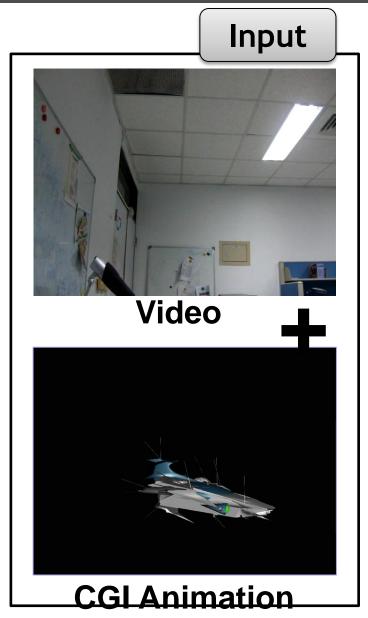
MatchMove

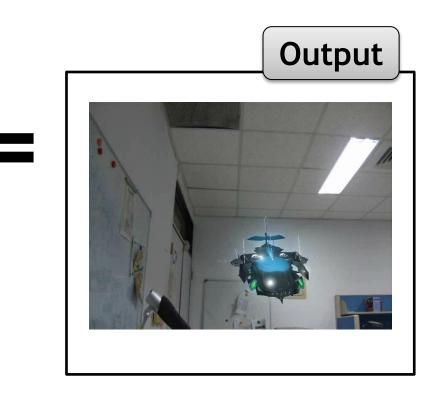
Digital Visual Effects, Spring 2013 *Tzu-Kuei Huang* (kuei@cmlab.csie.ntu.edu.tw) 2013/4/24



Flowchart

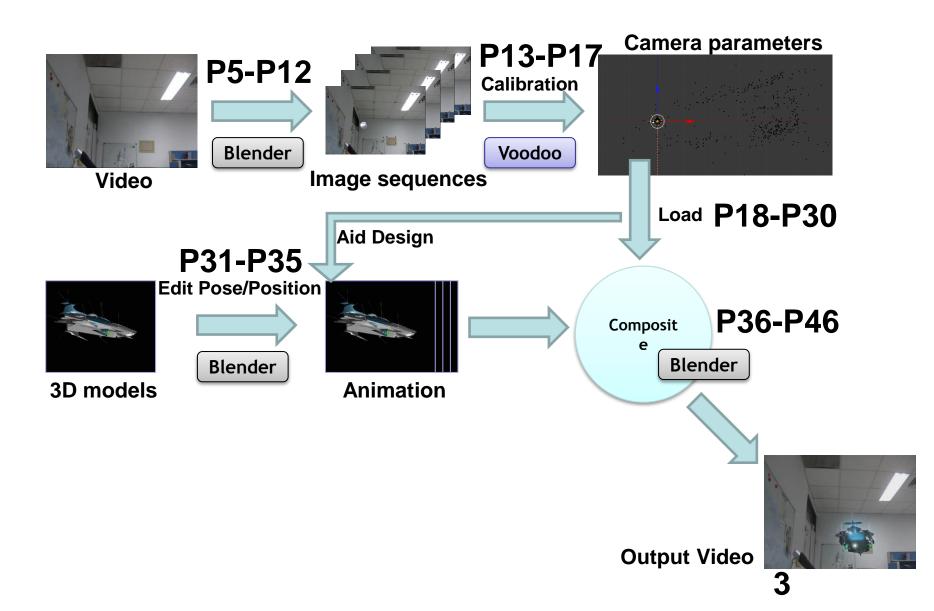


Matchmove is a technique of estimating camera parameters from an input video sequence so that computer generated imagery (CGI) could be seamlessly inserted into the sequence.



Flowchart (detailed)





Environment Setting

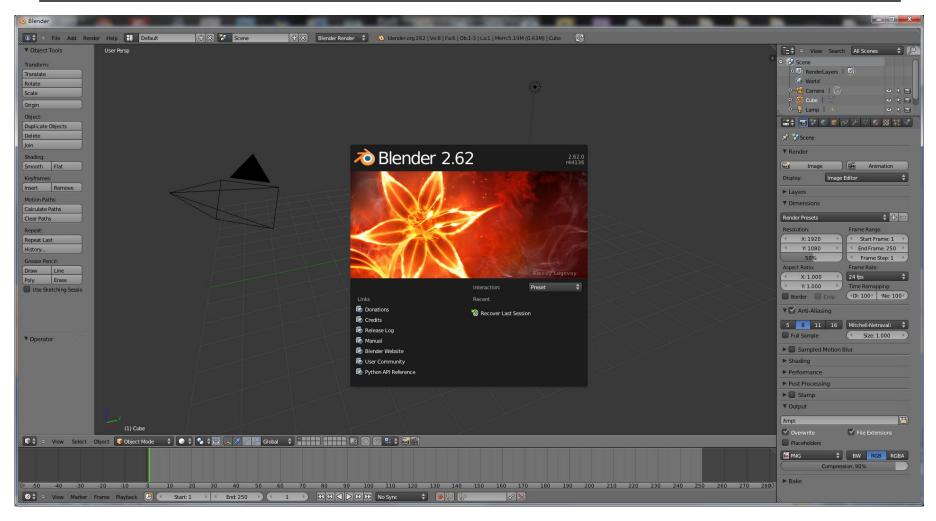


4

- Blender
 - Version 2.6.2 http://download.blender.org/release/
 - Using version 2.6.6 might get error while running python scripts
- Voodoo
 - Version 1.2.0 http://www.viscoda.com/index.php/en/voodoo-download
- Other options
 - Free: Blender + ICARUS
 - Pay: boujou + 3D Max, boujou + Maya, ...

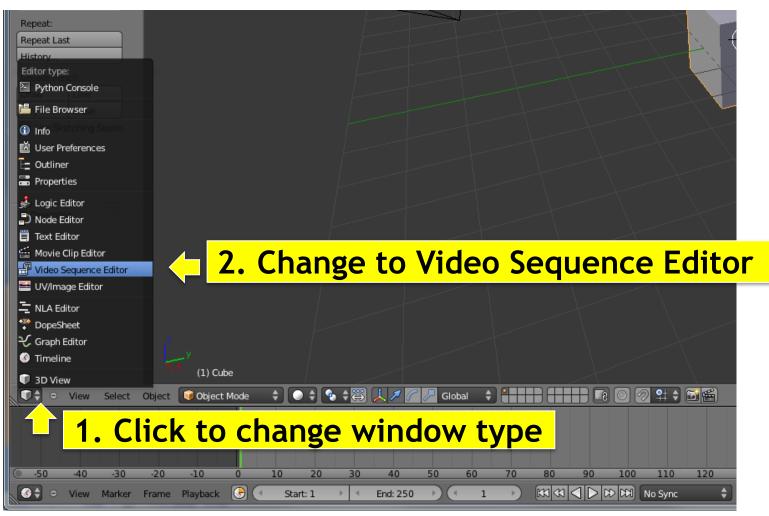
Recipe: Get Image Sequence

- Open Blender
- Load video file:
 - Change window type to "Video Sequence Editor"
 - Select Add \rightarrow Movie
 - Put the strip in Layer 1
- Do sequence:
 - Frame
 - Set number of frames and resolution of frames
 - Choose output file type (Targa)
 - Time interval: select start and end of the sequence
 - Choose output location
- Click "Animation" button

