specified in the file, along with all preferences about 3D objects in the scene. Please note that this step may fail if the current SketchUp™ scene is not EXACTLY the same as the one used during the save process.

- **Load tracks**: load the background music's playlist as specified in the file.

- By checking the "Show warnings" option, you will be alerted of any unusual condition that may happen during the loading process.

At the end of the loading process, the whole AR-media™ Plugin main panel will be refreshed to reflect the state of the just loaded preferences.

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[5] .arpattern files are the main files that contain markers' specifications. They are read by the AR-media™ Plugin in order to allow users to use customized markers in their scenes.

Scene configuration

This section of the main interface is used to manage the Active Markers' list in order to correctly configure your 3D model for Augmented Reality.
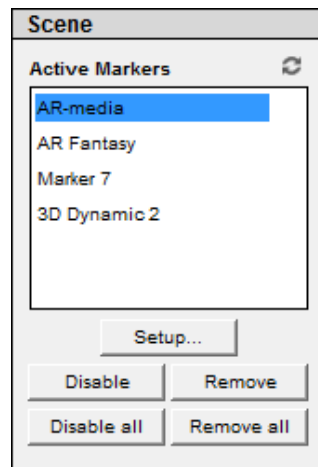

Figure 3 - Active Markers: Main interface's excerpt

Disabling or enabling active markers

You can change the state of the selected active marker by clicking on the Disable/Enable button to respectively switch its state to DISABLED or ENABLED.

By clicking on the Disable all/Enable all button you can change all the active markers' states with one click.

Removing active markers

A selected active marker (either ENABLED or DISABLED) can be removed from the list by clicking on the Remove button. Its entire configuration parameters together with the marker plane will be erased and its state will switch to INACTIVE. You can then re-add the marker to the Active Markers' list by choosing it from the library just like any other marker.

Clicking on the Remove all button will perform those operations on all of the active markers.

Configuring the marker

Users can produce a VALID marker (ie one that will be used during View or Export process) by adjusting its parameters (such as size, fit factor, …) and by attaching 3D objects to it.

Please remember that a marker with no attached objects is treated the same as a DISABLED marker.

This action can be performed by clicking on the Setup... button or double-clicking on an ENABLED maker in the Active Markers' list. It will open the marker configuration dialog (Figure 4) in order to access the configuration preferences of the selected enabled marker.

The marker configuration dialog will be then initialized and filled with the correct information about the selected marker. If this dialog is currently displayed and you click on another marker in the Active Markers' list, its content will be automatically updated to reflect the state of the newly selected marker. If the newly selected marker is DISABLED then all the dialog's controls will be disabled.

Please note that only one marker configuration dialog can be displayed at a time.

Refer to the "Marker configuration" section to learn how to correctly configure a marker.
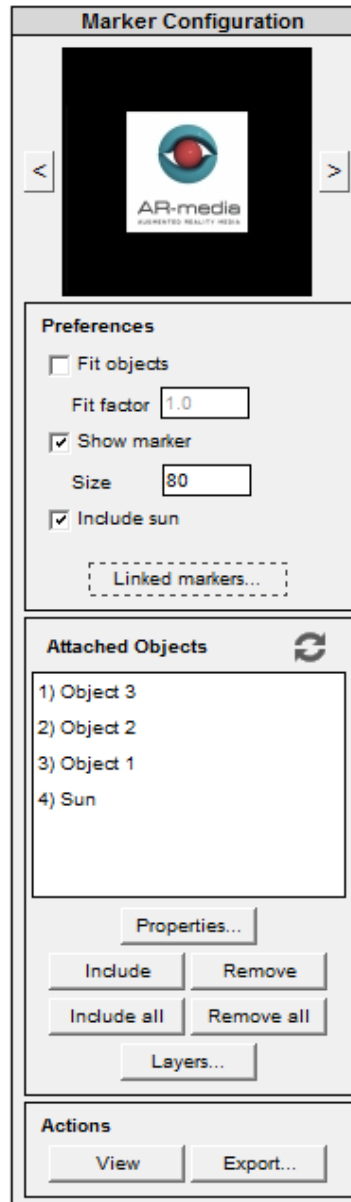
Figure 4 - Marker configuration dialog overview

AR-media™ Objects' Creation

This section describes all the custom objects you can create by using AR-media™ Plugin. These objects allow you to enrich your 3D scenes along with the resulting Augmented Reality experience.
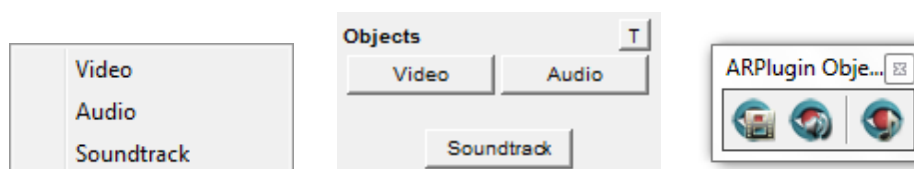

Figure 5- Menu excerpt, Main panel's excerpt and Objects' Toolbar

Video Objects

AR-media™ Video objects are 3D planes that can visualize video textures during the Augmented Reality experience.
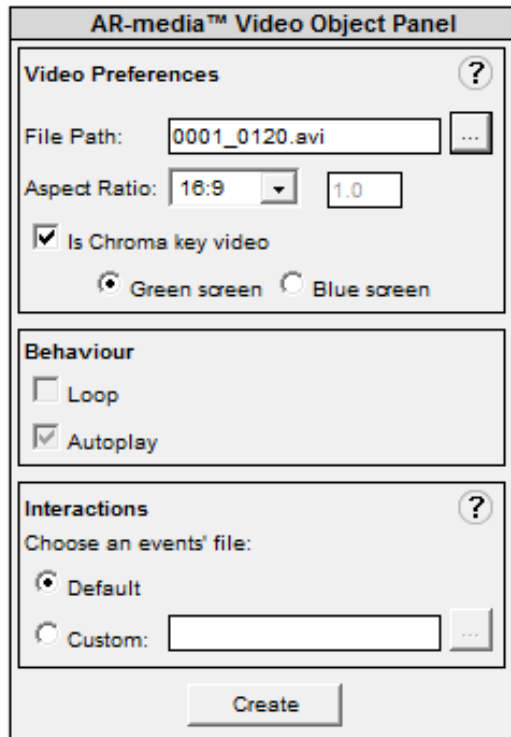
Figure 6 - AR-media™ Video Object Panel

The panel allows you to choose a video[6] file from your computer. Additionally, you can declare that the selected video has been created with the Chroma key technique and further choose between the two options (Green screen and Blue screen). The result of enabling this option is that the green or blue background in the video playback will be invisible during the AR visualization.

By checking the "Loop" box, the video will repeat when finished playing, while the "Autoplay" box will automatically start the video when its marker is detected during the Augmented Reality experience.

Note: once the 3D plane is created (with a default 'dummy' texture), you are free to modify it as you would with any other 3D object in SketchUp™. The simple texture which is automatically applied to the object will be replaced by the video texture during the Augmented Reality experience.

The "Interactions" preferences will be discussed in the "Object's custom interactions" section.

Audio Objects

AR-media™ Audio objects are 3D cubes that will emit a chosen sound during the Augmented Reality experience.

The panel allows you to choose an audio[7] file from your computer.

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[6] Currently supported formats are MOV, MPEG and AVI files (some files may not be correctly displayed depending on the encoder used).
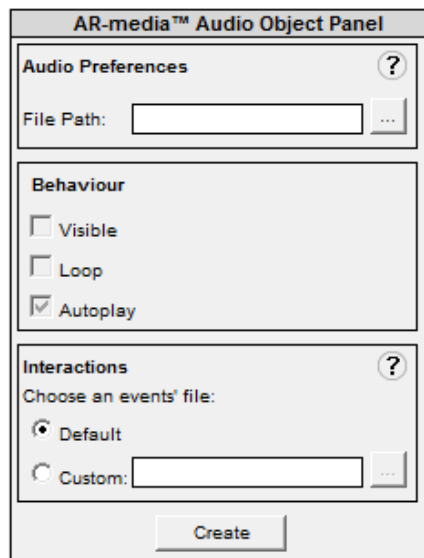[7] Currently supported format is WAV.

