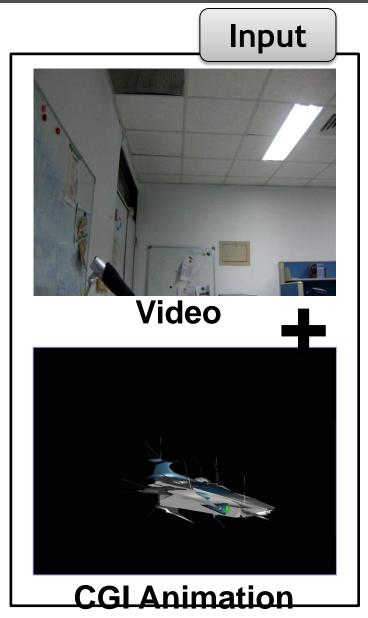
### MatchMove

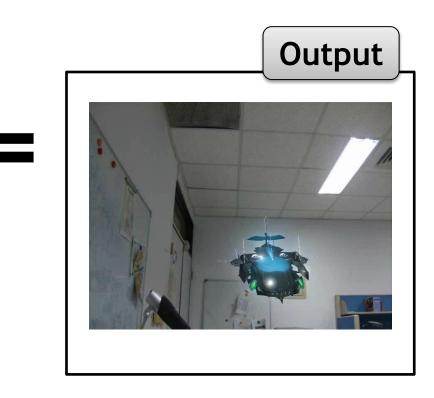
Digital Visual Effects, Spring 2013 *Tzu-Kuei Huang* (kuei@cmlab.csie.ntu.edu.tw) 2013/4/24



### Flowchart

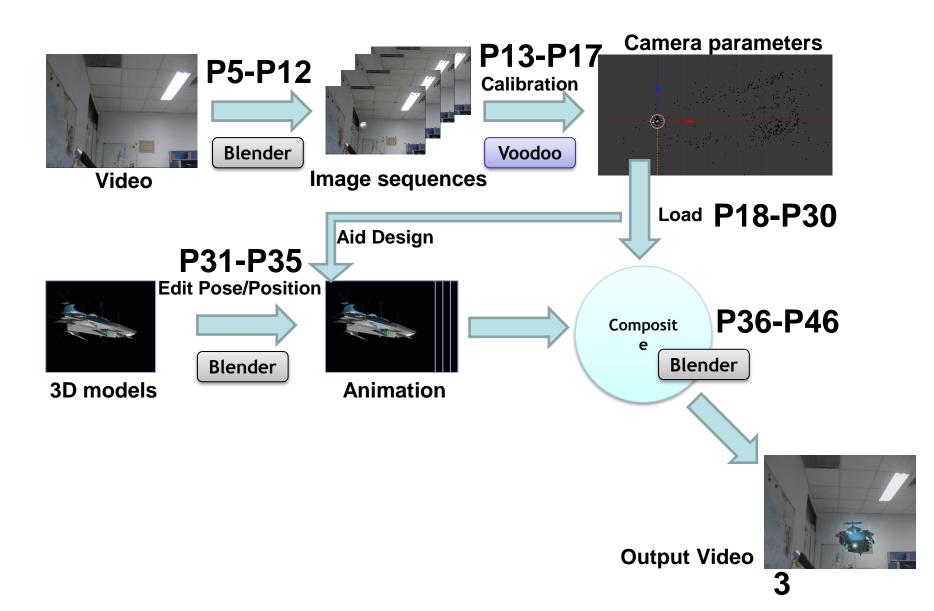


Matchmove is a technique of estimating camera parameters from an input video sequence so that computer generated imagery (CGI) could be seamlessly inserted into the sequence.



### Flowchart (detailed)





### **Environment Setting**

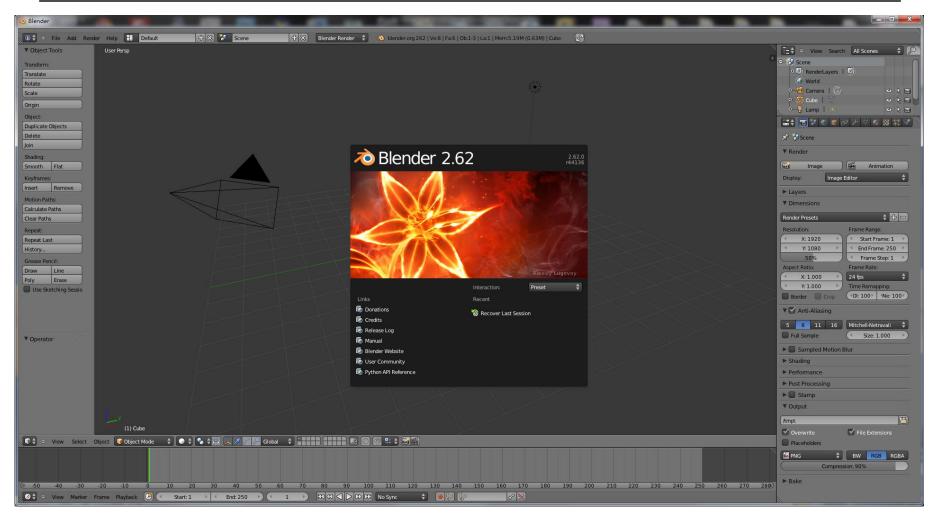


4

- 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, ...