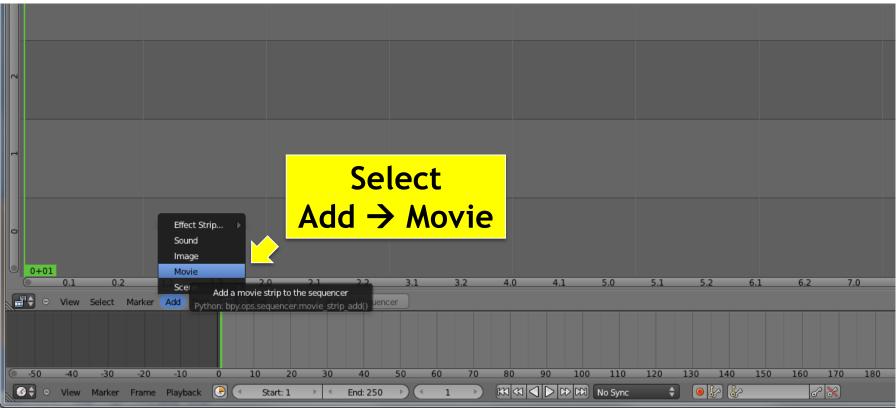


6

Start up Blender

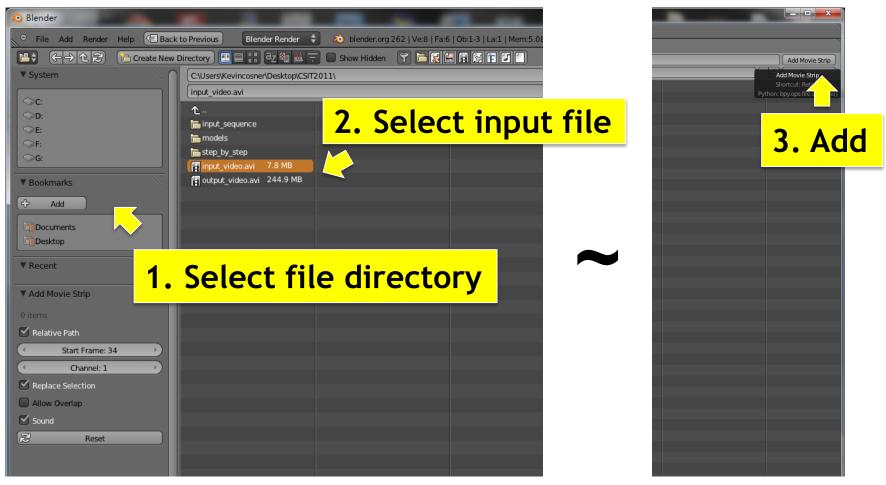


Change window type



8

Add video

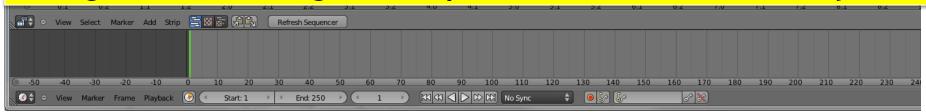


9

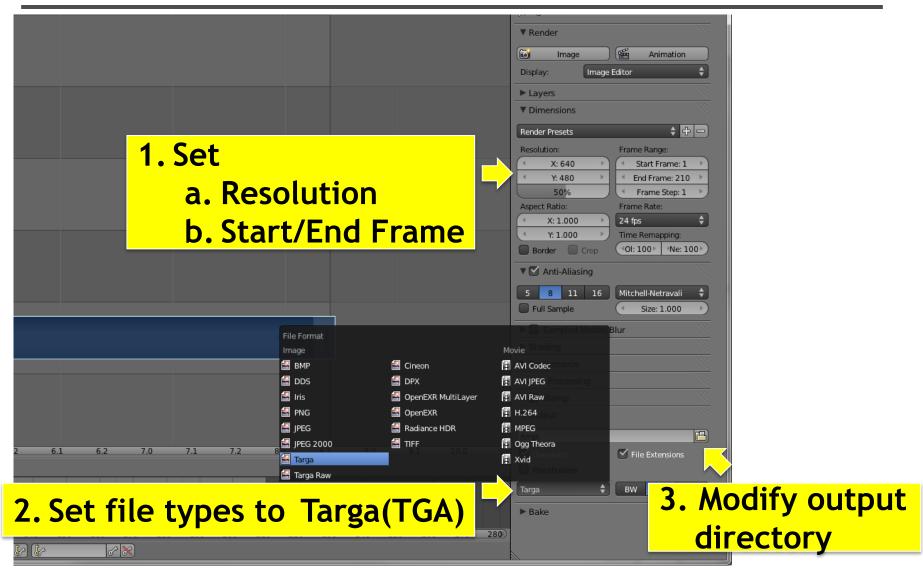
Select input video



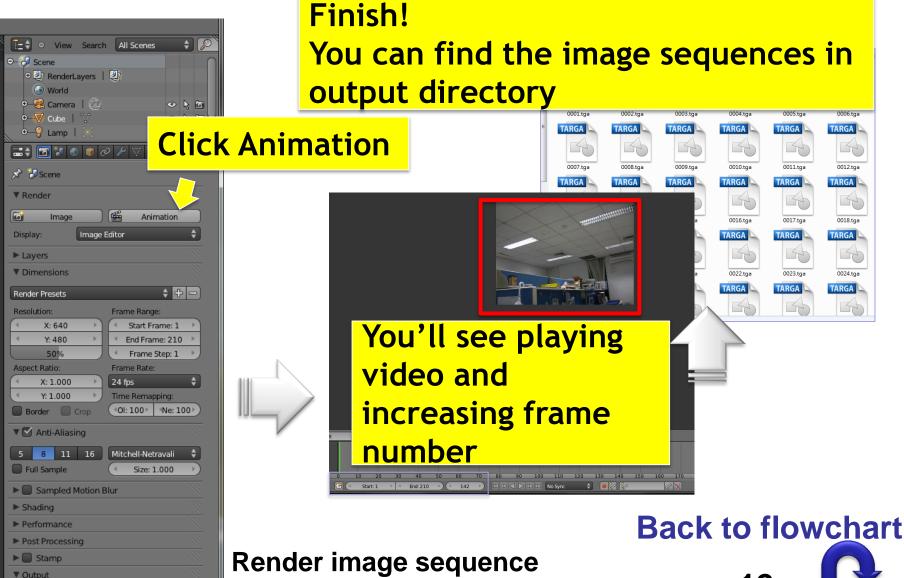
2. Right-click to drag the strip to the "1st Frame" in Layer 1



Edit layers (Right click and drag, left click to set)