Figure 7 - AR-media™ Audio Object Panel

By checking the "Visible" box, the audio objects will be showed during the Augmented Reality experience, just like any other object. If you check this option, you may want to edit the automatically created 3D cube and eventually transform it to something else (like a push button for instance).

Note: as any other 3D object, if you hide the 3D cube in SketchUp™, it will not be used during the Augmented Reality experience: just uncheck the "Visible" box if you want it to not be displayed.

By checking the "Loop" box, the audio sound will repeat when finished playing, while the "Autoplay" box will automatically start the audio sound when its marker is detected in the Augmented Reality experience.

Please note that if the "Visible" option is not checked, the "Autoplay" option will be set to "enabled".

The "Interactions" preferences will be discussed in the "Object's custom interactions" section.

Soundtrack object

This particular object is not linked with any 3D object in the scene; rather it allows to build an audio playlist that will play during the Augmented Reality experience.
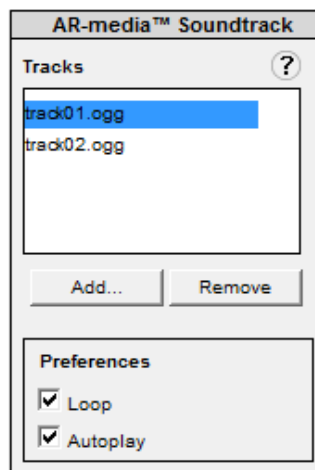
Figure 8 - AR-media™ Soundtrack Panel

By clicking on the <u>Add…</u> button you can choose an audio file[8] from your computer that will be automatically added to the selected tracks. The <u>Remove</u> button let you remove the selected track from the current list. The same audio file can be included more than once.

By checking the "Loop" option, the currently played track will be restarted when finished playing.

By checking the "Autoplay" option, background music will automatically starts during the Augmented Reality experience. Please note that you can manage the audio playback of the soundtrack in real-time by entering the "Sound Management Mode" (see the Viewer Interactions' section for more details).

Sun Object

This object can only be attached to one marker at time and it represents the sun as configured in the SketchUp™ model.
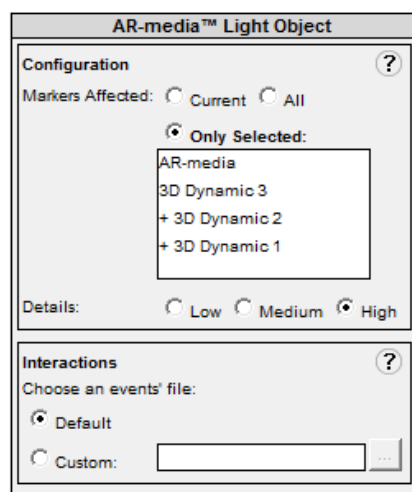

Figure 9 - Sun Object Dialog

Even though the sun can be added to one marker only, also other markers can be set up to be affected by the sun by adjusting its properties accordingly.

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[8] Currently supported format is OGG Vorbis.

Actions

This section describes all the actions that can be performed on the scene by means of the AR-media™ Plugin interface.

The same actions can also be accessed using the Plugin Toolbar, which you can freely move inside the main SketchUp™ interface and using the Plug-in Menu entries.
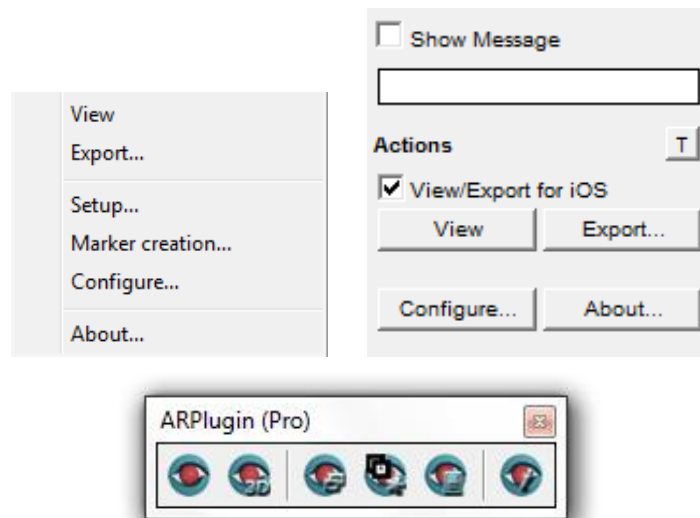

Figure 10 - Plugin menu, main interface's excerpt and toolbar

1. Configuring the message

By checking the "Show message" box, you can type a message in the box below that will be showed during the Augmented Reality experience.

2. Viewing the configured scene

This action allows you to start the Augmented Reality experience as configured in the markers' setup interface. All VALID markers found in the Active Markers' list will be processed and made available to the visualization. You can then point the camera toward any printed version of the configured markers to view your models on their respective marker(s).

If you chose to view for iOS/Android, then the scene will be prepared to be previewed as it would be displayed by the iOS/Android Player, with all the limitations applied.

IMPORTANT: if the Active Markers' list is empty, the whole scene will be prepared to be visualized with the default "AR-media" marker.

You can perform this action by pressing the <u>View</u> button on the main interface and on the menu or clicking the first image button on the toolbar.

Please refer to the "Marker configuration" section to learn how to create a valid marker.

3. Exporting the configured scene

This action allows you to start the AR-media™ Exporter and create a new AR-media Resource file containing all configured markers with any object attached to them.

If you chose to export for iOS/Android, see the section below.

IMPORTANT: if the Active Markers' list is empty, the whole scene will be exported to be visualized with the default "AR-media" marker.

You can perform this action by pressing the <u>Export…</u> button on the main interface and on the menu or clicking the second image button on the toolbar.

This action will start the export process, a dialog box asking where to save your model will be displayed. A new AR-media Resource file will be created in the specified path, containing the scene as configured by the user.

Please refer to the "Marker configuration" section to learn how to create a valid marker.

4. *Exporting for iOS/Android*

If you chose to create a .armedia file for AR-media™ Player iOS/Android, then an additional panel like the following will be displayed.
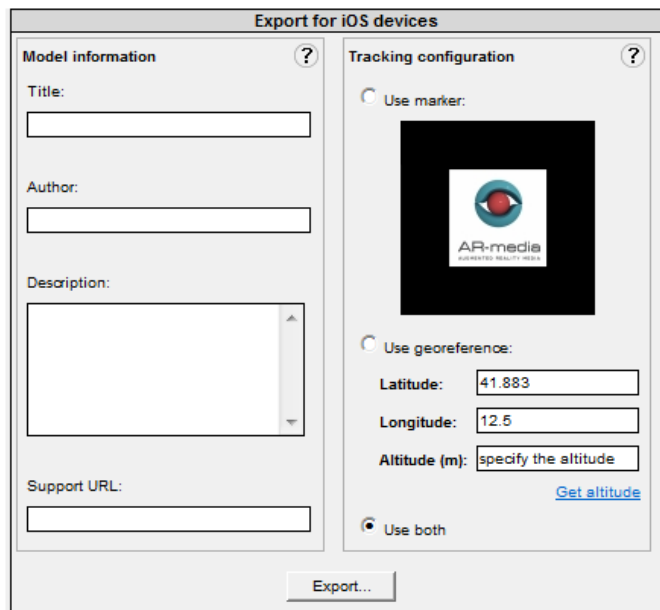

Figure 11 – iOS/Android export dialog

This panel requires you to fill all the fields which will be displayed in the summary page of ARPlayer for iOS/Android.

- **Title**: the title of the model.
- **Author**: the author of the model.
- **Description**: a brief description of what the user must expect from the AR visualization.
- **Support URL**: an URL pointing to a web site in which the user can obtain more information about the resource file. This can be useful if you want to display some additional information about the model.

Additionally, you can select the tracking mode which must be used by the iOS/Android Player to display your model:

- **Use marker:** this is the default tracking mode, which uses the selected marker to display 3D content during the AR visualization
- **Use georeference:** this mode uses the GPS capabilities of the iOS/Android device to display 3D content during the AR visualization. The model will be displayed at the geographical coordinates you set by using the relative SketchUp™ tool (you'll need to enter the *Altitude* value manually).
- **Use both:** in this mode, 3D objects will be displayed on the chosen marker and also at the specified geographic location.