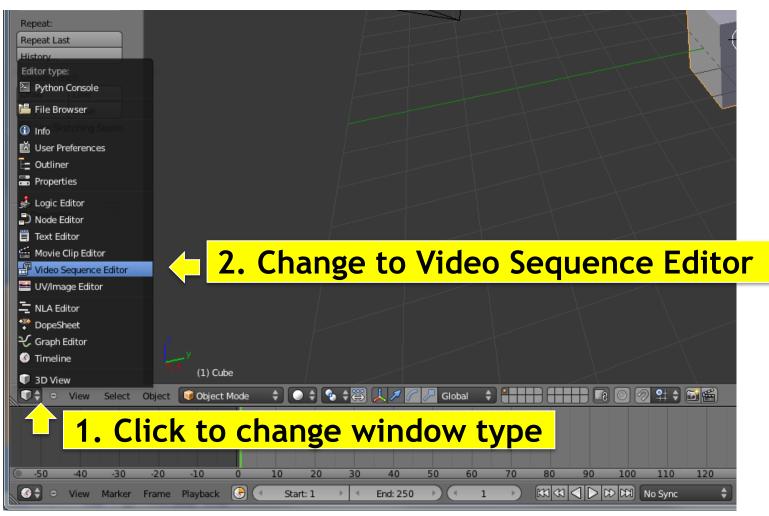
## Recipe: Get Image Sequence

- 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

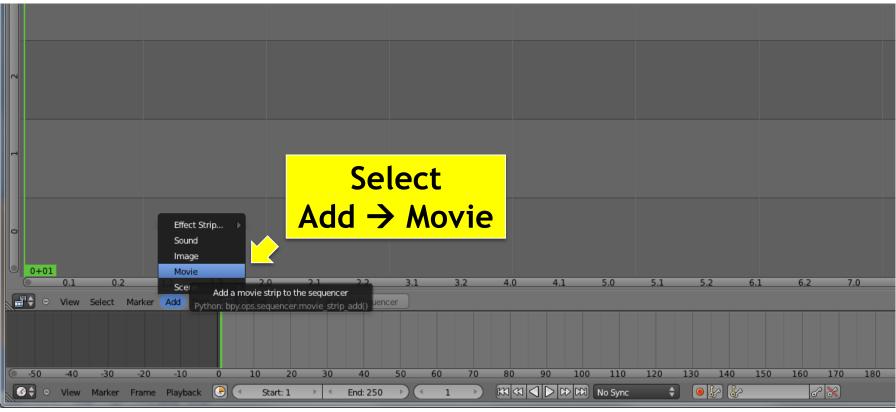


6

#### **Start up Blender**

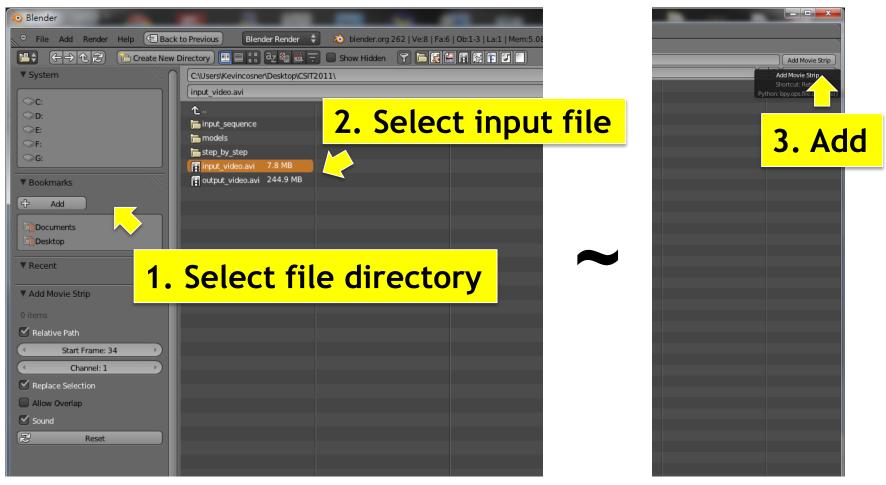


#### Change window type



8

Add video

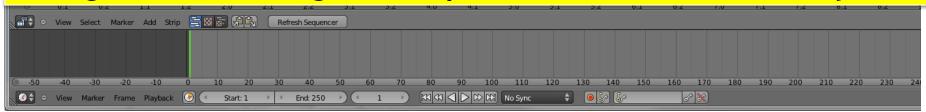


9

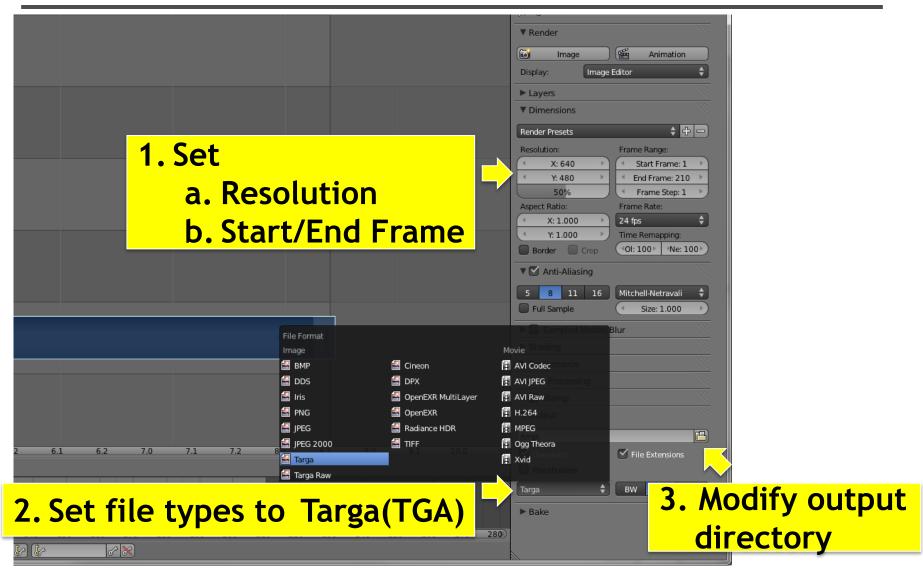
#### Select input video



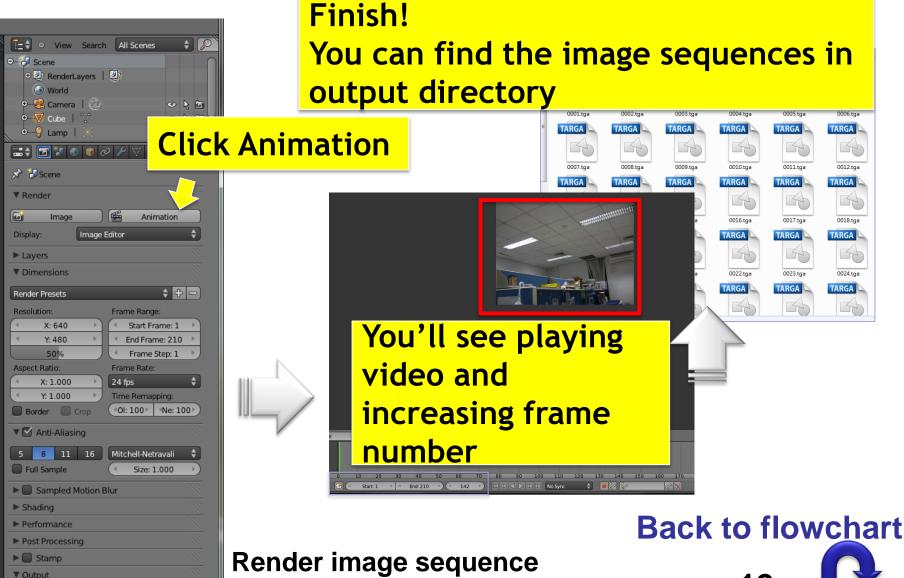
#### 2. Right-click to drag the strip to the "1st Frame" in Layer 1



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



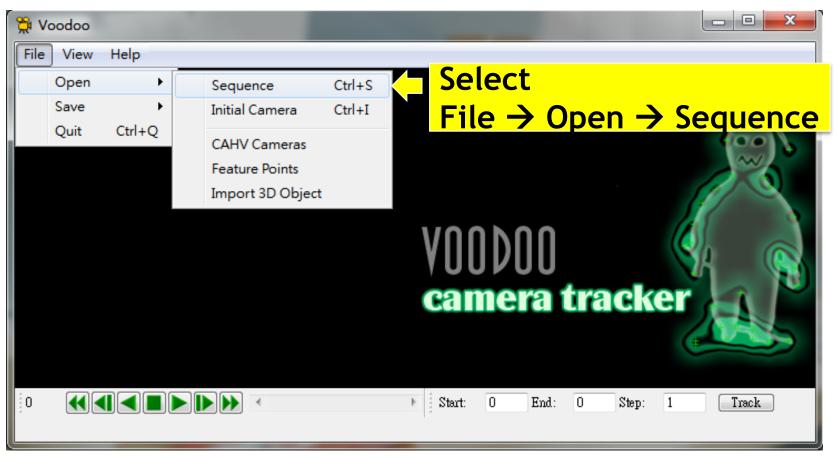
Do video setting





## **Recipe:** Calibration

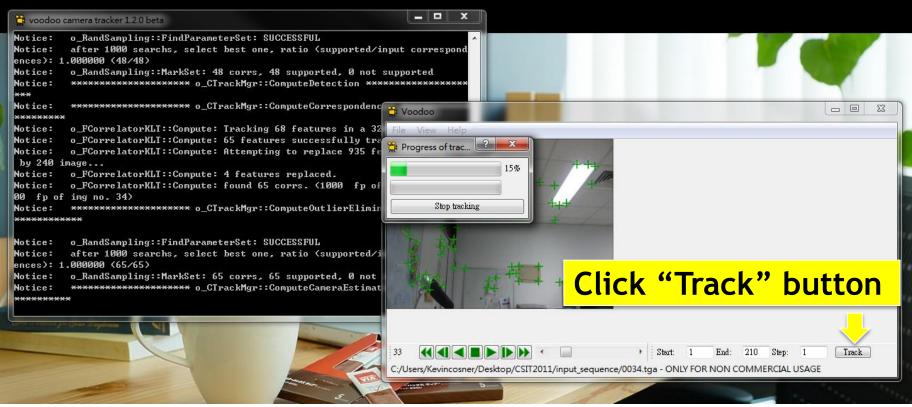
- Open Voodoo
- Open image sequence:
  - Select File  $\rightarrow$  Open  $\rightarrow$  Sequence
  - Select the first frame
  - Set Move Type to "free move"
- Track:
  - Click Track button
- Export Python script:
  - Select File  $\rightarrow$  Save  $\rightarrow$  Blender Python Script
  - Save .py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



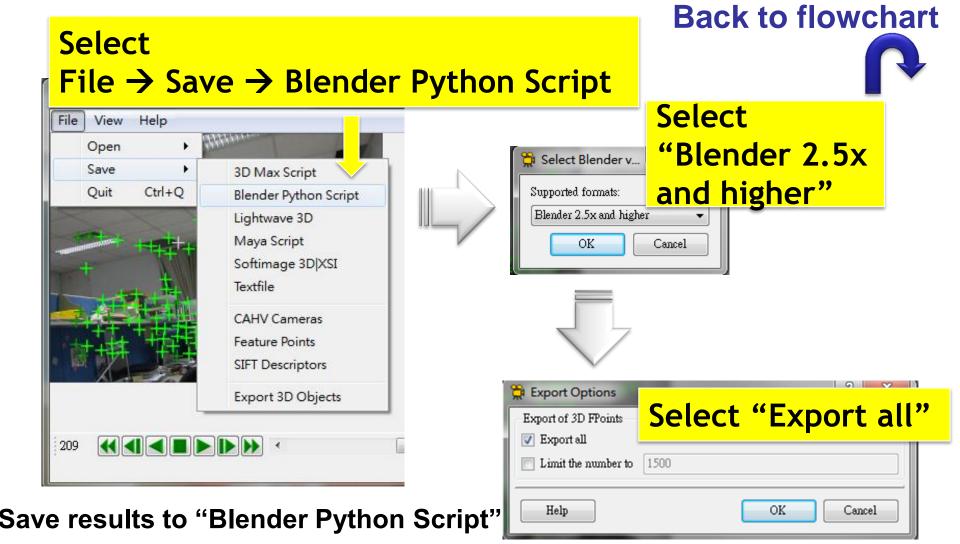
Use Voodoo to load image sequence

😤 Voodoo				
File View Help		1. Selec	t the fi	rst frame
Open   Sequen		(ex:	0001.tg	a)
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"