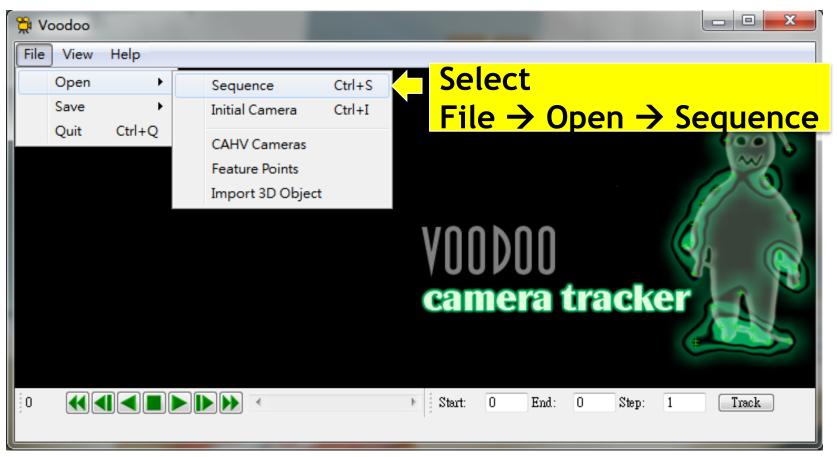
Do video setting





Recipe: Calibration

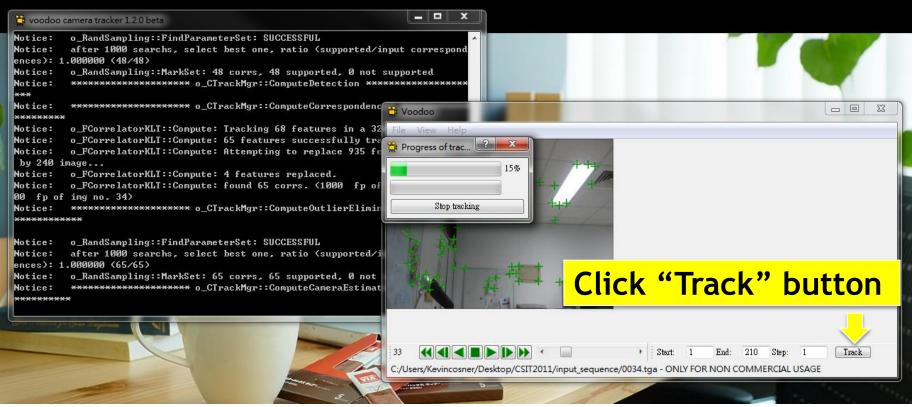
- Open Voodoo
- Open image sequence:
 - Select File \rightarrow Open \rightarrow Sequence
 - Select the first frame
 - Set Move Type to "free move"
- Track:
 - Click Track button
- Export Python script:
 - Select File \rightarrow Save \rightarrow Blender Python Script
 - Save .py file (Blender 2.5x and higher)



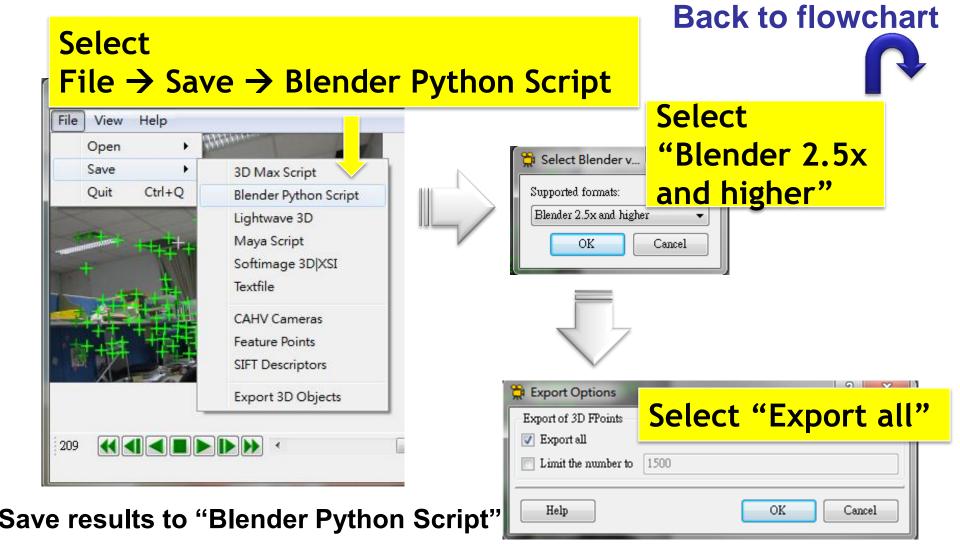
Use Voodoo to load image sequence

😤 Voodoo				
File View Help		1. Selec	t the fi	rst frame
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Save Initial C Quit Ctrl+Q	😭 Sequence Select			
Feature	Discharge C. III	osner/Desktop/CSIT20)11/input_sequence	Browse Help
	Start: 1	End:	210	
	Step: 1	Total	210	
	Interlace:	Move	Туре:	
2. Select "fre	free	on (camera on tripod)		
(general movin	ng of came	ra) 💷	001001	
	C F	Start: 0	End: O Step:	1 Track

Choose and set sequence



Tracking features



Recipe: Import 3D Motions

- Open Blender
- Delete default objects
 - Choose the object and press "Delete"
- Load Python Script
 - Change Window Type to "Text Editor"
 - Select Text \rightarrow Open Text Block
 - Select the .py file (exported from Voodoo)
 - Click "Run Script"

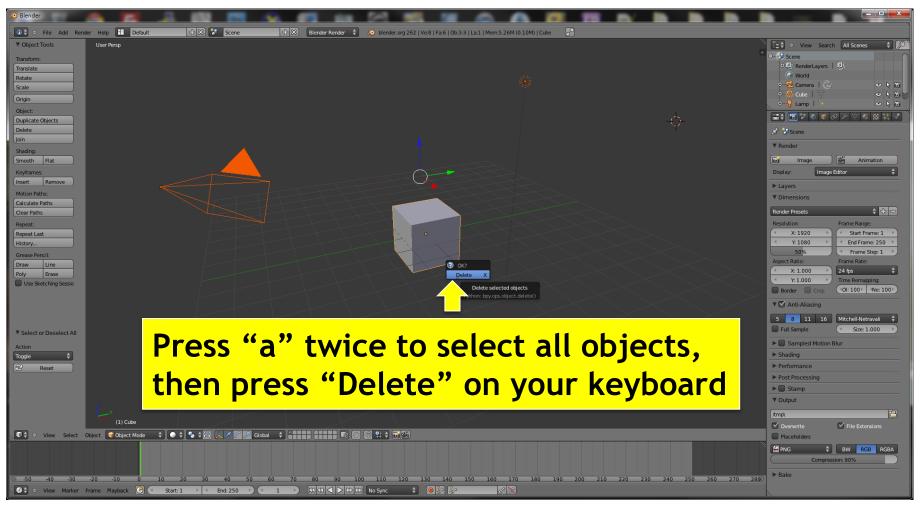
(cont.)

Recipe: Import 3D Motions

(cont.)

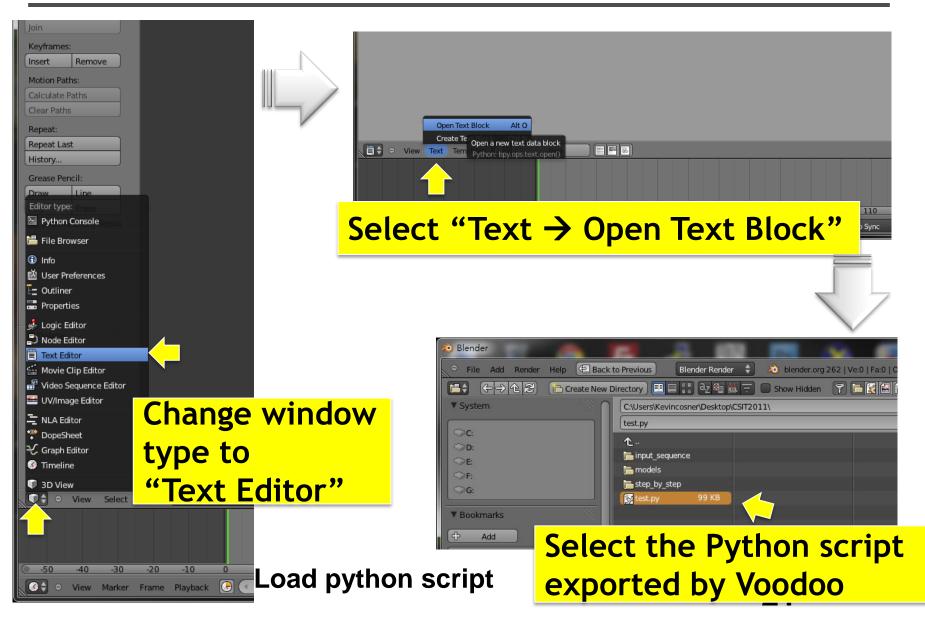
- Load Background Images
 - Change window type to "3D View"
 - Select View \rightarrow Cameras \rightarrow Set Active Object as Active Camera
 - Load background images
 - Set the parameters of background images
 - Change the view
 - View \rightarrow View Persp / Ortho
 - View \rightarrow Front
- Load models and edit their poses/motions in the video