Once filled, you can click on the Export… button and the exporter will create the AR-media Resource file. Since the created file is fully supported by the standard AR-media™ Player, you will be able to quickly view the model without the need to import it in your iOS/Android device.

For more information about the limitations of iOS/Android exporter, refer to the related section further in this document.

5. *Create the toolbar or display the main interface*

The Plugin Toolbar is created when the Plugin is initialized and can be closed anytime. To re-create the toolbar you can click the T button on the main interface. If the toolbar is already displayed, then clicking on the button will not yield any results.

If you want to access the main Plugin interface you can click on the Setup… entry in the menu or on the third button in the toolbar.

6. *Create a customized marker*

This action will execute the AR-media™ Marker Generator installed with the AR-media™ software.

You can perform this action by pressing the Create… button on the main interface and in the menu or clicking the fourth image button on the toolbar.

7. *Configure the AR-media™ Plugin*

This action will execute the AR-media™ Configuration Utility installed with the AR-media™ software.

You can perform this action by pressing the Configure… button on the main interface and in the menu or clicking the fifth image button on the toolbar.

8. *Show information about AR-media™ Plugin*

This action will display a window which contains information about the AR-media™ Software and the Plugin.

The Check for updates link will permit you to check if a newer version of ARPlugin is available for download.

You can perform this action by pressing the About… button on the main interface and in the menu or clicking the sixth image button on the toolbar.

Automatic actions performed by the Plugin

In order to avoid inconsistent plugin states, every time a new file is opened in SketchUp™ the Plugin will be re-initialized, thus deleting every active marker from the Active Markers' list.

Marker configuration

The AR-media™ Plugin allows to view and export selected objects attached with one or more markers. In order to be able to do so, you must first setup valid markers.

As stated before, by clicking the Setup... button on the main interface will open the marker configuration dialog. It can be logically divided into four sections: Marker navigation, Marker preferences, Objects management and Actions. Each one will be explained in the next parts of the document.

Marker navigation

This section visualizes the current enabled marker image and allows to display the previous or the next ENABLED marker in the Active Markers' list by using the two navigation buttons ($\leq$ and $\geq$) situated along the sides of the marker image and without the need to use the main interface controls.

By clicking on the navigation buttons the whole marker configuration dialog will automatically update its content to reflect the state of the current marker.
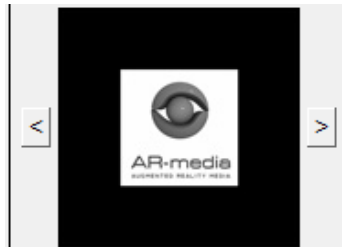

Figure 12 - Marker navigation dialog's excerpt

Marker preferences

This section contains the options to customize the behaviour and aspect of the marker.

Fit objects: this option allows to scale all the attached objects so that they will always be visible with respect to the marker. Selecting this option will disable both the Show marker box and the Size input.

Fit factor: Adjust this factor to modify the alghoritm scaling technique. A factor of 1.0 will scale the bounding box of the attached objects to the size of the marker.

Show marker: when you select it, a reference marker[9] will be shown in the scene, you can use it as a reference to place and scale objects before actually viewing or exporting them for Augmented Reality (the marker won't be displayed or exported).

Size: this option allows to enlarge or shrink the marker plane as visualized in the SketchUp™ active model. Please note that the marker is a square so any geometrical transformation applied outside this one will not be significant.

Include Sun: when you select this option, a new entry named "Sun" will be visible in the attached objects' list. This light will be used to generate shadows on objects during the AR visualization. Please note that, since only one marker can have the sun included, if another marker has already this option checked, you will be asked to switch it to the current one.
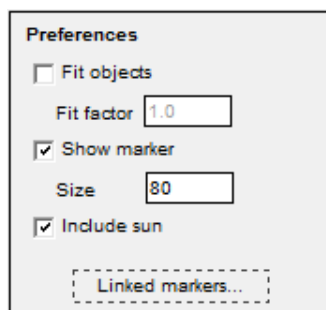

Figure 13 - Preferences: Marker configuration dialog's excerpt

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[9] The reference marker is a simple geometrical object just like any other in SketchUp™. In order to expect the correct behaviour from the Plugin, please try to not modify the marker objects' properties.

Clicking on the <u>Linked markers…</u> button will open a new window in which you can link the current marker to other active markers in order to create a *Linked Marker*. This button will be highlighted when the current marker is part of a *Linked Marker*, while it will be displayed as a standard button if the marker is not linked to any other marker.

Note that markers within the same group will share the same objects' list, moreover, the **Fit objects** option will be disabled for every marker linked to others.
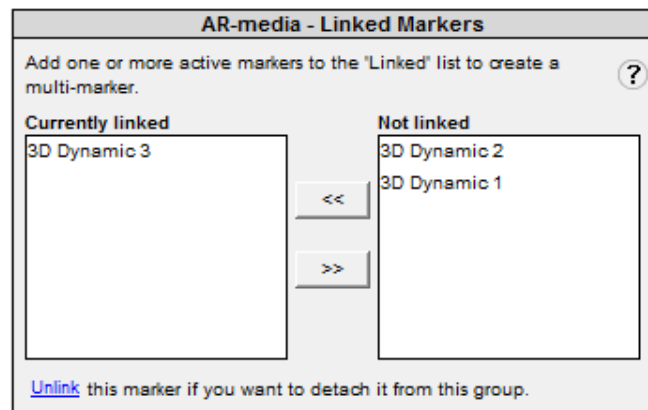

Figure 14 - Linked Markers' Panel

The **Currently Linked** list shows all the markers linked to the current one, while the **Not Linked** list shows all the active markers which can be linked to the group.

By clicking the <u><<</u> button, the selected marker in the **Not Linked** list will be added to the **Currently Linked** list: additionally, all its attached objects will be added to the objects' list which is currently shared between all the other markers in the group.

By clicking the <u>>></u> button, the selected marker in the **Currently Linked** list will be removed from the Linked Marker. Clicking on the <u>Unlink</u> label will remove the current marker from the Linked Marker and close the panel.

Objects management

The Attached Objects' list shows all the objects currently attached to the marker. By object, we mean any geometrical structure previously created. Clicking on an item in this list will highlight the object in SketchUp™ model. The items in the list will reflect the name of the objects created in SketchUp™, if any, or they will be automatically assigned.
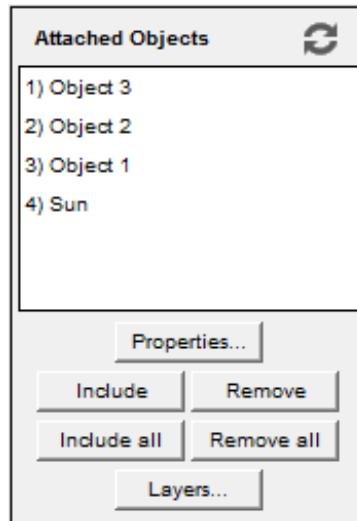
Figure 15 - Object management: Marker configuration dialog's excerpt

Clicking on the <u>Include</u> button the selected Groups and Components will be added to the Attached Objects' list. Please note that previously added objects[10] and markers' planes will not be included.

NOTE: please make sure that all the objects attached to a marker have different names[11], otherwise they could not be displayed in the desired way during the Augmented Reality experience.

If you want to quickly select all visible objects in the scene, you can click on the <u>Include All</u> button. In this way, the attached objects' list will show only one entry called "All visible objects". Consider this feature as attaching the whole active model to the selected marker. Please note that every time you click on the <u>Include</u> button, this information is erased and the selected objects will then fill the Objects' list.

Clicking on the <u>Remove/Remove all</u> buttons the selected object in the list (or all of them) will be removed from the list.

To refresh the Attached Objects' list, you can click on the typical refresh image, thus removing any non-existent or invalid object from the list.

Clicking on the <u>Layers…</u> button will display the Layers Management dialog (figure below) which permits you to configure the layers of the marker and set the default visualization mode.