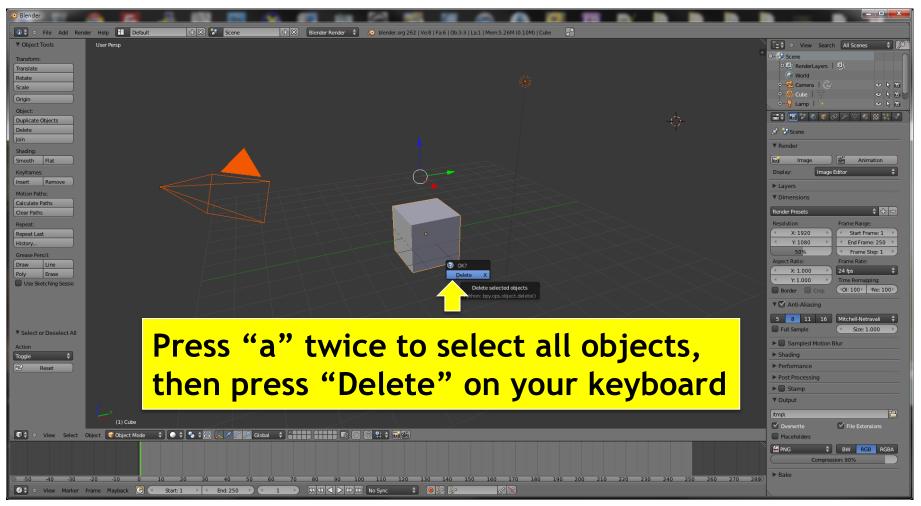
(cont.)

## Recipe: Import 3D Motions

(cont.)

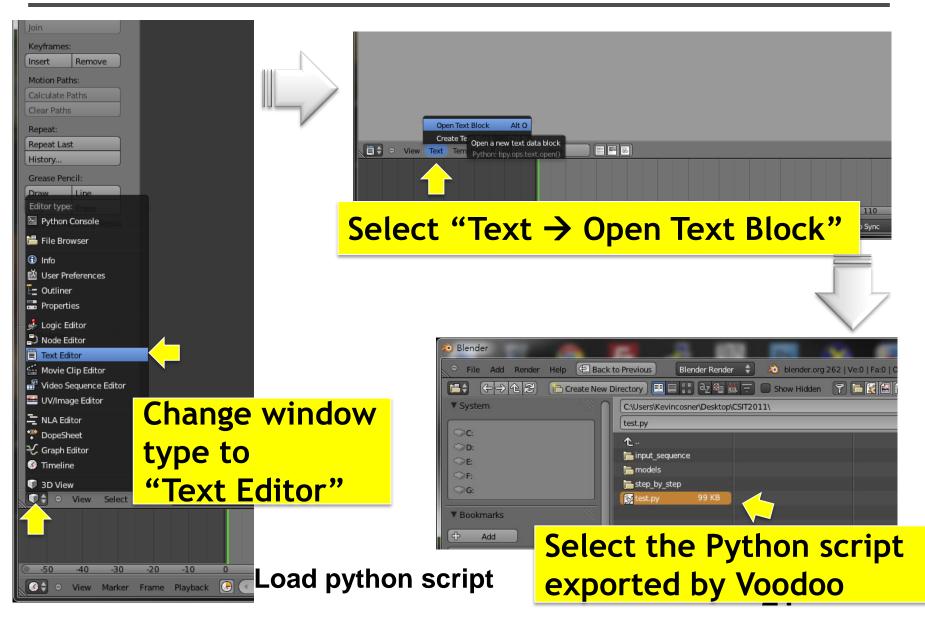
- Load Background Images
  - Change window type to "3D View"
  - Select View  $\rightarrow$  Cameras  $\rightarrow$  Set Active Object as Active Camera
  - Load background images
  - Set the parameters of background images
  - Change the view
    - View  $\rightarrow$  View Persp / Ortho
    - View 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