Step by Step: Import 3D Motions



Delete default objects

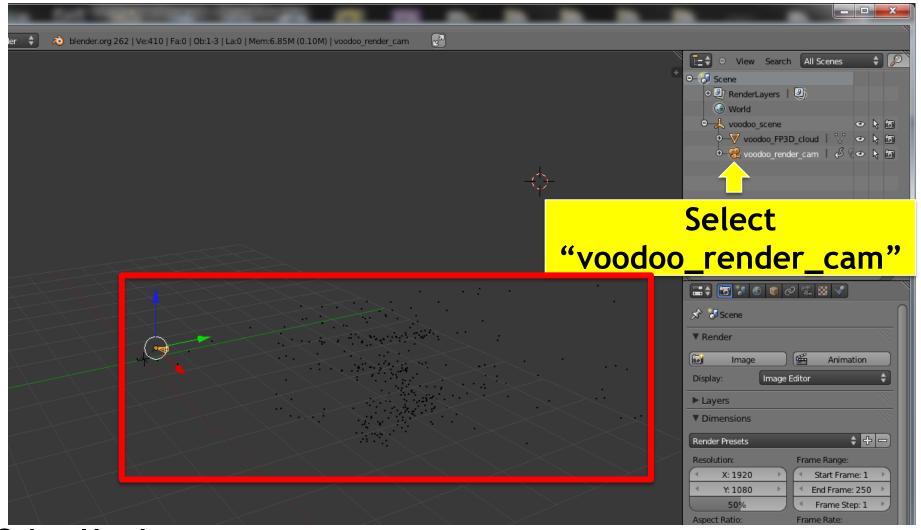
Step by Step: Import 3D Motions



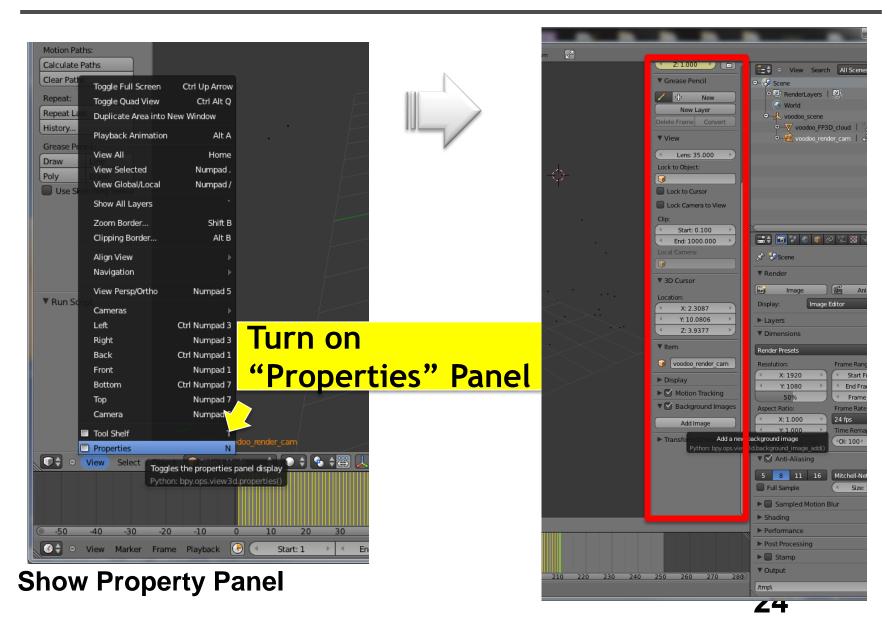
Step by Step: Import 3D Motions

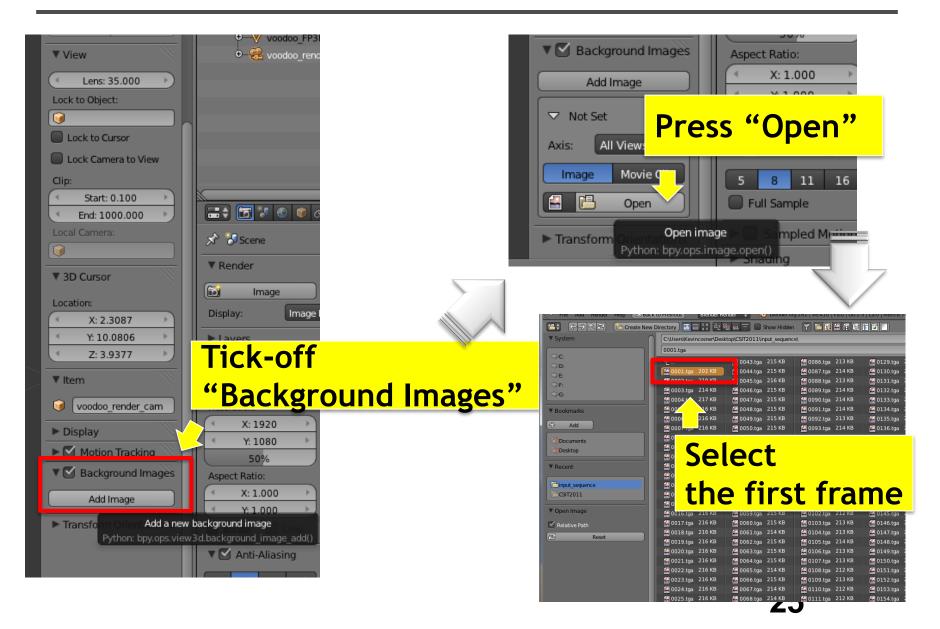
🐠 🗘 🕫 File Add Render Help 🔠 Default 🕂 🛠 🔀 Scene 🕼 🔀 Blender Render 🛊 🔊 blender.org 262 [Ve0] Fa3] Ob:0-0 [La3] Mem:S-90M (0.10M)	
<pre> # blender export (blender version 2.5x and higher) # created by voodoo camera tracker - www.digitab.uni-hannover.de # Created by voodoo amera tracker - www.digitab.uni-hannover.de # Created by voodoo render (and this python script into Blender's text editor and execute the script with ALT-P # USAGE: load this python script into Blendering your scene # use the voodoo render cam' for rendering your scene # use the helper object "voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the scene # use the voodoo_scene' to rotate, translate and scale the voodoo_scene' to rotate, translate and scale the voodoo_scene' to rotate, translate and translate and scale the scene # use the vo</pre>	Image: Second
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<pre>dummy.scale = (0.2, 0.2, 0.2) scene.objects.Link(dummy) data = bpy.data.cameras.new('voodoo_render_cam') data.tons_unit = 'DEGREES' vcam = bpy.data.objects.new('voodoo_render_cam', data) vcam.scation = (0.0, 0.0, 0.0) vcam.rotation = uler = (0.0, 0.0, 0.0) vcam.scate = _(1.0, 1.0, 1.0)</pre>	x Scene ▼Render
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<pre>mesh.rotation euler = (0.0, 0.0, 0.0) mesh.scale = (1.0, 1.0, 1.0) scene.objects.link(mesh) mesh.parent = dummy #Camera Parameters scene.rframe current = 1</pre>	
vcam.data_lens = 54.08324 vcam.matrix world = ([0.999089,-0.000551,0.004552,0.000000], [-0.000416,-0.999563,-0.029551,0.000000], [0.004566,0.029549,-0.999553,0.000000], [0.062943,-0.024483,-0.433771,1.000000])) vcam.keyframe_insert('location') vcam.keyframe_insert('rotation_euler') vcam.keyframe_insert('rotation_euler') vcam.dat.keyframe_insert('rotation)	(* Y:1.000 Time Remapping: Border Crop (*01:100) (*Ne:100) V Anti-Aliasing (************************************
scene.frame_current = 2 vcam.data.lens = 54.088324 vcam.matrix.world = ([10.9999880.000251.0.004864.0.0000001, [-0.0001070.9995620.029604.0.0000001, [0.004870.0.029603,-0.999550,0.000000], [0.064143,-0.024497,-0.438955,1.000000]))	5 8 11 16 Mitchell-Netravali © Full Sample (Size: 1.000) Image: Size: Size
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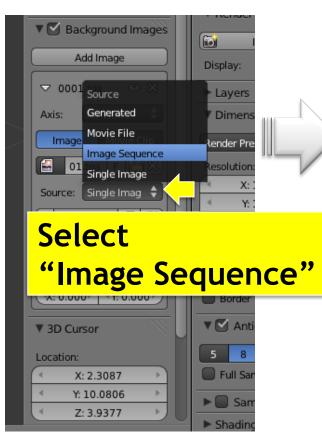
Run script