The "Standard" visualization mode will display all layers at the same time during the AR visualization, while the "Timed Slideshow" option will display one layer at a time (starting from the base layer) for the specified amount of time which can be set in the <u>Duration</u> field.

This panel also permits you to add or remove layers for the selected marker and set the layer for each of its attached object.

Moreover, clicking on the <u>Import</u> button will automatically organize objects in layers as they are configured in SketchUp™. The <u>Reset</u> button will restore the initial setup, in which all objects are in the base layer.

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[10] Since the inclusion process filters out the marker planes by their names, please do not choose names for your objects that start with the *"armedia_marker"* literal or they will be filtered out as well.
[11] Since SketchUp™ treats characters such as spaces and double quotes in peculiar ways, please ensure also that two objects' names does not differ only by these characters. For example, two objects named **object 1** and **object_1** will cause a homonymy problem when exported for Augmented Reality.
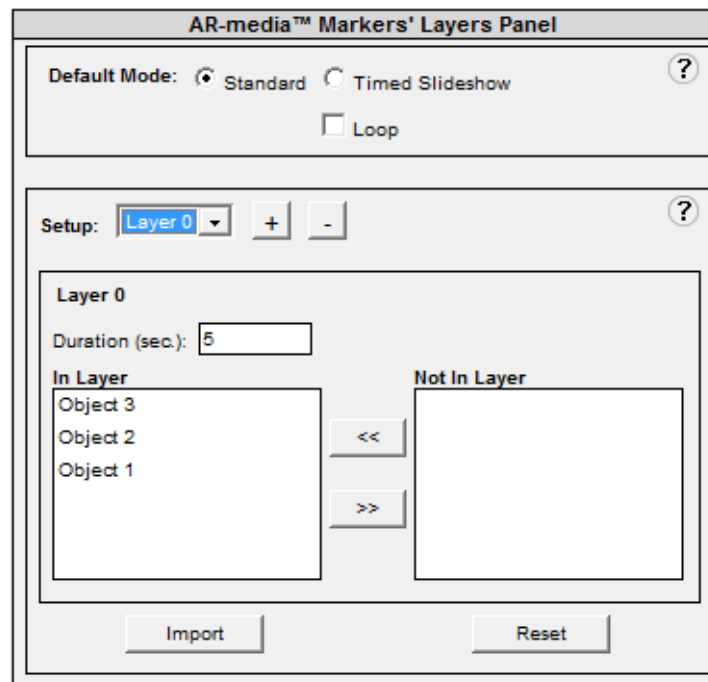
Figure 16 - Layers Management Panel

By selecting an entry in the Attached Objects' list and clicking on the <u>Properties…</u> button (or double-clicking the entry), the Object Type Panel will be displayed.

This particular panel is object-dependent and may vary depending on the object you select. For user-created 3D objects, the dialog shown will be the one in the following figure, while, if you choose to edit a custom AR-media™ object, the corresponding panel will be displayed (please refer to the previous sections for a description of those panels).
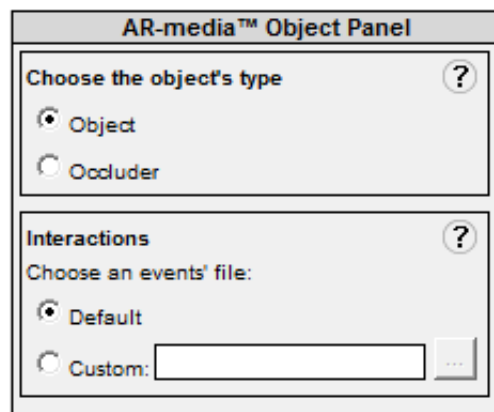

Figure 17 – Simple Object Type panel

"AR-media™ Object Panel" allows you to choose if an object will be an Occluder during the Augmented Reality Experience.

Please note that if one of the attached objects is chosen to be an Occluder type, the <u>Fit objects</u> option for all active markers will not be selected (even if the box will remain checked).

The "Interactions" preferences will be discussed in the following section.

Object's custom interactions

AR-media™ Plugin provides default interactions for any object that can be displayed. For example, during the Augmented Reality experience, you can click on an AR-media™ Video/Audio object to start/stop the video/audio playback.

Many other custom events can be handled in order to realize complex objects' interactions, by simply specifying a particular file.

As you can see from the properties windows showed before, ordinary objects as well as *Audio* and *Video Objects* offer the same "Interactions" section. By choosing the <u>Default</u> option you rely on the predefined set of actions and events that the plugin offers for the currently selected object, while, by selecting the <u>Custom</u> option, you will be able to attach a previously configured events file to the object

We'll now describe the general structure of an events (or interactions) file.

Interactions File

The general structure of an events file is like this (we will write in **bold** any new section we will progressively add):

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<events name="my_events_file">

   <!--  add one or more events here -->

</events>
```

We'll see how to add content to this file in a minute, now we just have to notice the root tag *<events>* that is the container of all the events we want to associate to an object. As shown you can choose a symbolic name for the set of events you are defining (this name is just for your convenience, it won't be used in any manner by the plugin).

Let's now see how to specify events in the events file.

Events

The plugin defines a set of events that can be configured for almost any 3D object that you want to display in Augmented Reality. Below is a list of all the possible events that can occur during the Augmented Reality experience.

Mnemonic	Event name	Description
	on_left_mouse_click	Occurs when the user left-clicks an object with its mouse.
	on_right_mouse_click	Occurs when the user right-clicks an object with its mouse.
	on_left_mouse_double_click	Occurs when the user double left-clicks an object with its mouse. This event is <u>always</u> preceded by the trigger of the *on_left_mouse_click* event.
	on_right_mouse_double_click	Occurs when the user double right-clicks an object with its mouse. This event is <u>always</u> preceded by the trigger of the *on_right_mouse_click* event.
	on_mouse_in	Occurs when the user moves its mouse pointer on an object.

	on_mouse_out	Occurs when the user moves its mouse pointer off an object.
	on_hide	Occurs when an object becomes hidden.
	on_show	Occurs when an object becomes visible.
	on_init	Occurs when the scene is first loaded, before any visualization is done.
	on_marker_detected	Occurs when any marker (whom the object is attached to) is first detected.
	on_marker_lost	Occurs when any marker (whom the object is attached to) is lost.

An event is associated to a specific object if it is used in the events file associated to that object. When you create a custom events file you must refer to events exactly by means of the names shown in the above table. So looking at the structure of an events file, we may add an event like this:

```xml
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<events name="my_events_file">

  <event name="on_left_mouse_click">
    <actions>

      <!-- add one or more actions here -->

    </actions>
  </event>

  <!-- add one or more events here -->

</events>
```

basically you add an event by adding the *<event>* and *</event>* tags, what really defines the event is its **name** attribute that must be one of those shown in the previous table and the set of actions defined within the *<actions>* and *</actions>* tags. Actions are described in the following section.

Actions

As stated before, every event can trigger the execution of one or more actions. Each action is started sequentially in the order in which they are defined in the actual events file. In the context of the events file an action is defined by the *<action>* and *</action>* tags as shown here:

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<events name="my_events_file">

  <event name="on_left_mouse_click">
    <actions>

      <action source="_self_" target="SomeObject">
        <!-- add exactly one command here -->
      </action>

    </actions>
  </event>

  <!-- add one or more events here -->

</events>
```

Every action has two attributes: **source** and **target**, which represents respectively the starting and receiving endings of the action. These attributes must be filled with the name of any object (as they appear in the 3D editor) or with the special value _self_, which indicates the object that owns the event, i.e. the objects you are configuring interactions for. The **target** is the object that will execute the command specified by the action, while the **source** is the object that *issues* the command. By specifying the _self_ value as a target, the action will be performed by the object that holds the event.

As you can see, the *<action>* tag essentially defines *"who (the source) asks whom (the target) to perform a specified command*. The command meant to be executed by the target is specified by the *<command>* and *</command>* tags. Each action must contain exactly one command, if you need more than one command for a specified event, you must define more than one action with their respective commands.