## Step by Step: Import 3D Motions



#### **Delete default objects**

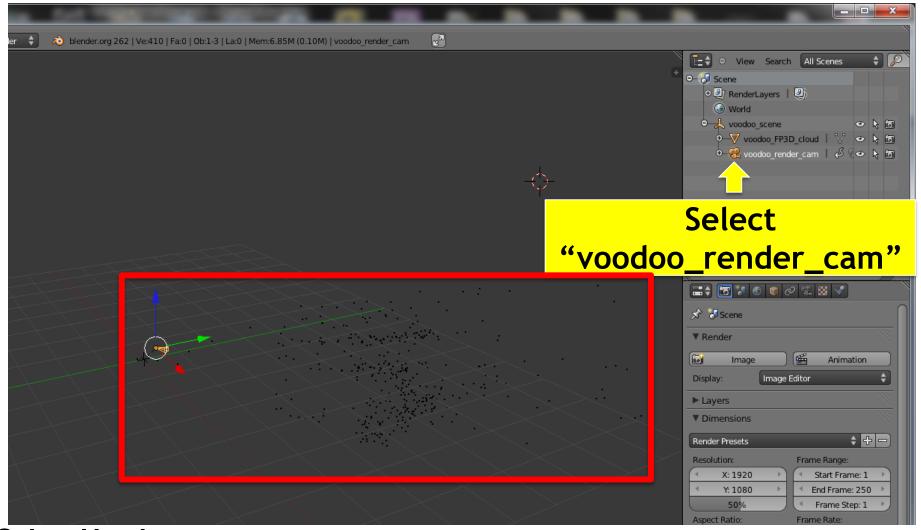
### Step by Step: Import 3D Motions



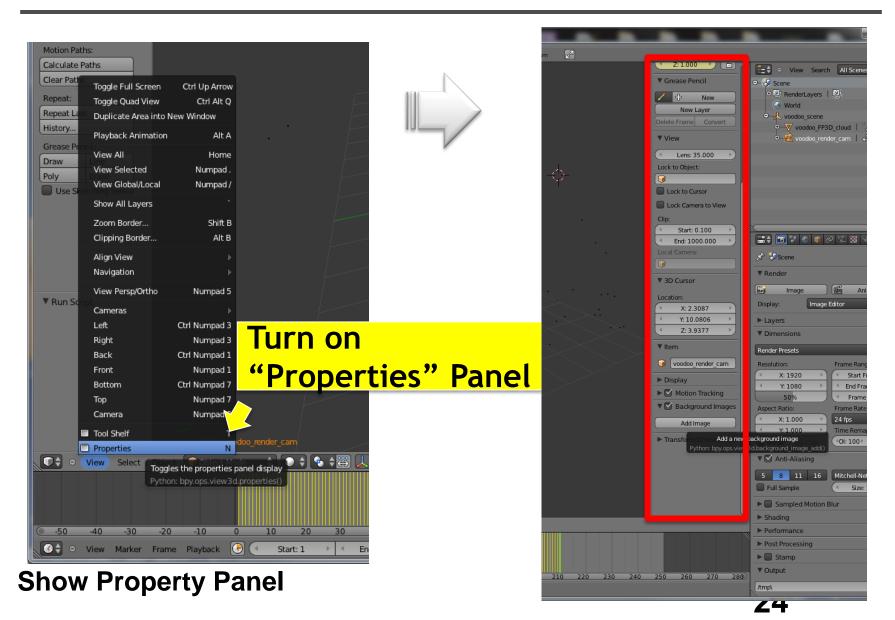
## Step by Step: Import 3D Motions

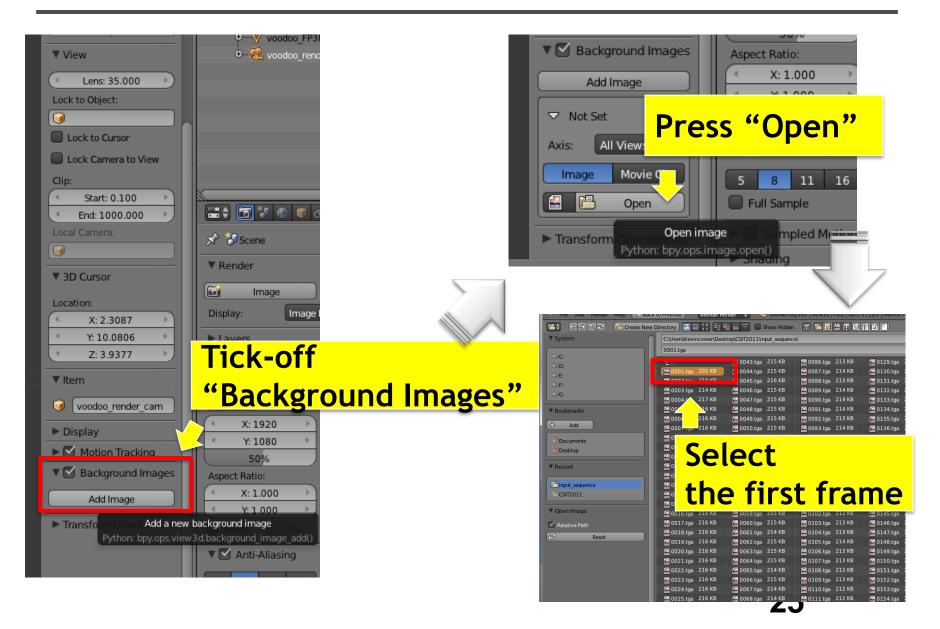
🐠 🗘 🕫 File Add Render Help 🔠 Default 🕂 🛠 🔀 Scene 🕼 🔀 Blender Render 🛊 🔊 blender.org 262 [ Ve0 ] Fa3 ] Ob:0-0 [ La3 ] Mem:S-90M (0.10M)	
<pre> # blender export (blender version 2.5x and higher) # created by voodoo camera tracker - www.digitab.uni-hannover.de # Created by voodoo amera tracker - www.digitab.uni-hannover.de # 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
<pre>import mathutils import mathutils import mathutils scene = bpy.context.scene dummy = bp.data.objects.new('voodoo_scene', None) dummy.location = (0.6, 0.0, 0.0) dummy.totation_euler = (-3,141533/2, 0.0, 0.0)</pre>	
<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
data.lens = 33.0 data.shift x = 0.0 data.shift x = 0.0 data.chift x = 0.0 data.chif ditarree = 0.0 data.chif start = 0.1	Display: Image Editor   Layers  Dimensions
data.ctip_end = 1000.0 data.draw size = 0.5 scene.objects.link(vcam) vcam.parent = dummy data = bpy.data.bests.new('vodoo_FP3D_cloud') mesh = bpy.data.bests.new('vodoo_FP3D_cloud', data) mesh.location = (0.9, 0.0, 0.0) mesh.rotation euler = (0.9, 0.0, 0.0)	Render Presets              •             •
<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
<b>2. Return to "3D View"</b>	Shading     Performance     Post Processing
<pre>vex.keyframe_insert('scate')</pre>	V Output
Adata. Tens = 54,088324     (10.999990,-0.0000268,0.004483,0.0000000), [-0.000137,-0.999571,-0.02927 b.00001     Comparison of the start of th	Compression: 90% Compr
50       40       -30       -20       -10       0       10       20       30       40       50       60       70       80       90       100       110       120       130       140       150       160       170       180       190       200       210       220       230       240       250       260       270       280         Image: Structure Playback       Image: Statcl 1       Image: Statcl 1 <th>D Bake</th>	D Bake

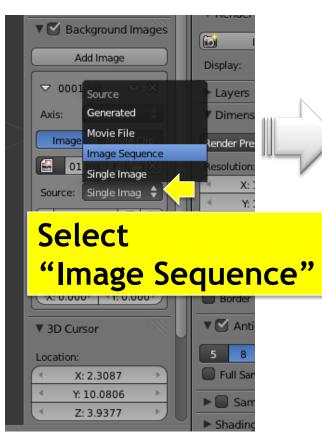
**Run script** 



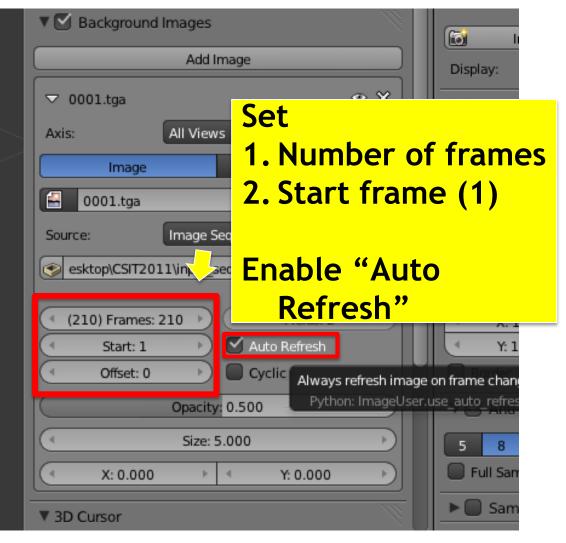
**Select Voodoo camera** 



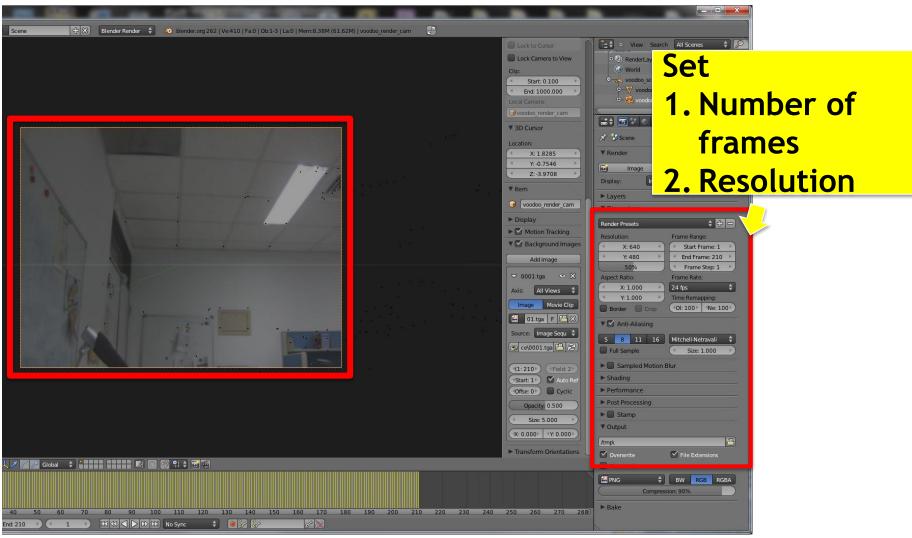




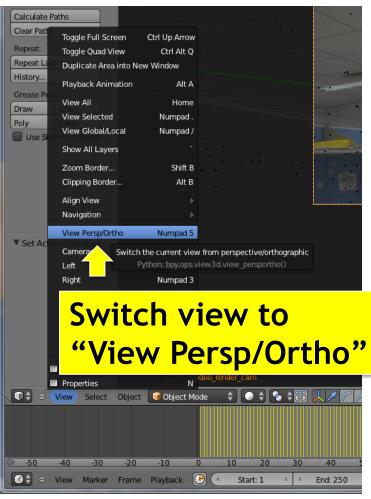
Change background type



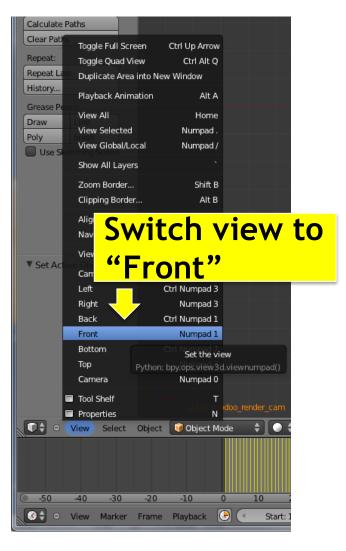
26



**Set resolution** 

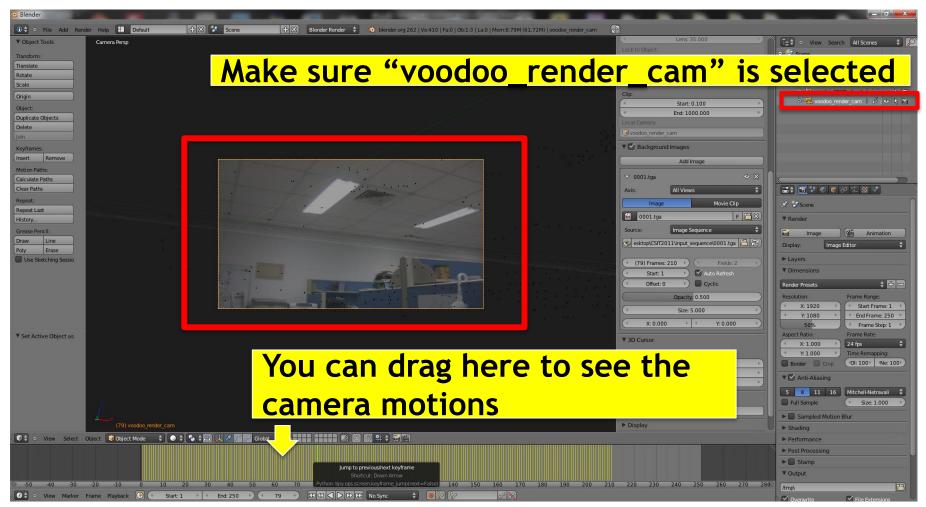


Set view



Clear Pat Repeat: Repeat La History	Toggle Full Screen Toggle Quad View Duplicate Area into N	Ctrl Up Arrow Ctrl Alt Q New Window Alt A	
Draw Poly Use S	view Global/Eocur	Home Numpad . Numpad /	
	Show All Layers Zoom Border Clipping Border	Shift B Alt B	
▼ Set Ac		Numpad 5	
	Cameras Left Right	Ctrl Numpad 3 Numpad 3	Set Active Object as Camera       Ctrl Numpad 0         Active Camera       Set the active object as the active camera for this view or scene         Python: bpy.ops.view3d.object_as_camera()
	Back Front Bottom	Ctrl Numpad 1 Numpad 1 Ctrl Numpad 7	
•	Front Bottom Top Camera Tool Shelf Properties	Numpad 1 Ctrl Numpad 7 Numpad 7 Numpad 0 T N	