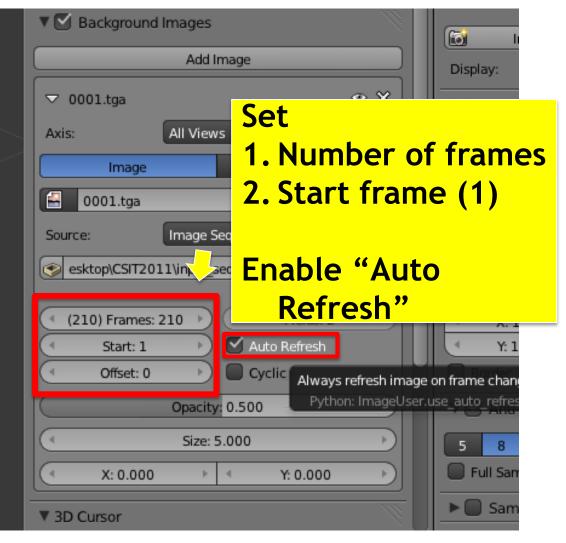
Select Voodoo camera



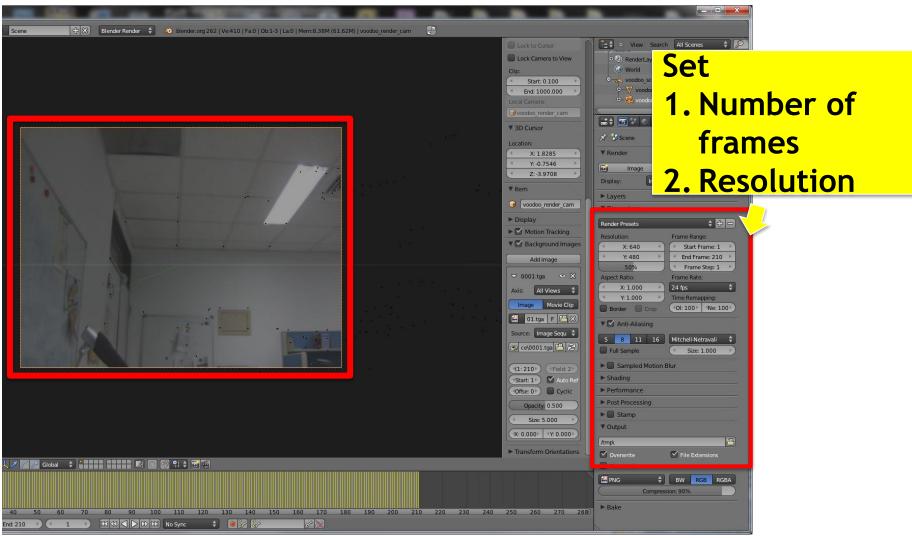




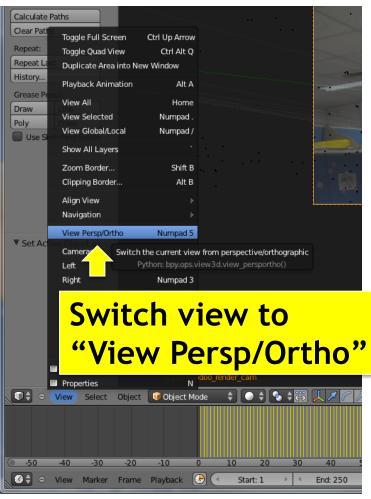
Change background type



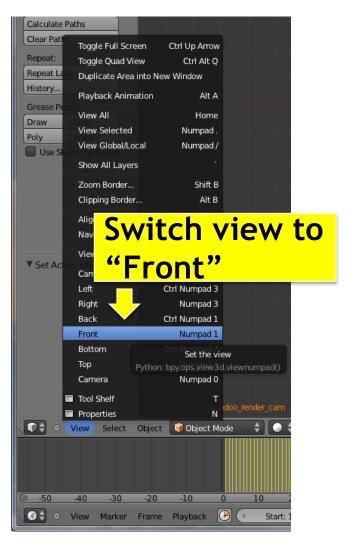
26



Set resolution

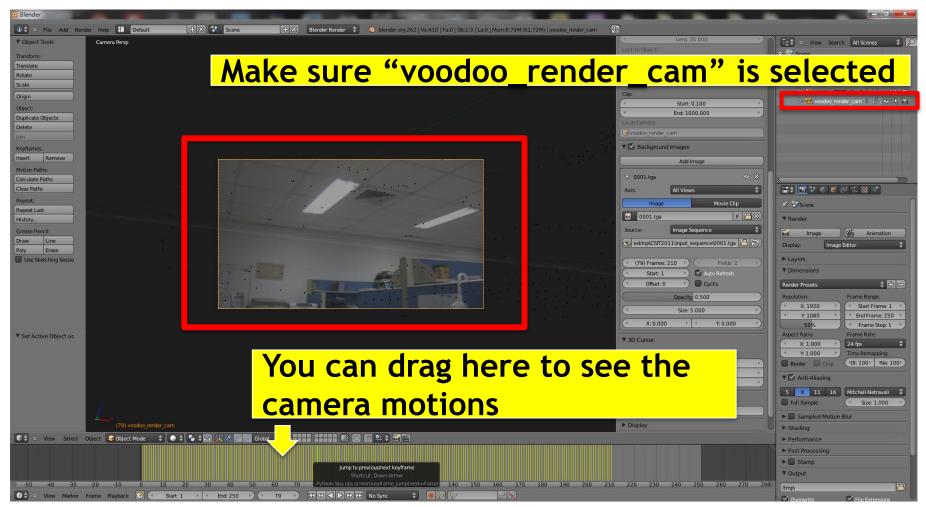


Set view



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Set active camera



Check background

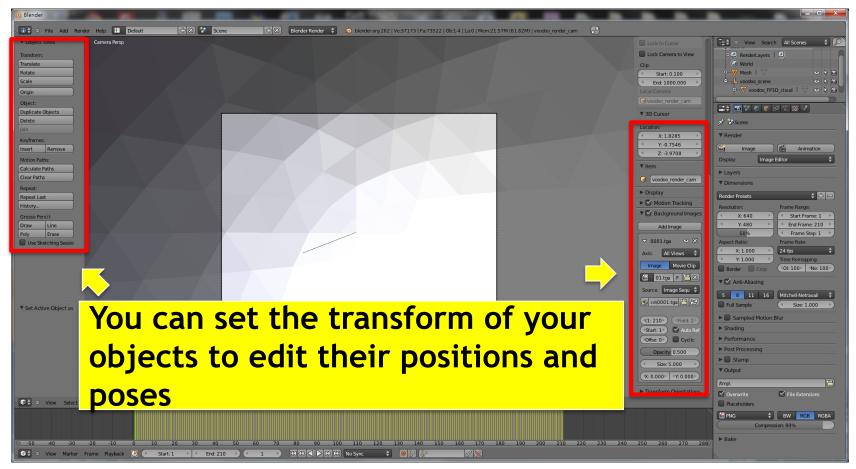
Back to flowchart

Step by Step: Load Models

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		(you can also use other file format)
