# How to Make 3D-360 Live-Action Video

by using multi action cameras

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# **Different btw VR and 3D-360 video**

- VR Virtual Reality
   Almost CGI. VR space is made on a computer.
   You can see around you 360-degree in 2D/3D,
   You can move your location freely in the VR space.
- 3D-360 video

Live-action or CGI. Almost just play a video. You can see around you 360-degree view in 3D, Less interaction, most 360 video can not move your location freely. But it can show a real view.



### HMD (Head Mount Display)



#### **Oculus Rift**



#### Google Cardboard

- Field of View : Less than 120deg
- 2D or 3D



#### Dome theater



- Field of View : 360deg half sphere
- 2D or 3D (difficult on the Top)



### Circle theater





- Field of View : 360deg circular
- 2D or 3D



#### On flat screen (such as PC, TV)



#### On demand view by mouse operation



#### Little planet view

- Field of View : various
- 2D or 3D (Limited)

### INPUT

#### 2D-360 Camera



- Simple to use, Easy to use
- Already available to consumers

# **INPUT** 3D-360 Camera





iZugar Z6X3D SAMSUNG Project Beyond

Google JUMP

- Not easy to use yet. Not perfect yet.
- Not general yet

# Difficulty in showing 3D-360 video

 Difficult to keep the parallax horizontally in all direction of 360 degree, especially at Nadir the top & bottom of view.

#### ex. Showing 3D-360 at dome



#### ex. Recording by 3D cameras



# **Difficulty in recording 3D-360 video** Nodal Point for perfect 360



- Nodal point is the axis that parallax doesn't generate even if a camera rotates.
- In order to shoot panorama for perfect stitch, the camera should rotate on the nodal point.











You can stitch perfectly!

# Dilemma between Panorama & 3D



No Parallax Rule for Panorama Need Parallax Rule for Stereo3D

### for Stereo 3D - 360

# This is a solution to mediate between panorama and stereo3D















This rig is good for still photo like a chacha, But not for video because multi cameras can not be placed on the plate at the same time.

# for 3D-360 video

4 pairs of stereo camera.Stitch 4 left images and 4 right images separately

# for 3D-360 video, other setting

8 cameras are on a plate radiallyMake a stitch profile using from all images

Stitch left image by using right half of each image, Stitch right image by using left half of each image

# My recent rig for 3D-360 video





8 GoPro cameras are on a plate radially



Stitch left image by using right half of each image, Stitch right image by using left half of each image



Stitch left image by using right half of each image, Stitch right image by using left half of each image



## 8 GoPro 3D-360 rig on a tripod



Circle LED lamp for sync







# **A Stitching Workflow of mine**

Copy all videos into computer

Adobe Premier<sup>↓</sup> Count numbers of slipped frames

Video Stitch $\checkmark$ Import videos into 'Video Stitch'and Set the slipped frame numbersto the gaps of sync

Video Stitch ↓ Extract still images for 'PtGui'

PtGui↓Import the still images into 'PtGui'

PtGui ↓ Stitch 360 still image by using all images PtGui \* Mask the left half on each images, then save as PtGui file for right eye

PtGui + Mask the right half on each images, then save as PtGui file for left eye

Video Stitch ↓ Apply the PtGui file for right eye Then stitch out right video movie Video Stitch ↓ Apply the PtGui file for left eye Then stitch out left video movie

Panorama_3_c - PTGui Pro registered to Takashi Sekitani
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[] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
Project Assistant Source Images Mask Control Points Exposure / HDR Preview Create Panorama
1. Load images
Camera / lens parameters
Automatic (use EXIF data from camera, if available)
Lens type: Full Frame Fisheye -
Focal length:17.08mmFocal length multiplier:1x
2. Align images The project may contain some misplaced control points. See the <u>Control Point Assistant</u> for details.
You can preview your panorama in the Panorama Editor. Or create the panorama now:

3. Create panorama...

### Import the still images into 'PtGui' stitch software





### Stitch 360 still image by using all images



#### Mask the left half on each images



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#### And then, save as PtGui file for right eye



### Mask the right half on each images





#### And then, save as PtGui file for left eye



Apply the PtGui file for right eye to VideoStitch, Then stitch out right video movie



Also, Apply the PtGui file for left eye to VideoStitch, Then stitch out left video movie

Exposure compensation



Construct final video in Over/Under or Side-by-side format for 3D viewers



Example of equirectangular Over/Under format for 3D-360 HMD viewers

# Tips

How many cameras is the best for 3D-360

- About 865 degree of total camera FOV is needed. 865 means 360  $x^2$ (for 3D)  $x^{1.2}$ (for stitch loss) GoPro3 has 120degree FOV  $\rightarrow$  865/120 = 7.2 Fisheye camera 220degree FOV  $\rightarrow$  865/220 = 3.9 Shooting with more camera with narrower lens contributes to increase image resolution. Shooting with fewer camera with wider lens
  - contributes to reduce stitch lines.

How to make 3D-360 is still not perfect because of the dilemma between 'No Parallax' for panorama and 'Need Parallax' for 3D. However the technique and technology are grown up time after time in this field. So I may change my workflow in the near future. But I hope this workshop will help you who want to know about 3D-360 filming.

Thank you for your attention.