#### Set active camera



#### Check background

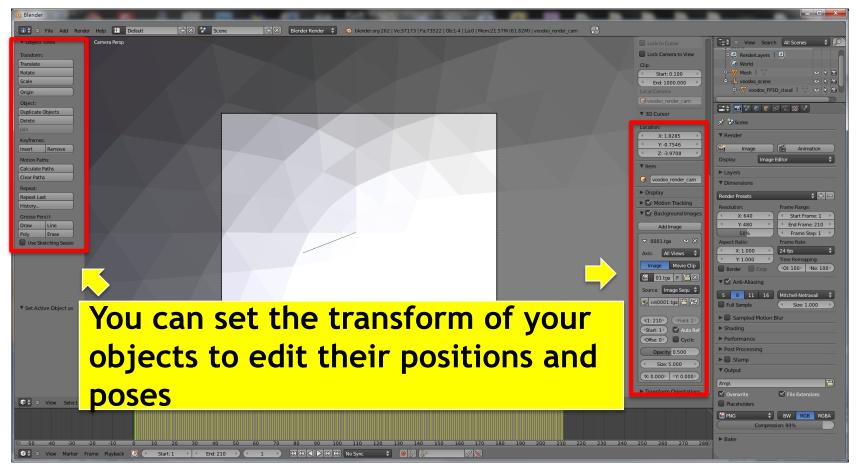
### Back to flowchart

## Step by Step: Load Models

🥺 Blender		
🕕 🗢 🖬 Add Render Help	Default 🕂 🛠	Scene 🕂 🛞 Blender Render 🗧 🔊 blender.org 262   Ve:410   Fa:0   Ob:1-3   La:0   Mem:8.93
V Object New Ctrl N		
🔚 Open Ctrl O		
Transform Open Recent Shift Ctrl O		
Translate Recover Last Session		
Scale		
Save Ctrl S     Origin Save As Shift Ctrl S		
Object: Save As Shift Ctrl S Object: Save Copy Ctrl Alt S		
Duplicate 🖄 User Preferences Ctrl Alt U Delete Save User Settings Ctrl U		
Join Load Factory Settings		
Keyframe Link Ctrl Alt O		
Insert Append Shift F1	r	······································
Motion Pa	COLLADA (.dae)	
Calculate Export	Motion Capture (.bvh)	
Clear Path	Scalable Vector Graphics (.svg)	
External Data	Stanford (.ply)	
Repeat La U Quit Ctrl Q	Sti (.sti)	
History	3D Studio (.3ds)	Select
Grease Pencil:	Wavefront (.obj)	
Draw Line	X3D Extensit Load a Wavefror	nt OBJ File File Almont AWayofront
Poly Erase	Python: bpy.ops.impo	<sup>nt OBJ File</sup> ort_scene.obj() File → Import → Wavefront
Use Sketching Sessio		(you can also use other file format)
		(you can also use other file format)
Total Anti-		
Set Active Object as		

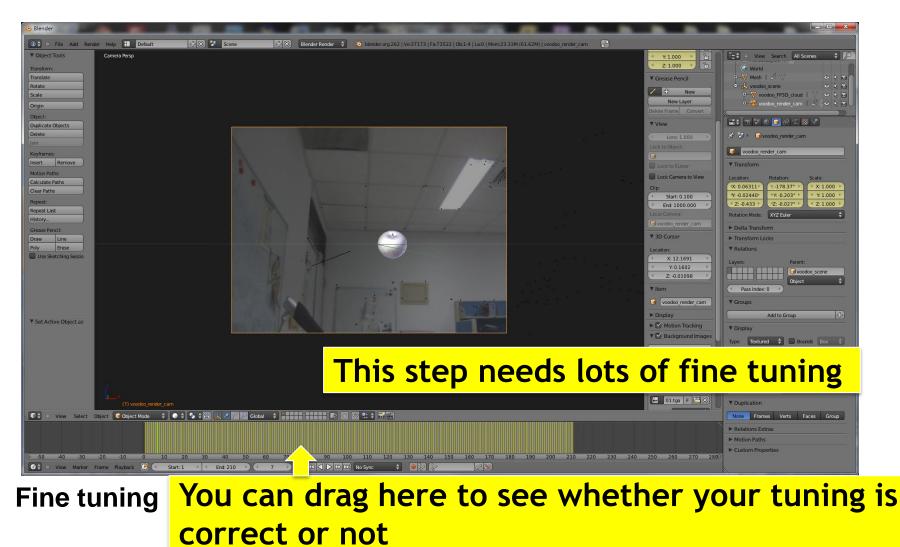
Load models

## Step by Step: Load Models



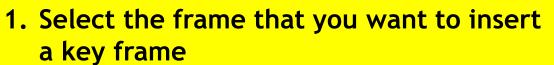
Set poses / positions for models

## Step by Step: Load Models



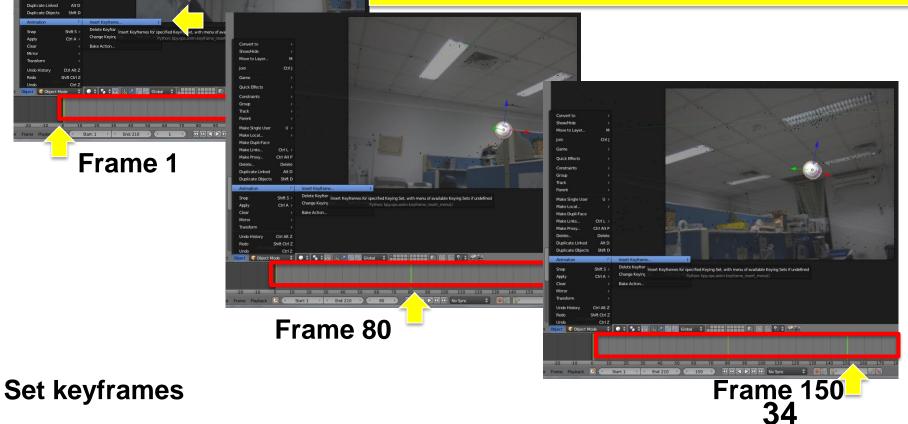
(is the object located at the correct position?)