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Set Active Object as		

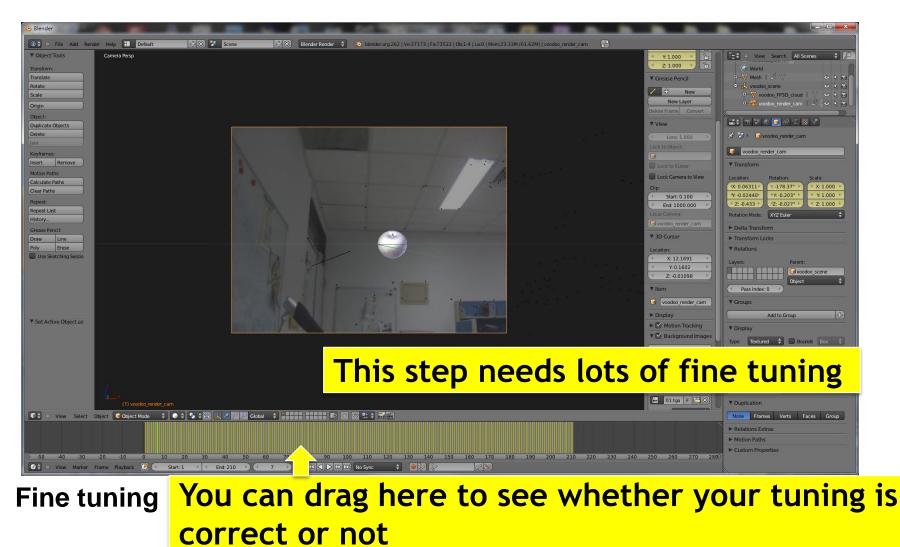
Load models

Step by Step: Load Models



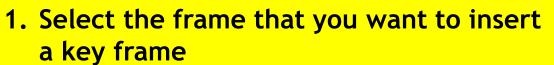
Set poses / positions for models

Step by Step: Load Models



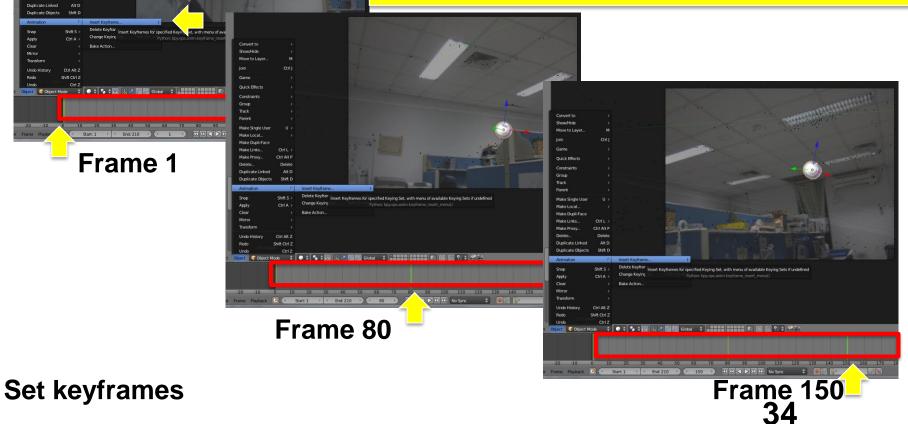
(is the object located at the correct position?)

Step by Step: Set Animation

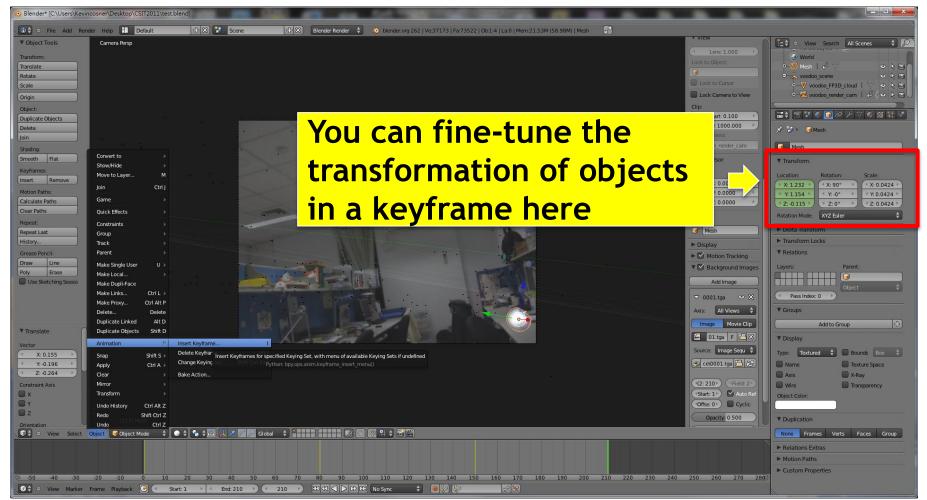


2. Select

- Object \rightarrow Animation \rightarrow Insert Keyframe..
- 3. Repeat multiple times



