Overview of draft NPs on drive monitoring and recording

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- As a result of studies of SS5 mirror PT in Japan.
- Drive monitor system is a infotainment system to provide the surrounding view of the car to user.
  - This is not a device for indirect vision and Camera-Monitor System(CMS) of GRSG and ISO 16505, and NHTSA Rear Visibility in US.
- Standardization is to provide a good drive monitor system.
  - Requirement
  - Compatibility
  - Measurement

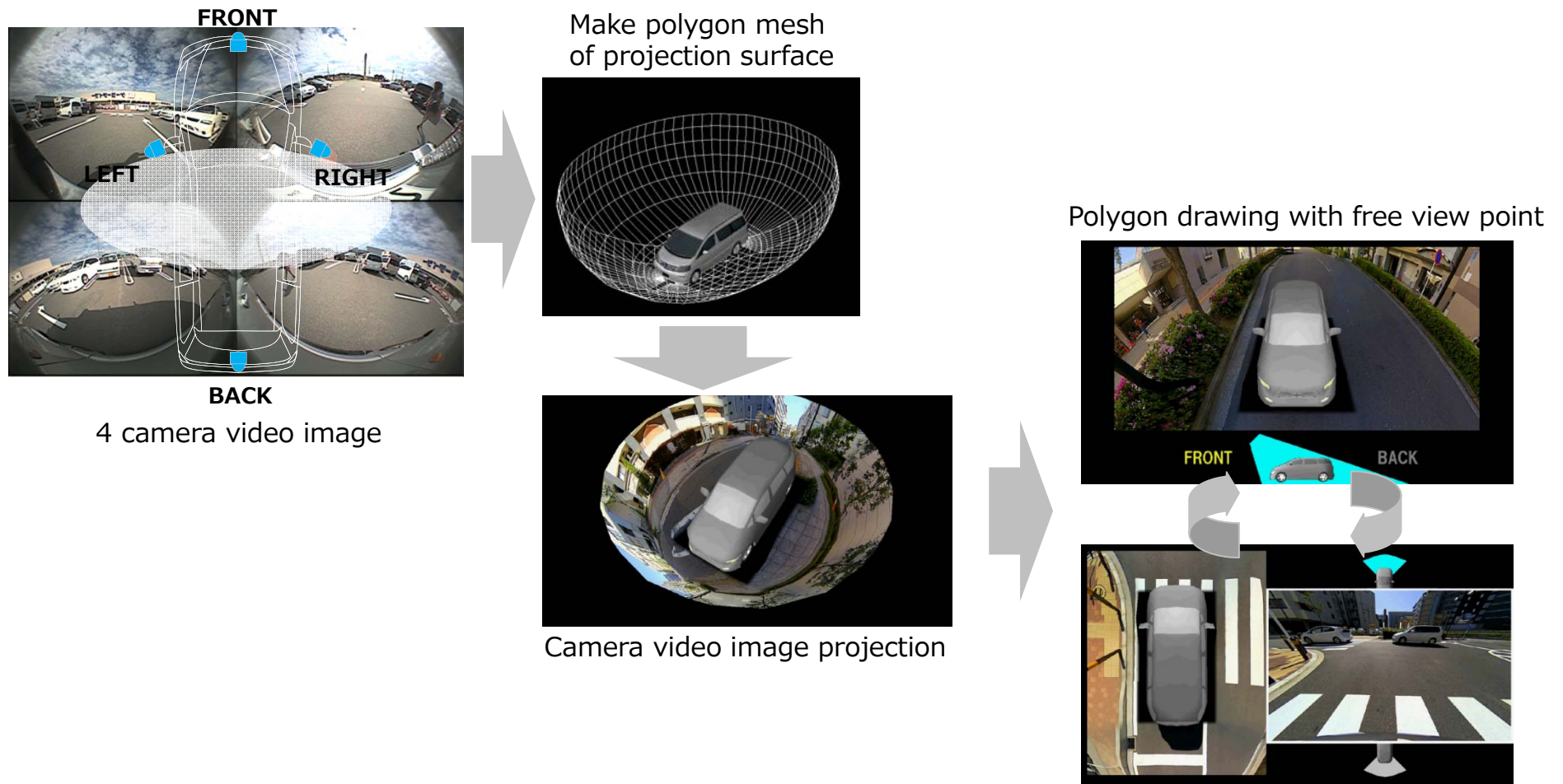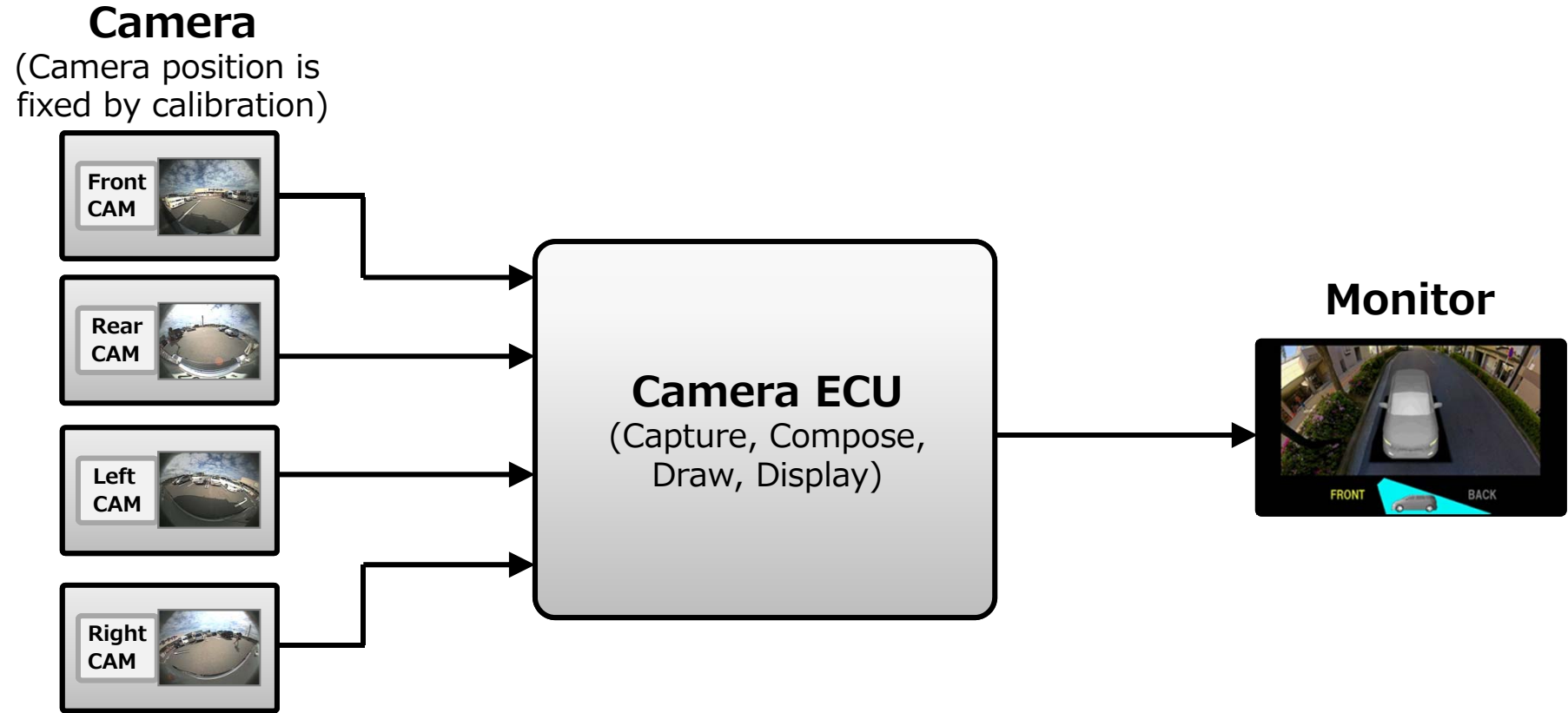- The following is an explanation of the system.