## Step by Step: Set Animation

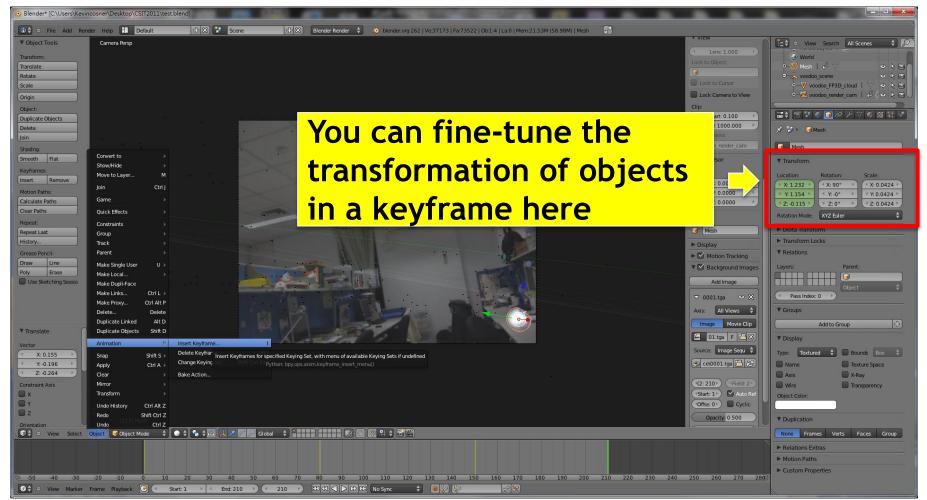


2. Select

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



## Step by Step: Set Animation



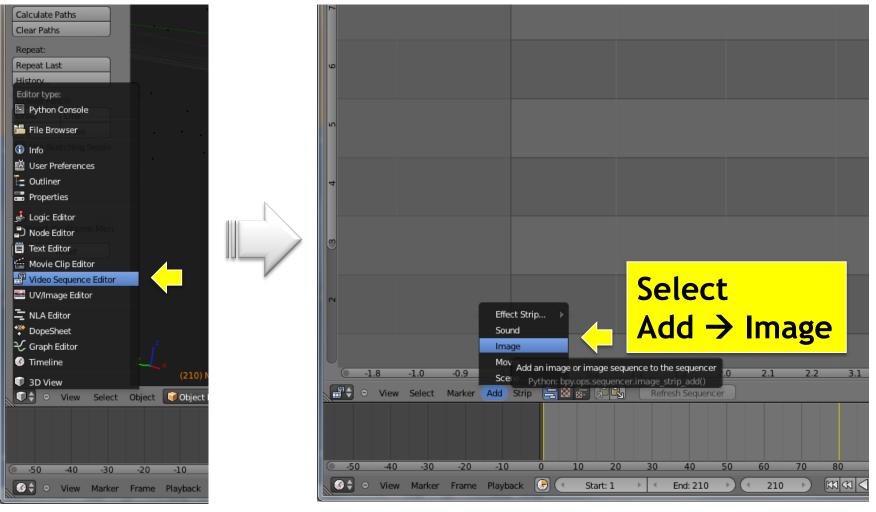
#### **Fine tuning**



## **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"

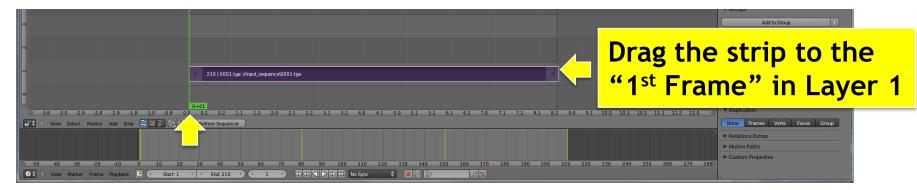


**Set to Video Sequence Editor** 

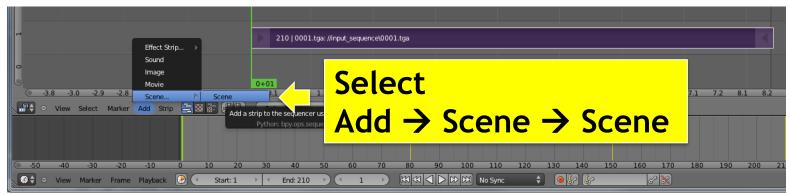
### Add image sequence (Video Channel) 37

Blender* [C:\Users\Kevincosner\Desktop\CSIT2011\test animation.blend]						
File Add Render Help 🕀 Back					im (59.28m)   mesh 🖉 👘	
E ← → た 2 E Create New	Directory	🗄 🚍 🔲 Show Hidder				
▼ System	C:\Users\Kevincosner\Des	<pre>ctop\CSIT2011\input_sequence</pre>	e/			
	0001.tga					
©C:	ሲ	🖾 0043.tga 215 KB	🖾 0086.tga 213 KB	🔚 0129.tga 213 KB	🗐 0172.tga 214 KB	
©D:	0001.tga 202 KB	0044.tga 215 KB	0087.tga 214 KB	0130.tga 214 KB	0173.tga 213 KB	
⇔e ⇔F:	🖾 0002.tga 219 KB	🚺 0045.tga 216 KB	🖸 0088.tga 213 KB	🚺 0131.tga 215 KB	🚰 0174.tga 213 KB	
⇒r: ⊃G:	🔛 0003.tga 214 KB	🖬 0046.tga 215 KB	🖬 0089.tga 214 KB	🖬 0132.tga 215 KB	🚰 0175.tga 214 KB	
	🛃 0004.tga 217 KB	🔛 0047.tga 215 KB	🔛 0090.tga 214 KB	🔛 0133.tga 215 KB	🔛 0176.tga 214 KB	
▼ Bookmarks	🔛 0005.tga 216 KB	🔛 0048.tga 215 KB	🔛 0091.tga 214 KB	🔛 0134.tga 215 KB	🔛 0177.tga 213 KB	
	🔛 0006.tga 216 KB	🔛 0049.tga 215 KB	🔛 0092.tga 213 KB	🔛 0135.tga 215 KB	🔚 0178.tga 213 KB	
4 Add	🔚 0007.tga 216 KB	🔚 0050.tga 215 KB	🔚 0093.tga 214 KB	🔚 0136.tga 216 KB	🔚 0179.tga 214 KB	
Documents	🚺 0008.tga 216 KB	🚺 0051.tga 214 KB	🚺 0094.tga 214 KB	🚺 0137.tga 215 KB	🚰 0180.tga 214 KB	
Desktop	0009.tga 216 KB	0052.tga 215 KB	0095.tga 214 KB	0138.tga 216 KB	0181.tga 213 KB	
	0010.tga 216 KB	0053.tga 215 KB	0096.tga 213 KB	0139.tga 213 KB	0182.tga 214 KB	
▼ Recent	0011.tga 216 KB	0054.tga 215 KB	0097.tga 214 KB	0140.tga 214 KB	🚺 0183.tga 213 KB	
	0012.tga 216 KB	🔮 0055.tga 215 KB	0098.tga 214 KB	0141.tga 213 KB	🔁 0184.tga 212 KB	
forklift	🔂 0013.tga 216 KB	0056.tga 215 KB	🔂 0099.tga 213 KB	0142.tga 212 KB	🔛 0185.tga 213 KB	
Apple	0014.tga 216 KB	🖬 0057.tga 215 KB	🖬 0100.tga 213 KB	🖬 0143.tga 213 KB	😫 0186.tga 212 KB	
input_sequence	0015.tga 216 KB	0058.tga 215 KB	0101.tga 213 KB	0144.tga 214 KB	🖬 0187.tga 211 KB	
CSIT2011	0016.tga 216 KB	0059.tga 215 KB	0102.tga 212 KB	0145.tga 215 KB	0188.tga 213 KB	
▼ Add Image Strip	0017.tga 216 KB	0060.tga 215 KB	0103.tga 213 KB	0146.tga 213 KB	0189.tga 212 KB	
	0018.tga 216 KB	0061.tga 214 KB	0104.tga 213 KB	0147.tga 212 KB	0190.tga 213 KB	
0 items	0019.tga 216 KB	0062.tga 215 KB	0105.tga 214 KB	0148.tga 213 KB	0191.tga 212 KB	
C Relative Path	0020.tga 216 KB	0063.tga 215 KB	0107.tga 213 KB	0149.tga 214 KB	0192.tga 213 KB	
(     Start Frame: 11 )	0021.tga 216 KB	0065.tga 214 KB	0107.tga 213 KB	0150.tga 212 KB	0193.tga 213 KB	
End Frame: 36	0023.tga 216 KB	0066.tga 215 KB	🖬 0109.tga 213 KB	0152.tga 215 KB	195.tga 212 KB	
	0023.tga 216 KB	0067.tga 214 KB	0110.tga 212 KB	0153.tga 213 KB	196.tga 213 KB	
Citatilities 2	0025.tga 216 KB	0068.tga 214 KB	🖬 0111.tga 212 KB	🖬 0154.tga 214 KB	0197.tga 214 KB	
Replace Selection	0026.tga 216 KB	0069.tga 214 KB	0112.tga 212 KB	0155.tga 215 KB	🖬 0198.tga 212 KB	
Allow Overlap	0027.tga 217 KB	0070.tga 214 KB	0113.tga 213 KB	0156.tga 213 KB	199.tga 212 KB	
Reset	0028.tga 216 KB	0071.tga 214 KB	0114.tga 212 KB	0157.tga 215 KB	20200.tga 214 KB	
	0029.tga 216 KB	0072.tga 215 KB	0115.tga 213 KB	0158.tga 215 KB	🚰 0201.tga 214 KB	
	0030.tga 216 KB	0073.tga 215 KB	🚺 0116.tga 213 KB	0159.tga 215 KB	🖬 0202.tga 214 KB	
	🔂 0031.tga 216 KB	🖬 0074.tga 215 KB	🖬 0117.tga 212 KB	🖬 0160.tga 214 KB	🔮 0203.tga 212 KB	
	🖬 0032.tga 216 KB	🖬 0075.tga 214 KB	🖬 0118.tga 214 KB	🖬 0161.tga 215 KB	🖬 0204.tga 213 KB	
	🔚 0033.tga 216 KB	🔚 0076.tga 215 KB	🔚 0119.tga 213 KB	🔚 0162.tga 215 KB	🚰 0205.tga 214 KB	
	🔚 0034.tga 216 KB	🔚 0077.tga 214 KB	🔚 0120.tga 214 KB	🔚 0163.tga 216 KB	🚰 0206.tga 211 KB	
	🗧 0035.tga 216 KB	🚺 0078.tga 215 KB	🚺 0121.tga 215 KB	🔚 0164.tga 214 KB	🚰 0207.tga 213 KB	
	🗧 0036.tga 217 KB	🚰 0079.tga 213 KB	🚰 0122.tga 215 KB	🚰 0165.tga 215 KB	🔁 0208.tga 212 KB	
	🖬 0037.tga 216 KB	🖬 0080.tga 215 KB	🚺 0123.tga 215 KB	🚺 0166.tga 215 KB	🚰 0209.tga 211 KB	
	🔛 0038.tga 215 KB	🔚 0081.tga 213 KB	🔚 0124.tga 215 KB	🔚 0167.tga 215 KB	🚰 0210.tga 212 KB	
	🔛 0039.tga 216 KB	🖴 0082.tga 214 KB	🔮 0125.tga 215 KB	🔚 0168.tga 214 KB		
	🔛 0040.tga 216 KB	🔛 0083.tga 213 KB	🚼 0126.tga 215 KB	🔚 0169.tga 213 KB		
	🔛 0041.tga 216 KB	🚰 0084.tga 214 KB	🚰 0127.tga 216 KB	🔚 0170.tga 214 KB		
	🔂 0042.tga 216 KB	🔛 0085.tga 214 KB	🔛 0128.tga 216 KB	🔚 0171.tga 212 KB		