Step by Step: Set Animation



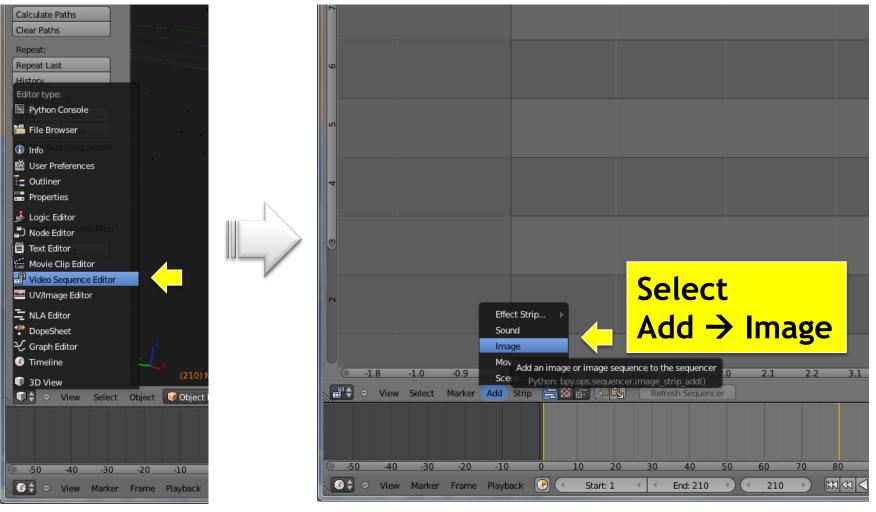
Fine tuning



Recipe: Compositing



- Add image sequence
 - Change window yype to "Video Sequence Editor"
 - Select Add \rightarrow Images and select all images
 - Drag the strip to the "1st Frame" in Layer 1
- Add scene
 - Select Add \rightarrow Scene
 - Drag the scene strip to the "1st Frame" in Layer 2
- Set Scene
 - Change scene property to "Alpha Over"
 - Set parameters of frame and video
- Click "Animation"

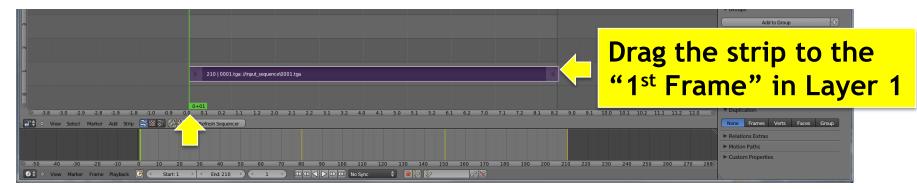


Set to Video Sequence Editor

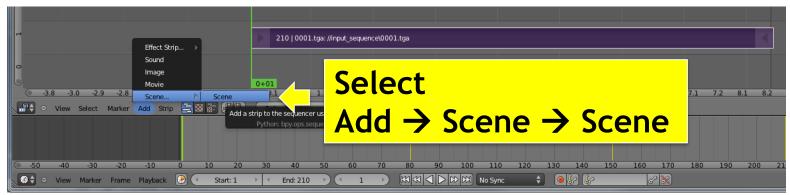
Add image sequence (Video Channel) 37

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	🔂 0042.tga 216 KB	🔛 0085.tga 214 KB	🔛 0128.tga 216 KB	🔚 0171.tga 212 KB		

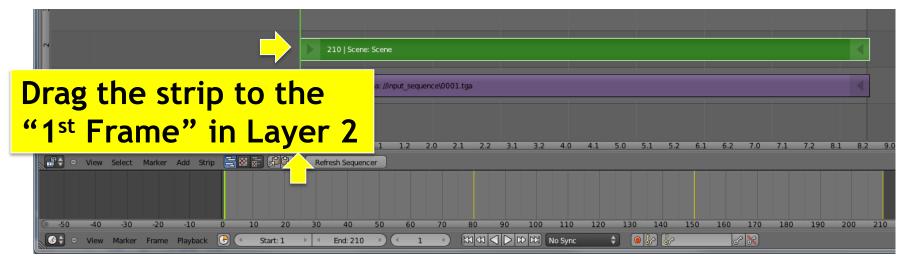
This time, select all frames (Press A)



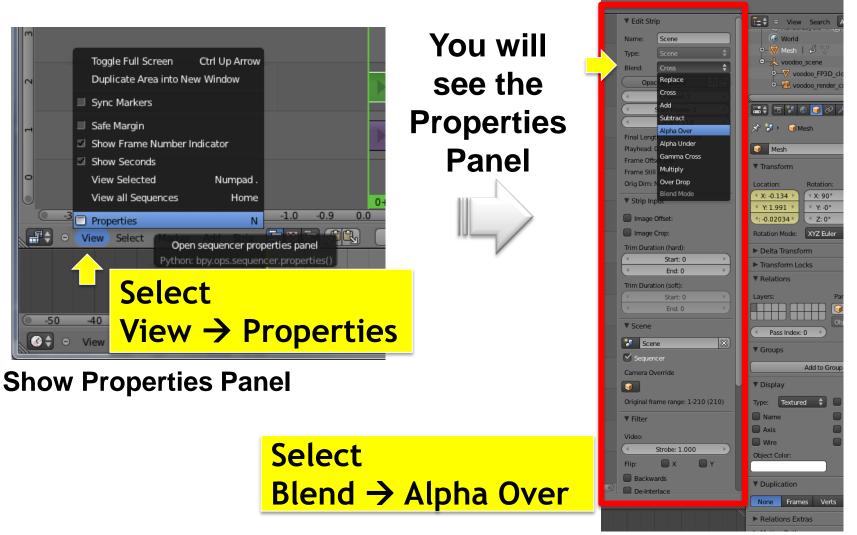
Edit Video Layer (Right click and drag, left click to set)



Add scene layer



Edit scene layer (Right click and drag, left click to set)