Here's an example of the definition of a command in the context of an action:

```
<action source="_self_" target="SomeObject">
    <command>hide</command>
</action>
```

Some command may require some parameters to work, in that case they are specified also by the *<parameters>* and *</parameters>* tags like this:

```
<action source="_self_" target="SomeObject">
 <command>loop</command>
    <parameters>
      <parameter name="loop">true</parameter>
    </parameters>
</action>
```

When parameters are required you must always provide the parameter's *name* as well as the *value* meant to be used when the command will be issued. The set of possible commands you can use are listed below:

Command name	Description & Parameters
Hide	The *target* object will be hidden even if any marker associated with it is currently detected.
Show	The *target* object will be shown if it was previously hidden by means of the hide command.

Visibility related commands.

The above commands apply to every kind of objects, but the plugin let you also use specific commands for multimedia objects like *Video Objects* and *Audio Objects*, these commands are listed below:

Command name	Description & Parameters
Play	The multimedia stream (either audio or video) associated to the *target* object will be played. The *target* object must be either a *Video Object* or an *Audio Object*.
Pause	The multimedia stream (either audio or video) associated to the *target* object will be paused. The *target* object must be either a *Video Object* or an *Audio Object*.
toggle_pause	The multimedia stream (either audio or video) associated to the *target* object will be paused if it was playing, otherwise it will be played. The *target* object must be either a *Video Object* or an *Audio Object*.
Rewind	The multimedia stream (either audio or video) associated to the *target* object will be set to its initial state. The *target* object must be either a *Video Object* or an *Audio Object*.
Loop	The multimedia stream (either audio or video) associated to the *target* object will be set to loop if the mandatory parameter whose name is "*loop*" contains the **true** value, otherwise the stream will be played just once. The *target* object must be either a *Video Object* or an *Audio Object*.
go_fullscreen	The video stream associated to the *target* object will occupy the whole window, thus hiding all the other objects and even the camera stream. The *target* object must be a *Video Object*.
resign_fullscreen	The video stream associated to the *target* object will restore itself as a texture on the corresponding *Video Object*. The *target* object must be a *Video Object*.

Multimedia Objects related commands.

As you can see, some commands must be defined by specifying one or more parameters, while others do not need any.

Note: since SketchUp™ does not support objects' animations, all the commands related to animations were not listed.

Reminders

For your convenience, it is useful to summarize what we have been saying so far:

- interactions are specified by means of *XML files*, also referred as events file
- each object can be assigned *1 and only 1* events file, if no custom events file is assigned then default events file will be used
- custom interactions are defined by a list of *events* and related *actions* to be performed when the corresponding event occurs
- you can choose from a number of predefined events (refer to above tables for details)
- actions are defined by exactly *one command* and eventually by *one or more parameters* (refer to above tables for details)
- actions are specified by a *source* and a *target* object: the semantic of an action is "*the source asks the target to perform the specified command with provided parameters*"
- the *source* of an action is always set to the predefined value *_self_*
- the *target* of an action can be either *_self_* (the command will be executed by the object itself) or the name of an arbitrary object as it appears in the 3D editor

Please note that you can find various tutorials which show some practical examples on how to build Interactions' files on the product's page, available at:

http://www.inglobetechnologies.com/sketchup_plugins.php

Actions

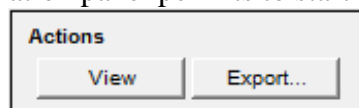This section of the Marker Configuration panel permits to start the AR processes.

Figure 18 - Marker related actions - Marker Configuration dialog's excerpt

Clicking on the <u>View</u> button will start the Augmented Reality experience.

Clicking on the <u>Export</u> button will start the exporting process.

Viewer Interactions

During the viewer execution, you can switch between different management modalities using the function keys: each one permits you to adjust different parameters and interact with the AR scene in real-time. You can bring up an on-screen help which contains all the supported commands for the current active mode by hitting the 'h' key at any time.

The following sections will offer a brief description of each mode and then a summary table of all supported commands.

Visualization Management Mode

This mode permits you to adjust the visualization parameters regardless of AR content that will be displayed. All operations performed in this mode will affect the global scene and all the 3D objects.

This mode is especially useful when you want to adjust to different camera and monitor configurations like in-built webcams and projectors (which are sometimes set up to flip the image output vertically).

Note that this is the initial mode in which the Viewer will be every time is started.

Object/Scene Interaction Mode

This mode permits you to configure the global scene with respect to the markers. This mode is useful for demonstration reasons, to quickly change the global display of a model in real-time.

In fact, you can scale the whole model up or down to emphasize the details of 3D objects.

You can also highlight (reveal) occluder objects to quickly adjust them into the real environment.

Animation Management Mode

Not available for this version.

Sound Management Mode

This mode permits you to interact with the soundtrack which has been previously configured.

You can cycle between selected tracks or pause/restore the audio playback in real-time in order to smoothly adapt to different scenarios.

Layers/Sequences Management Mode

This mode permits you to manage layers and timed slideshows. You can switch between two different modes:

- *Layers:* this is the "classic" display mode, in which all layers are visible at the same time. You can then toggle layers' visibility by using the respective numbers' keys.
- *Sequence:* this mode displays each layer for a selected amount of time, then it hides the current layer and displays the next one. You can pause/restore this "slideshow" visualization by simply hitting the Spacebar.

Note that if you did not manually set specific layers for your 3D objects, they will be automatically placed in the base layer (the 0 layer). In this situation you can hide/show the whole model by hitting the '0' key.

Clipping/Sectioning Management Mode

This mode permits you to show and interact with the clipping planes of the 3D objects in the scene to perform real-time sectioning. By sectioning your models you can look inside them and interactively move the section as you wish. Note that in order to start the sectioning command one and only one marker must be visible because clipping planes are bound to the currently visible marker (the default position of these planes are placed on the faces of a cube whose bottom face is over the marker and whose side is 80.0 units wide).

Note: in order to perform all the actions described below, clipping/sectioning must be 'enabled' by using the corresponding key (refer to the table below for details).

Tracking Management Mode

This mode permits you to adjust some parameters that will help you to improve tracking performances.

For instance, modifying the lighting threshold will allow you to recognize the marker even in bad lighting conditions (too dark or too lit environments) and it is useful if used in combination with the lighting debug mode (see below for details).

You can also modify the tracking smoothness factor: this parameter is what modifies the way 3D objects follow the marker movements on the screen.

A low factor will make 3D objects appear to have "inertia": they will tend to remain to their position despite marker movements. This is useful when the marker is not moved much and in a slow way during the Augmented Reality visualization, so the objects will appear more stable and especially in those cases when you experience jittering because of bad lighting conditions.

Instead, a high factor will make 3D objects strictly follow the marker movements. Remember that a very high factor will magnify all the little movements of the markers (even the ones that are due to the camera adjustments to the lighting conditions), so it may result in 3D objects which appear unstable.

Lighting Management Mode

This mode permits to manage the light source eventually available in the AR scene and the shadows casted and received by the 3D objects.

You can freely move and rotate the light source in the 3D space during the Augmented Reality visualization in order to display different light configurations.

Since shadows are computed in real-time, there are two accuracy modatilities available:

- *Fastest accuracy:* this mode permits to gain more speed during the shadows calculation and display. This may result in a more responsive interaction with the model, especially in older computers' configurations.
- *Highest accuracy[12]:* this mode permits to have a better shadows' visualization, at the cost of more processing power.

You can also switch between two shadows mode:

- *Simple shadows:* this mode displays shadows as they are calculated from the 3D environment. This mode results in edgy and precise shadows, just like the ones that comes from a direct light.

---

[12] Please note that some textures may not be displayed in the desired way if this mode is active.

- *Soft shadows:* this mode will soften the shadows' edges. Please note that since this mode requires more processing power than the other one, you may want to switch to the 'Fastest' shadows visualization's accuracy to obtain good performances.

Note: this mode is only available when a Sun light has been added to a marker.

Note: the only supported light for this version is the Sun light that is a directional light, for this reason it is not possible to 'move' it using the interaction keys described below, on the other hand it is still possible to 'rotate' it and see how shadows change in realtime.