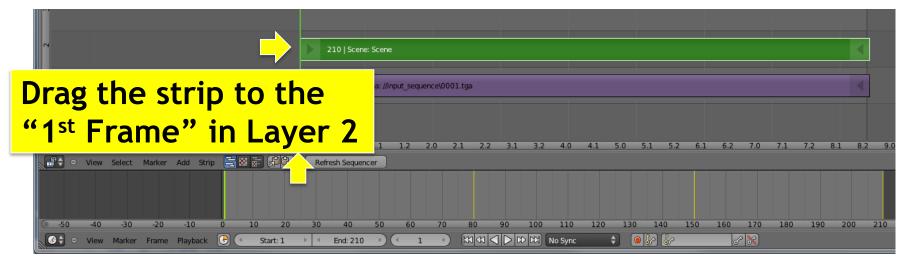
This time, select all frames (Press A)



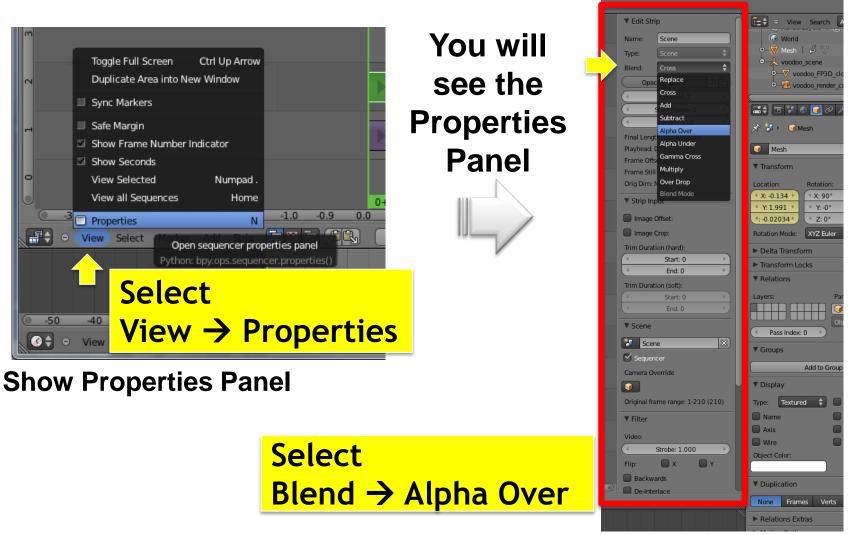
#### Edit Video Layer (Right click and drag, left click to set)



#### Add scene layer



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

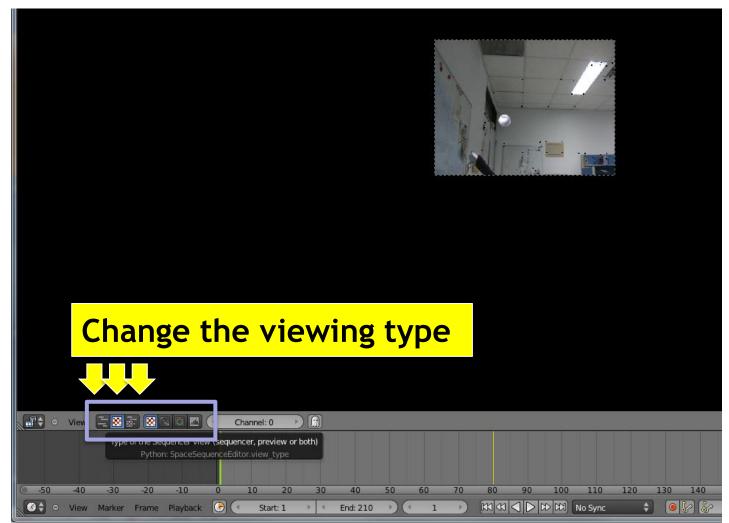


Set Blend Type 41

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
Proxy / Timecode     Proxy Custom Directory     Proxy Custom File	Select Premultiply		Set scene camera

	Opacity: 1.000	ీ- 😤 voodoo_render_cam   🕹 ( ☉ 🔖 🛅 🗌
	Channel: 2	
	Length: 210	
		🖈 🥻 Render
	Playhead: 0	▼ Render
	Frame Offset 0:0	🐻 Image 🥻 Animation
	Frame Still 0:0	Display: Image Editor
	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:
	Start: 0	X: 1.000 24 fps \$
	End: 0	Y: 1.000 Firme Remapping:
	▼ Scene	Border Crop (*Ol: 100 ≥ *Ne: 100 ≥
	Scene 🛞	🔹 🔄 Ang-Aliasing
	Sequencer	
		5 8 11 16 Mitchell-Netravali
	Camera Override	
	voodoo_render_cam	Sampled Motion Blur
	Original frame range: 1-210 (210)	► Shading
	▼ Filter	Performance
	Video:	► Post Processing
	( Strobe: 1.000 )	► Stamp
	Flip: X Y	▼ Output
	Backwards	/tmp\
.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