Drive monitor system

2014.10.21
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1. Scope

This International Standard specifies drive monitor system which allows drivers to monitor the vehicle's surroundings in real time, this system displays composite views from the free view point and builds composite 3D models from four cameras mounted on a vehicle.


FRONT

LEFT   **RIGHT**

BACK

4 camera video image

Make polygon mesh
of projection surface

Camera video image projection

Polygon drawing with free view point

FRONT   BACK

2. System model

Camera
(Camera position is
fixed by calibration)

Monitor

Camera ECU
(Capture, Compose,
Draw, Display)

3. Camera requirement

- Horizontal Field of View at camera should be more than 180 degree.

- Lenz distortion data at camera should be offered.

  - 1D distortion data (rotationally symmetric lens)
    It is composed of the following data: an angle of incidence (angle "a" between optical axis center)
    and the distance (d) from the center.

d1 = distance from the center

d2 = distance from the center   Imaging element

a2 = angle of incidence (angle between optical axis center)

a1 = angle of incidence (angle between optical axis center)
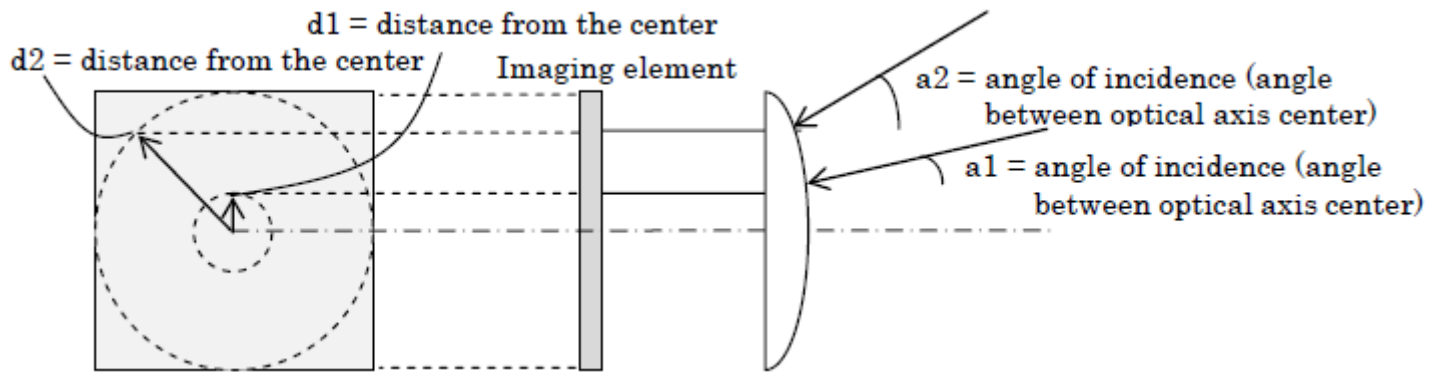
  - 2D distortion data (non-rotationally symmetric lens)
    It is composed of the following data: an angle of incidence (pan angle and tilt angle) and
    the location (x,y) on imaging element.

(x2,y2) = location on imaging element

(x1,y1) = location on imaging element   Imaging element

(pan2,tilt2) = angle of incidence (pan angle and tilt angle)

(pan1,tilt1) = angle of incidence (pan angle and tilt angle)
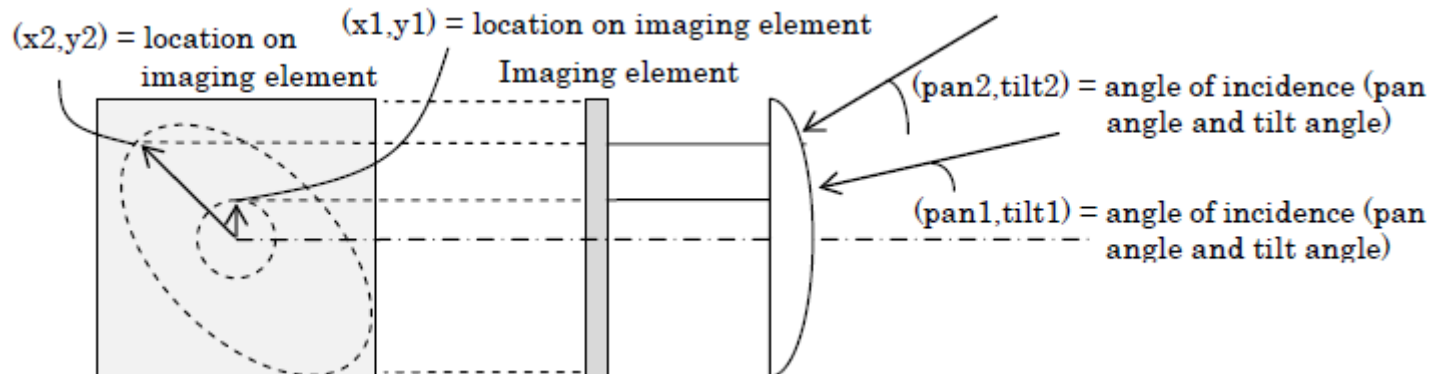
4. Camera setting position to the vehicle

- Four camera should be set in the edge outside the vehicle.