Commands and Interactions' Summary

The following table summarizes all the keys' interactions available during the Augmented Reality visualization.

| Description	Key
Visualization Management	F1
flip the video horizontally	← or →
flip the video vertically	↓ or ↑
toggle fullscreen visualization ON and OFF	F
toggle wireframe visualization ON and OFF	W
Object/Scene Interaction	F2
scale up the model	S
scale down the model	⇧ Shift + S
Take back a full-screen video playback on the corresponding 'Video Object' (this behavior can be also achieved by clicking anywhere on the screen while the video playback is in full-screen). Hitting the key again will restore the full-screen playback, but only if a corresponding resign_fullscreen action on the same 'Video Object' had not been issued in the meanwhile.	F or ⇧ Shift + F
toggle Occluder objects' highlighting	O
Animation Management	F3

Not available for this version

Sound Management	F4

start the previous track	← or →
start the next track	↓ or ↑
rewind the soundtrack	←
toggle the soundtrack playback ON and OFF	↵

Layers/Sequence Management	F5

show the previous layer	← or →
show the next layer	↓ or ↑
switch between the layer/sequence mode	↵
pause the sequence visualization	space
show all layers	⇧ Shift + U
hide all layers	U
toggle respective layer visibility	0 … 9

Clipping/Sectioning Management	F6

move clipping plane away from the marker	↓
rotate clipping plane clockwise with respect to the marker	←
rotate clipping plane counter-clockwise with respect to the marker	→
move clipping plane towards the marker	↑
disable Clipping mode	←

show all clipping planes	space
enable Clipping mode	↵
activate respective clipping plane	1 … 6
show respective clipping plane	Alt + 1 … 6
select respective clipping plane	Ctrl + 1 … 6
activate all clipping planes	A
deactivate all clipping planes	N
select clipping plane of a 3D object	
Tracking Management	F7
increase lighting threshold	→ or +
decrease lighting threshold	← or −
increase smoothing parameter (increase objects' stickiness to the marker)	↑ or ⇧ Shift + A
decrease smoothing parameter (decrease objects' stickiness to the marker)	↓ or A
toggle lighting debug mode	D
reset lighting threshold	space or 0
Lighting Management Mode	F8
Toggle light source visibility	space
Rotate light source around its local X axis	Q and A
Rotate light source around its local Y axis	W and S
Rotate light source around its local Z axis	E and D

Set shadow mode to 'Simple'	Ctrl + 1
Set shadow mode to 'Soft'	Ctrl + 2
Set visual accuracy to 'Fastest'	Alt + 1
Set visual accuracy to 'Highest'	Alt + 2
Show only shadows (only for 'Highest' accuracy mode)	Ctrl + 0
Show shadows and textures (only for 'Highest' accuracy mode)	Alt + 0
On-screen help	H
Terminate the execution and take you back to SketchUp™	Esc

Lighting Debug Mode

Lighting debug mode allows you to adjust parameters in order to track markers even in bad lighting condition. By entering the "Tracking Management Mode" and then hitting the 'd' key the video will turn into black & white showing you the way the software 'sees' reality and in particular how the printed marker is seen. In order to have a good tracking or even to just have your models appear on markers, they must be clearly detected, if they are not then you can use the '+' or '-' keys in order to improve detection.
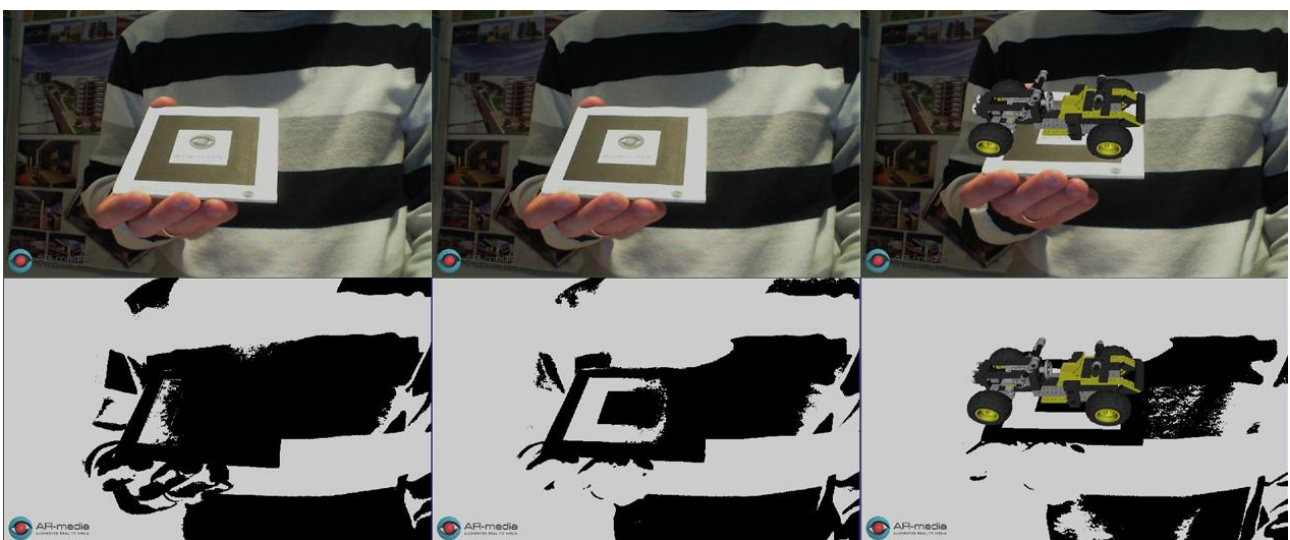
Lighting debug mode in action.

In the above image, the upper row shows the video from the camera and the lower row shows the video in 'lighting debug mode'. From left to right you can see how, at the beginning, some

reflections on the right side of the marker make it appear almost black in lighting debug mode and so it is not detected and the model doesn't appear; when you hit '+' several times the situation improves and the marker becomes clear and the model is displayed as well; by hitting the 'd' key again you exit from the lighting debug mode. When you have darker scenes you can use the '-' key instead of '+'. Note that even though the black & white image changes as you use the '+' or '-' keys, the original video doesn't change.

Exporting Models

When you export your models the plugin will create a file with the name you provide and the .armedia extension. The .armedia file format is the format used within AR-media™ tools and technologies. In order to experience .armedia files in Augmented Reality users have to download and install the free AR-media™ Player available on the Inglobe Technologies website. Once the Player is installed, users simply have to double-click the .armedia file to start their experience. Although the Exporter refers to specific content creation software (such as SketchUp™), exported files do not require any software but the free AR-media™ Player to be displayed.

iOS/Android Exporter

Currently, the provided iOS/Android exporter comes with some limitations which are directly related to the nature of the iOS/Android devices.

First of all, the resulting .armedia file is fully compatible with the standard AR-media™ Player, so you can quickly preview the result of the export process without import it in an iOS/Android device.

The main limitations of the exporter are the following:

- occluders objects are not supported. Any configured occluder object will be displayed as any other 3D object during the AR visualization.
- audio objects (as well as soundtracks) are not exported yet
- video objects will be visualized but some limitations apply: video playback will automatically start when the marker is recognized and will restart when finished. Moreover, chroma key videos will be displayed as normal videos.
- custom interactions are not supported. The only interaction you can perform during the AR visualization is start/stop the animation of all objects by tapping on the device screen.
- the exported model will be displayed on the chosen marker (linked or multiple markers are not supported yet)
- advanced features like real-time shadows, layers and sectioning are not supported by the iOS/Android player.
- The Android player does not support audio playback.

Please also note that the current hardware available on iOS/Android devices offers limited performance, so please be aware of that if you are creating models which must be viewed on iOS/Android devices.

Visit the ARPlayer web page for more information about the ARPlayer capabilities and for tips on how to build 3D models to be displayed efficiently in iOS/Android:

http://www.inglobetechnologies.com/armedia_player.php

Marker creation utility[13]

The Professional versions of the Plugin come with a marker creation utility that allows to create custom markers by simply specifying a name and an image file.