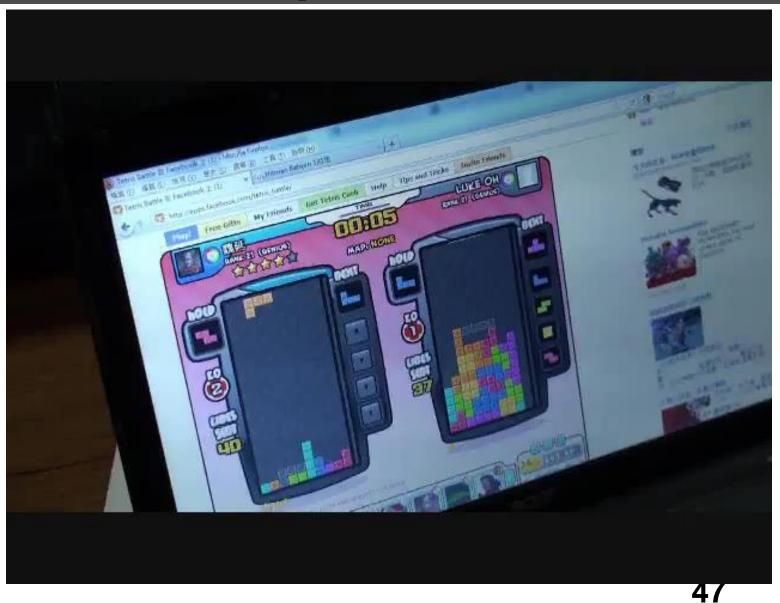


• CSIE Robot



### **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
	<ul> <li>▲ Final Estimation</li></ul>	Apply	QK Cancel

### FAQ



 Use different views to adjust the positions and poses of objects

Top     Numpad 7       Camera     Numpad 0       ■ Tool Shelf     T       ■ Properties     N       ● View     Select     Object					
Repeat La       Duplicate Area into New Window         History       Playback Animation       Alt A         Grease Pto       View All       Home         Draw       View Selected       Numpad.         Poly       View Selected       Numpad.         Use S       Show All Layers       >         Zoom Border       Shift B       Clipping Border       Alt B         Align View       >       Navigation       >         View Persp/Ortho       Numpad 2       Store area       Store area         Front       Drawe       Store area       Store area         Cameras       Left       Ctrl Numpad 2       Store area         Back       Ctrl Numpad 3       Store area       Store area         Front       Store area       Numpad 4       Store area         Top       Numpad 5       Store area       Numpad 5         Camera       Numpad 7       Store area       Numpad 7         Top       Numpad 7       Store area       Numpad 7         Oracera       Numpad 7       Store area       Numpad 7         Oracera       Numpad 7       Numpad 7       Store area         Numpad 7       Numpad 7       Numpad 7 <t< th=""><th>Clear Pat</th><th>Toggle Full Scre</th><th>een Ctrl Up Arrow</th></t<>	Clear Pat	Toggle Full Scre	een Ctrl Up Arrow		
History Playback Animation Alt A Grease Pteri Draw Poly Use Selected Numpad. View Selected Numpad. View Global/Local Numpad. Show All Layers Zoom Border Shift B Clipping Border Alt B Align View Navigation View Persp/Ortho Numpad 5 View Persp/Ortho Numpad 5 View Persp/Ortho Numpad 5 Set A Cameras Left Ctrl Numpad 1 Back Ctrl Numpad 2 Front Staff T Properties N View Select Object Object Mo	Repeat:	Toggle Quad Vi	ew Ctrl Alt Q		
Playback Animation Alt A Grease Per View All Home Poly View Selected Numpad . View Global/Local Numpad . Show All Layers Zoom Border Shift B Clipping Border Alt B Align View All Navigation View Navigation View Persp/Ortho Numpad 5 View Persp/Ortho Numpad 5 Set A Cameras Left Ctrl Numpad 5 Back Ctrl Numpad 5 Back Ctrl Numpad 5 Front Stelf T Properties N View Select Object Object Mo	Repeat L	<sup>ast</sup> Duplicate Area			
Draw     View All     Home       Poly     View Selected     Numpad.       View Global/Local     Numpad.       Use S     Show All Layers       Zoom Border     Shift B       Clipping Border     Alt B       Align View     >       Navigation     >       View Persp/Ortho     Numpad 5       Cameras     Left       Cameras     Cameras       Left     Ctrl Numpad 5       Back     Ctrl Numpad 5       Front     Str       Bottom     Python: bipy.ops.view 3       Top     Numpad 0       Tool Shelf     T       Properties     N       View Select     Object More		Playback Anima	ation Alt A		
Poly       View Selected       Numpad.         Use SI       View Global/Local       Numpad.         Zoom Border       Shift B         Clipping Border       Alt B         Align View       >         Navigation       >         View Persp/Ortho       Numpad.         View Persp/Ortho       Numpad 5         Set A       Cameras         Left       Ctrl Numpad 5         Back       Ctrl Numpad 6         Front       Sk         Bottom       Python: bpy.ops.view         Top       Numpad 7         Camera       Numpad 7         Camera       Numpad 7         Camera       Numpad 7         Camera       Numpad 7         O       Tool Shelf       T         Properties       N         O       View Select       Object         0       -50       -30       -20       -10			Home		
Poly       View Global/Local       Numpad /         Use Si       Show All Layers       X         Zoom Border       Shift B         Clipping Border       Alt B         Align View       >         Navigation       >         View PerspOrtho       Numpad 5         Set A       Cameras         Left       Ctrl Numpad 5         Back       Ctrl Numpad 5         Front       Numpad 5         Bottom       Python: bipy.ops.view         Top       Numpad 0         Tool Shelf       T         Properties       N         Numpad 0       Select       Object Mo		View Selected	Numpad.		
Use S       Show All Layers         Zoom Border       Shift B         Clipping Border       Alt B         Align View       >         Navigation       >         View PerspOrtho       Numpad 5         Et A       Cameras         Left       Ctrl Numpad 5         Back       Ctrl Numpad 5         Front       St         Bottom       Python: bipy.ops.view         Top       Numpad 7         Camera       Numpad 7         Top       Numpad 7         Olimeters       St         Bottom       Python: bipy.ops.view         Top       Numpad 7         Olimeters       Numpad 7         Other       Stelf         Object Mo       Numpad 7         Object Mo       Numpad 7		View Global/Lo			
Clipping Border       Alt B         Align View       >         Navigation       >         View Persp/Ortho       Numpad 5         View Persp/Ortho       Numpad 5         Set A       Cameras         Right       Numpad 5         Back       Ctrl Numpad 5         Back       Ctrl Numpad 5         Top       Numpad 7         Camera       Numpad 7         Top       Numpad 7         Camera       Numpad 7         Top       Numpad 7         O       Tool Shelf       T         Properties       N         View Select       Object Model         -50       -40       -30       -20       -10	Use Sketching Sessio				
Set A Set A Bight Cameras Cameras Cameras Bight Cameras Camera Bight Ctrl Numpad 5 Bight Ctrl Numpad 5 Bight Ctrl Numpad 5 Bight Ctrl Numpad 5 Bight Numpad 5 Bight Numpad 5 Bight Numpad 7 Camera Numpad 0 Top Numpad 7 Camera Numpad 0 Camera Nump		Zoom Border	Shift B		
Align View Navigation View Persp(Ortho Numpad 5 View Persp(Ortho Numpad 5 Cameras Left Cameras Left Cameras Left Ctrl Numpad 5 Back Ctrl Numpad 5 Front Python: bipy.ops.view Top Numpad 7 Camera Numpad 7 Cam					
Set A Set A Cameras Left Ctrl Numpad 5 Right Numpad 5 Back Ctrl Numpad 5 Front Numpad 5 Bottom Python: bpy.ops.view Top Numpad 7 Camera Numpad 0 Tool Shelf T Properties N View Select Object Object Mo					
View Persp/Ortho       Numpad 5         Set A       Cameras         Left       Ctrl Numpad 5         Right       Numpad 5         Back       Ctrl Numpad 5         Bottom       Python: bipy.ops.view         Top       Numpad 7         Camera       Numpad 7         Camera       Numpad 7         Top       Numpad 7         Oshelf       T         Properties       N         View Select       Object Mo         0       -50       -30       -20       -10		-			
Set A       Cameras         Right       Chri Numpad E         Right       Numpad E         Back       Ctrl Numpad E         Front       Set Bottom         Python: bpy.ops.view       Top         Top       Numpad E         Carnera       Numpad T         Carnera       Numpad T         © Tool Shelf       T         © Properties       N         N       © Select       Object         0       -50       -40       -30       -20       -10		Navigation			
Cameras Left Ctri Numpad 2 Right Numpad 3 Back Ctri Numpad 3 Front Python: bipy ops view 5 Camera Numpad 0 ■ Tool Shelf T ■ Properties N View Select Object © Object Mo		View Persp/Ort	ho Numpad 5		
Right       Numpad         Back       Ctrl Numpad         Front       St         Bottom       Python: bipy ops.view         Top       Numpad         Camera       Numpad         Tol Shelf       T         Properties       N         View       Select       Object       Object         -50       -40       -30       -20       -10	▼ Set A	Cameras	,		
Back Ctrl Numpada Front Python: bipy.ops.view Top Numpada Carnera Numpada Carnera Numpada □ Tool Shelf T □ Properties N View Select Object © Object Mo 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Left			
Front Number St Bottom Python: bip/opis.viewe Top Numpad 7 Camera Numpad 0 Tool Shelf T Properties N View Select Object © Object Mo 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Right			
Front Numero St Bottom Python: bipy.opis.view Top Numpad 7 Camera Numpad 0 ■ Tool Shelf T ■ Properties N View Select Object © Object Mo					
Bottom Python: bpy ops.view Top Numpad 7 Camera Numpad 0 ■ Tool Shelf T ■ Properties N ♥ • View Select Object ♥ Object Me 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Front	Numpart		
Top     Numpad 2       Camera     Numpad 0       ■ Tool Shelf     T       ■ Properties     N       ● View     Select     Object       ● 0     View     Select     Object       ● 0     -50     -40     -30     -20     -10		Bottom			
Tool Shelf     Tool Shelf     Properties     N     View Select Object      Object Mo     Object Mo     -50 -40 -30 -20 -10 0					
Properties     N     N     View Select Object      Object Mo     Object 40     -50     -40     -30     -20     -10     O		Camera	Numpad 0		
Properties     N     N     View Select Object      Object Mo     Object 40     -50     -40     -30     -20     -10     O		Tool Sholf	×		
● -50 -40 -30 -20 -10					
· -50 -40 -30 -20 -10					
		Jelee			
🐼 🗘 🗢 View Marker Frame Playback 🤇	-50	-40 -30	-20 -10 (		
		Maria Marian	France Blauback		
		view Marker	Frame Playback		

Set

view





Camera view

view



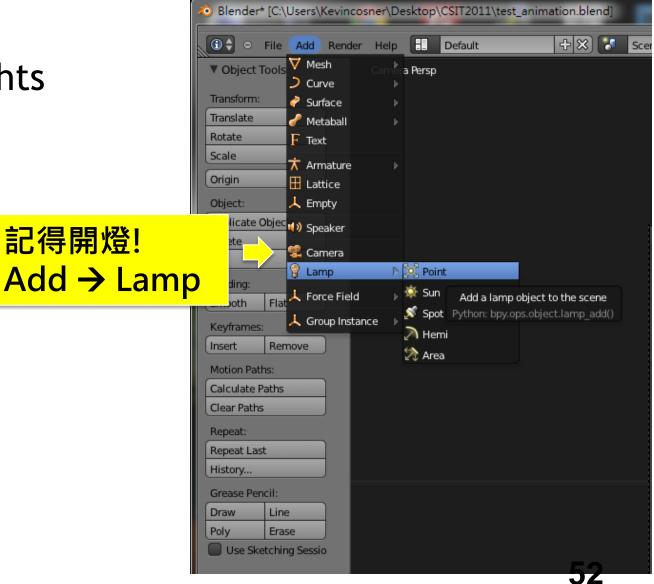
Тор view

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>