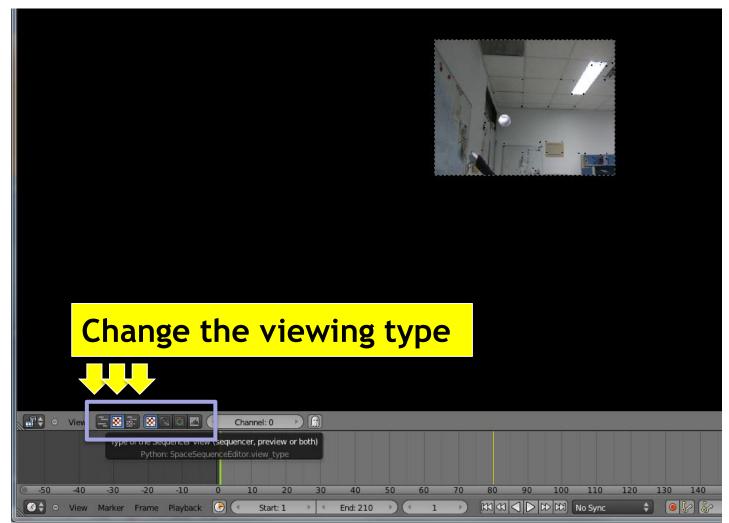


Set Blend Type 41

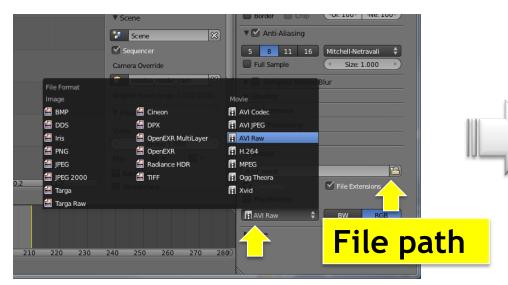
Frame Offset 0:0 Frame Still 0:0 Orig Dim: None Strip Input Image Offset: Image Offset: Image Crop: Trim Duration (hard): Start: 0 End: 0 Trim Duration (soft): Scene Scene Scene Scene Scene Scene Scene Scene Scene Scene Scene Stribe: 1.000 Flip: Stribe: 1.000 Flip: Stribe: 1.000 Flip: Sturation: 1.000 Flip: Scene Sturation: 1.000 Flip: Scene Sturation: 1.000 Flip: Scene Sturation: 1.000 Flip: Scene Sturation: 1.000 Trim Scene Sturation: 1.000 Trim Scene Sturation: 1.000 Trim Scene Sturation: 1.000 Sturation: 1.000	Set scene camera to "voodoo_render_cam"	Frame Still 0:0 Orig Dim: None Strip Input Image Offset: Image Crop: Tim Duration (hard): Start: 0 End: 0 Tim Duration (soft): Scene Scene <	World Wesh Wesh Mesh Mesh
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	Orig Dim: None	
	▼ Strip Input	► Layers
	Image Offset:	▼ Dimensions
	Image Crop:	Render Presets 🗧 🕂 🗖
	Trim Duration (hard):	Resolution: Frame Range:
	Start: 0	
	End: 0	
	Trim Duration (soft):	50% Frame Step: 1 Aspect Ratio: Frame Rate:
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	▼ Filter	Performance
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	(Strobe: 1.000)	► Stamp
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.0 5.2 6.2 7.1 8.1 9.0 10.0 10.2 11.2	De-Interlace	🗹 Overwrite 🛛 🗹 File Extensions

Check output setting again!



Preview your video

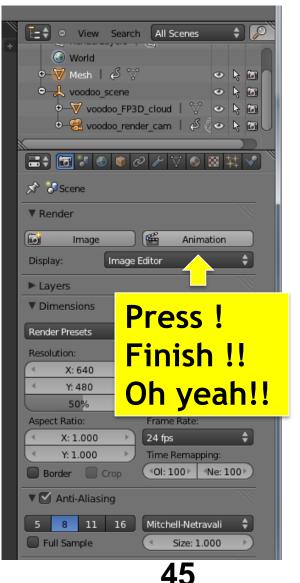


Select output format

Back to flowchart



Final Output



More Examples

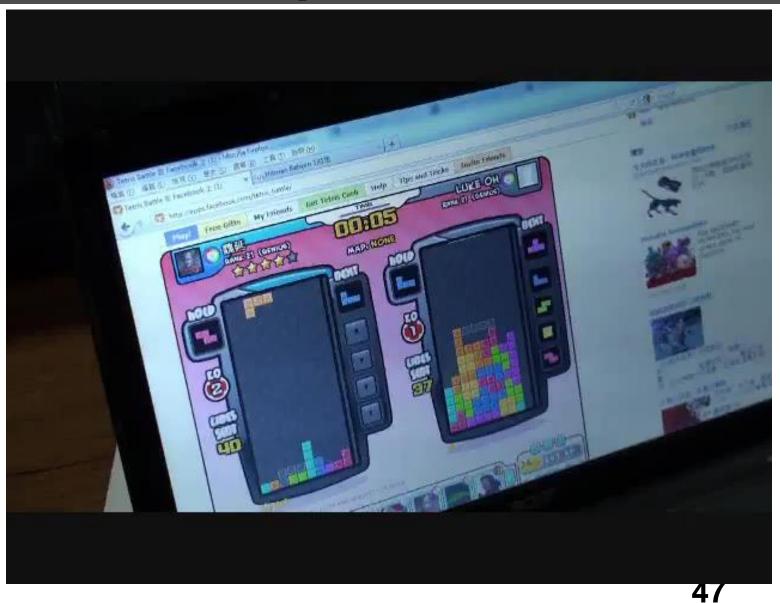


• CSIE Robot



More Examples





More Examples



おがみ 新り紙 - VFXproj 3

b97901170 曾任培 b97901186 簡伯宇



FAQ

- Voodoo會當掉!
 - 拍攝的影片內容差異太大
 - 調整tracking的方式
- 為什麼我在Blender中的Background和Feature沒辦法配合
 - 記得要設定 Cameras → Set Active Object as Camera
- 3D models的 位置/動作 好難調整...
 - 你是對的!
 - 多利用座標系相對位置以及不同視角會有幫助,不過還是需要一些時間
 - 設定動作時, 盡量避免大角度或大範圍的 interpolation, 多設一些 key frames
- 為什麼最後做出來的動畫 Model 是黑的?
 - 記得在場景裡加盞燈
- 我該去哪裡找3D models
 - 網路上免費資源非常多!
 - 例如: http://www.3dm3.com/modelsbank/ http://www.sharecg.com/

FAQ



😤 Voodoo File View Help	調整設定		
File View Help Controls Draw Options Camera Parameter 3D Scene Viewer Modelling Tools FPoint Track Editor	Ctrl+K Ctrl+D Ctrl+P Ctrl-P Ctrl+P Parameter Settings Ctrl+P Parameter Settings Ctrl+P Nodule on / off Parameter Settings DLineCorner DLineCorner Susan O DLineCorner Susan O Susan O Foerstner O SIFT O Correspondence An ✓ Enable Cross Correlation KLT Tracking O Synthetic O Outlier Elimination ✓ Enable Estimation depe O Rotation+Zoom H-Matrix O Nown Camera Enable Rotation ✓ Enable Known Camera Enable Enable	Harris Main Parameters Max. Corners: 900.000 Gauss Sigma: 0.70 Gauss Sigma: 0.70 Relative Min: 1.000e-05 Scale Factor: 0.04 Adaptive Parameters 00 Density Thresh: 0.50 Min. Size for Local Max: 9 Deriv. Gauss Sigma: 1.000	Set Default New Default Reset Flags Adaptive Verbose Deriv. Gauss
	 ▲ Final Estimation	Apply	QK Cancel

FAQ



 Use different views to adjust the positions and poses of objects

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Set

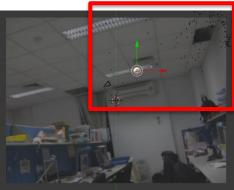
view





Camera view

view



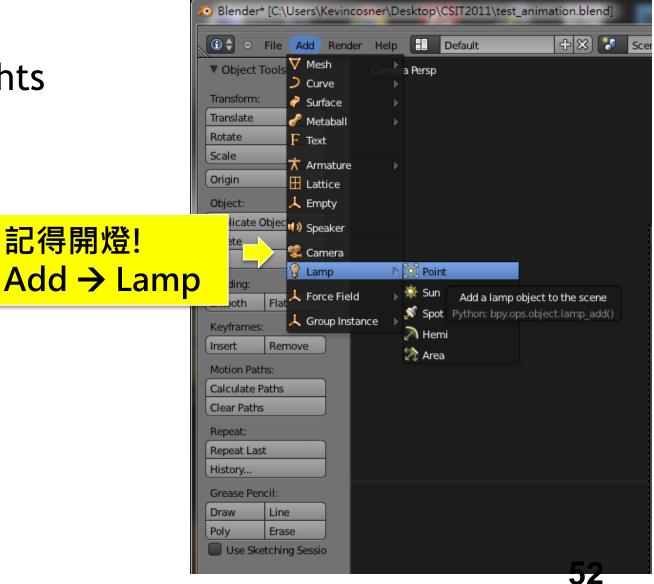
Тор view

51

Digi<mark>VFX</mark>

FAQ

• Add lights



Document



- Blender official website
 - <u>http://www.blender.org/education-help/</u>
- Voodoo document website
 - <u>http://www.viscoda.com/index.php/en/voodoo-manual</u>