Input specification

As you can see in the figure below, the marker generation utility provide three input boxes to fill:

- **Marker name**: provide a valid alphanumeric string that fully describes the marker. This name is what will be displayed in the Marker Library and Active Markers' List of the Plugin.
- **Input image**: choose a file containing one or more markers.
- **Output**: choose a file name and a folder to save the output files. The file name you specify will be used to create output files with similar names.
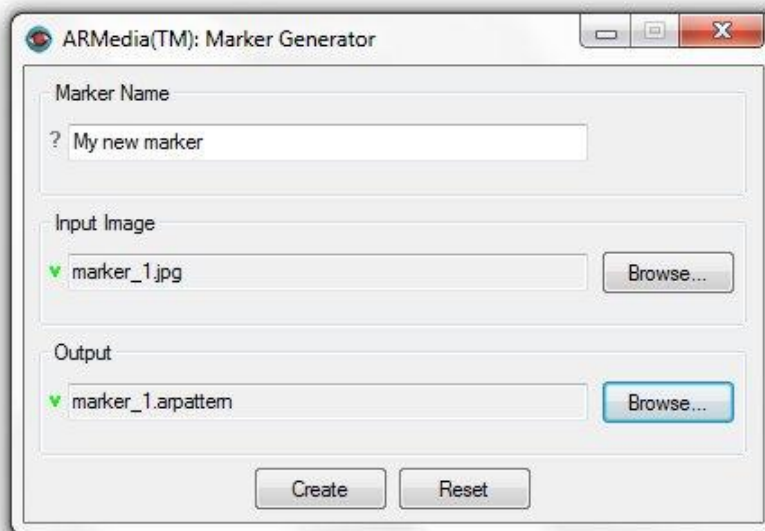

Figure 19 - Marker creation utility interface

By clicking on the <u>Create</u> button, the utility will check the specified name and will analyze the input file to search for valid marker images. At the end of the analysis process, a small window highlighting the marker images will appear. If one or more error occurs during the process, you will be advised by an error message and eventually, a red "!" will be shown beside one of the input boxes.

To cycle over all the recognized patterns and select the one you want to generate, you can use "+" and "-" keys. The currently selected pattern will be highlighted by a green rectangle. The figure below shows an example of a file containing two marker images correctly recognized.

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[13] In order to use the marker creation utility Apple QuickTime™ is required.
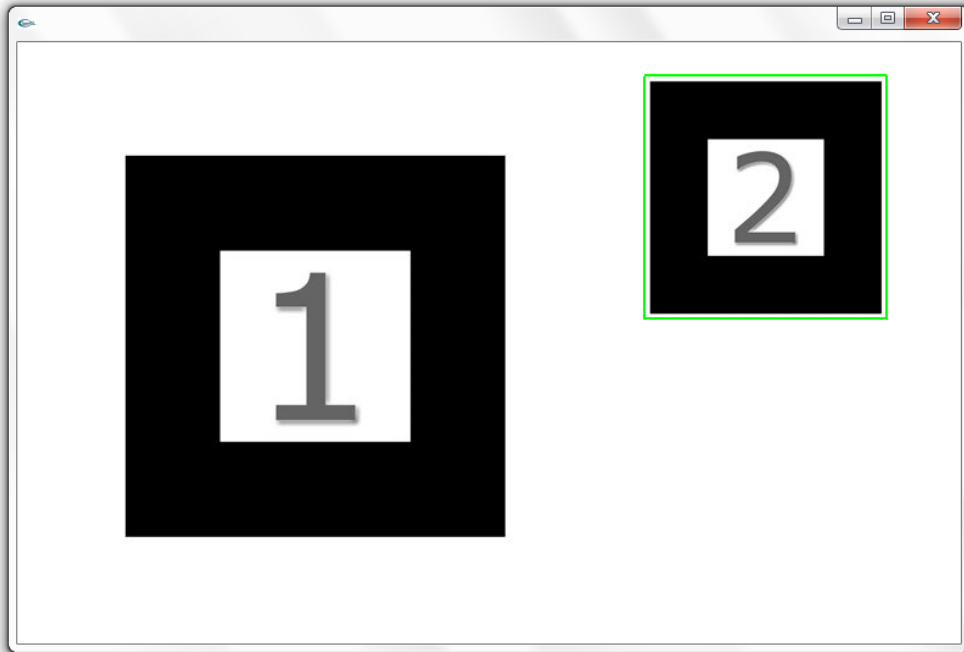
Figure 20 – Analysis window's example

By clicking on any point in the window, the utility will generate all the files and then open the output folder.

Below are shown two analysis windows which describe respectively a situation with no markers found and with one marker correctly found. Please notice the slightly white border present on the second image that triggers the correct analysis.

Figure 21 - Analysis windows - Invalid marker and valid marker cases

Currently, there are only a few things to consider in order to correctly generate a marker:

- Supported image types: jpg, jpeg, bmp, tga, png, tif, tiff, with RGB color model.
- Image files dimension: the images you can select must be files up to 1024x1024 pixels (greater resolutions might not work properly).
- Marker image specification: the image present in the input file MUST have a slightly wide white border to be recognized as a valid marker by the application. Images that do not have this border will not be recognized as valid.

- Marker image position: if an image's border present in the input file is not orthogonal with respect to the image canvas (see image below), the utility will still recognize the image as a marker but it will not automatically generate the preview and texture files. Importing this marker into the Plugin will result in using the default "No marker preview" and "No marker texture" files. However, this marker will still be usable as any other marker because all of the necessary files are generated.

Figure 22 - Non orthogonal marker image

Output files

In best cases, the utility will generate 4 files:

- One ".arpattern" file that is used by Plugin to extract the marker information. This file is the one to choose by clicking on the Add... button in the *Marker Library Section* (see the "Customize the Marker Library" section*).*
- One ".patt" file used to correctly recognize the marker during Augmented Reality experiences.
- Two ".jpg" files representing the preview and the texture used by Plugin to display the marker information to the user: a thumb JPEG file with resolution of 128x128 pixels and a Preview file with a resolution of 512x512 pixels. Please note that these two files will not be created if the source image is not orthogonal with the image canvas (for more details see previous section).

These files will eventually overwrite previously existing ones in the same folder, so be sure to save the other ones on a different location or to choose a different folder.

When exporting a scene that uses customized markers, users do not have to worry about distributing any of the files generated by the Marker Generator Utility but only the .armedia file that will everything needed to be played (of course users should provide some printable versions of their customized markers).

Licensing

In order to use the full capabilities of the AR-media™ Plugin you need to:

1) register yourself

2) buy one or more licenses

3) download the registered version of the plugin

4) follow the activation procedure

Each step will be now described in more detail.

Registering

You can register yourself by pointing your browser at the following URL:

http://www.inglobetechnologies.com/register.php

After successful registration you'll be prompted to access the SketchUp Area in order to:

1. buy new licenses

2. download the last registered versions of the plugin

3. recover from a license problem

4. request and download personal customizations

The *Online License Manager*'s control panel also summarizes the number of purchased licenses as well as the number of currently active licenses. License activation and management will be described later.

NOTE: at the end of the registration process, a license for the *FREE version* will be immediately available for you.
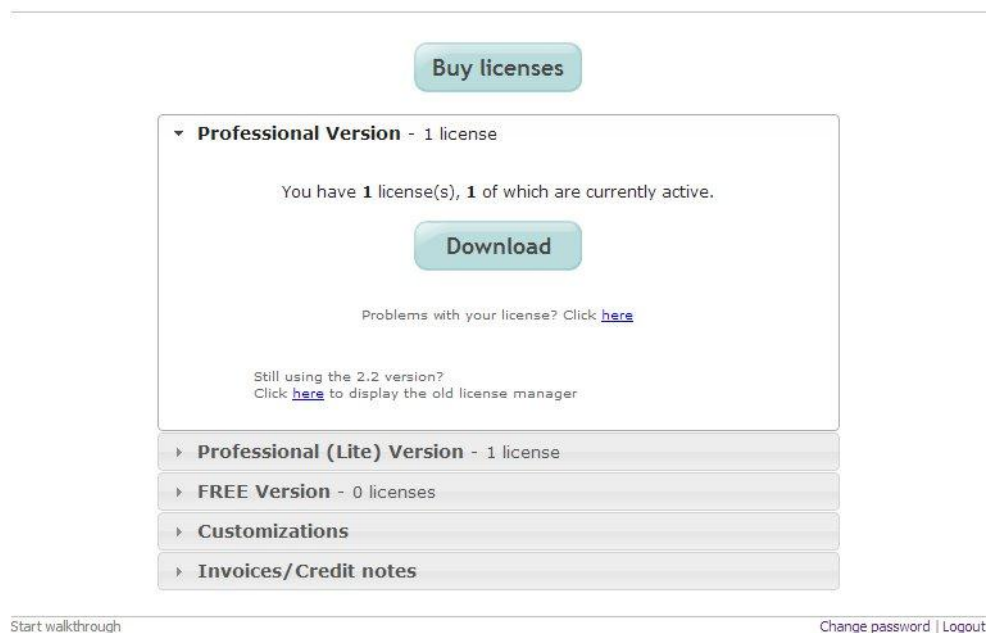

Figure 23 - Online License Manager's control panel

You can always access the control panel by using the previous URL and your registration credentials.

Buying licenses

To buy a new license, you need to click on the "*Buy licenses*" button from the *Online License Manager*'s control panel. After submitting your billing information, this will bring you to the purchase's page where you can click on the PayPal™ button to start a standard PayPal™ procedure. Please note that if you need more than one license, you can set the desired quantity during the PayPal™ checkout procedure. If you prefer to agree on other payment methods you can contact the licensing service (see below for contacts details).

Downloading registered versions

After the registration or buying a license you'll be able to download the registered versions of *AR-media™ Software*.

In order to download the *AR-media™ Plugin* you must click the link that will be displayed at the bottom of the relative version available in the *License Manager'*s control panel.

Before installing the latest available version, it is recommended to remove any previously installed version (both Free and registered)[14]. You can always refer to the download section for the latest registered version available.

Licenses management[15]

Licensing for the *AR-media™ Plugin* is based on the following actions:

1) license activation
2) license release

License management actions require you to use the local *AR-media™ License Manager* that is installed with the plugin and that can be found in the Plugin program group. Please refer to the following section for instructions on how to activate and release a license.

IMPORTANT: to activate or release a license you need a working internet connection, otherwise the operation will not be performed.

License Activation: allows you to unlock your registered version. Unless you activate your plugin, it will still run with the time limit. In order to activate your plugin, follow these steps:

1) On the machine you need a license for, run the local License Manager that was installed with the plugin:

---
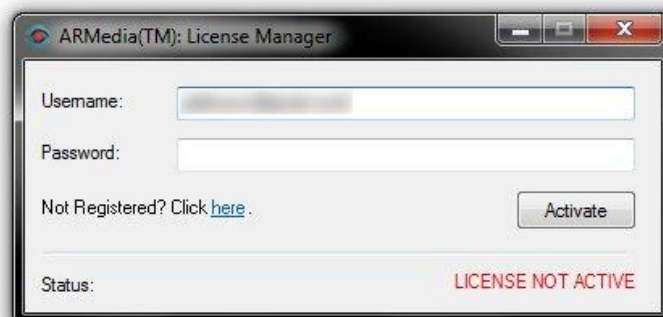
[14] If you're removing an installation that has been already activated with a license, make sure to release the corresponding license before actually removing it. Refer to the licensing management section for details.

[15] In order to buy, activate or release a license you must have an Internet connection available.

2) Input the *Username* and *Password* needed for server-side authentication. These are exactly the ones which you selected when you registered on our website.

3) Click the **Activate** button to start the activation process. If everything is correct, your license will be activated and the windows will look as follows:
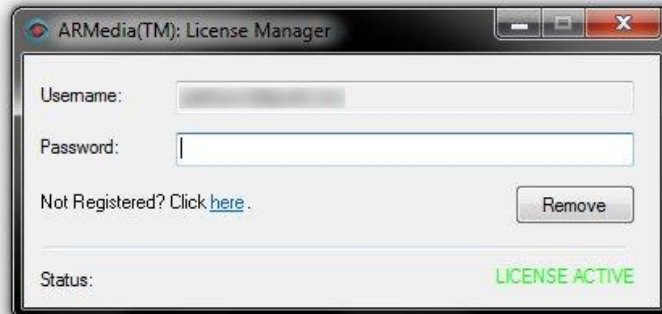
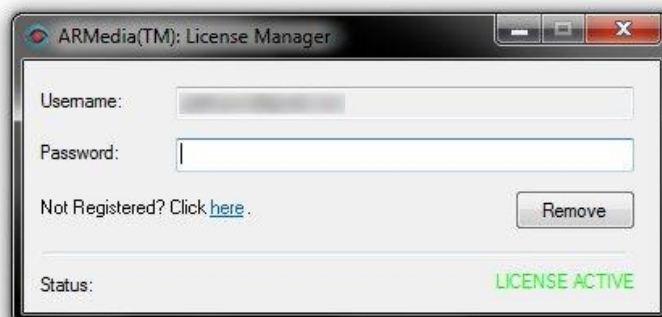Please note that the activation procedure can fail for the following reasons:

- *No internet connection available*: make sure you have a working internet connection. Make sure you don't have a firewall blocking connections or your antivirus.
- *The licensing server is unavailable*: just wait a little bit and try again.
- *Invalid user credentials:* the username and password you submitted are not valid.
- *Not enough licenses available:* you have no licenses available to activate.

License Removal: allows you to remove your previously activated license so that you can re-use it. Only correctly activated licenses can be released. Typically you'll need to release your license in the following scenarios:

1) when you need to uninstall or re-install the plugin or the operating system

2) when you need to move your license from a computer to another

License release is achieved by following these steps:

1) execute the local License Manager:

2) Input the *Password* needed for server-side authentication. This is exactly the one which you selected when you registered on our website. Note that the displayed *Username* will be the one you previously used during the activation process.

3) click the **Remove** button, a confirmation message will pop up

4) Confirm the operation and if everything is correct, your license will be released.

Please note that the release procedure can fail for the following reasons:

- *No internet connection available*: make sure you have a working internet connection. Make sure you don't have a firewall blocking connections or your antivirus.
- *The licensing server is unavailable*: just wait a little bit and try again.
- *Invalid user credentials:* the username and password you submitted are not valid.

The *Online License Manager'*s control panel will be updated with the information regarding your current active licenses. Once your license has been released, the plugin will run with a time limit again, and you can use your license with another computer or for a new installation by repeating the License Activation procedure described earlier.

Request license deactivation: if you are unable to release a license anymore because the uninstaller failed or you forgot to release your license manually:

1) Log into your user's area
2) Click on the link which permits to manage your licenses for the product
3) Follow the link that appears just under the form
4) Click on the button to submit the request for a deactivation.

Submitting this request will inform our Licensing service that will provide a manual release of one of your license. Please note that this operation requires the analysis of your request by the licensing/support team, so it could take some time before one of your licenses will be actually released. At the end of the administrative process, you will receive an e-mail notification.

WARNING: this operation cannot be repeated if you already submitted a request. You will be able to issue a new request only after the licensing/support team has processed your previous one.

Legacy versions

If you are still using a version of ARPlugin which provides the old license mechanism, please see the following topics on our forum:

- License Activation:
  http://www.inglobetechnologies.com/forum/viewtopic.php?f=20&t=1811

- License Removal:
  http://www.inglobetechnologies.com/forum/viewtopic.php?f=20&t=1812

License Type

Each license is valid for one seat only: you may install and use the full version of the plugin only on a single machine. In order to use the plugin on other machines you must purchase another license or transfer the license from a machine to another. Please refer to previous sections in order to understand licenses management tasks.

Customizations

By accessing the "Customizations" panel found at the bottom of the online *License manager*, you can request software customizations and download them when they are available.

Once the customization process is over, you will receive an e-mail notification containing the credentials to download the file from our site. In order to obtain your personal customization you have to:

1) Log into your user's area
2) Open the "Customizations" panel
3) Click on the link displayed
4) Provide the login credentials that you'll receive by email.

Support

Licensing Service

The user can refer to the Inglobe Technologies licensing service through the email address: licensing@inglobetechnologies.com. Please feel free to write for any licensing related questions.

General Help

For any problem or question you can write to: help@inglobetechnologies.com.