- The same height of each camera should be set.

- Four camera should be set in higher position.

- 360 degrees at the road surface should be photographed by four camera.

5. Camera calibration

- Setting position and angle for four camera shall be calculated at the vehicle coordinate system.
  Setting position: X, Y, Z (mm) at optics center
  Setting angle   : Tilt angle $[\psi]$, Rot angle $[\varphi]$, Pan angle $[\theta]$ at optical axis direction (deg)
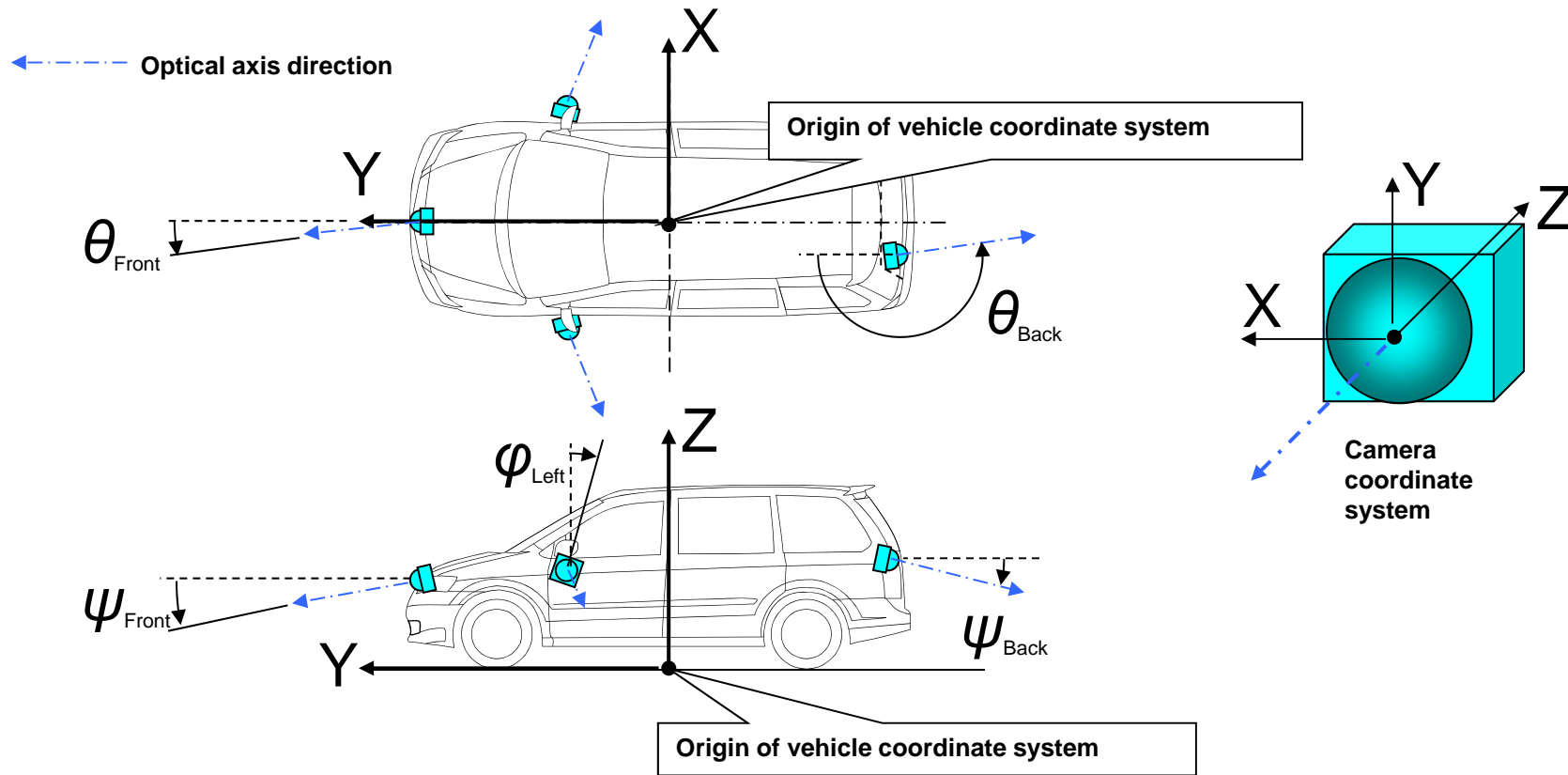
6. Capture

- The video image of four camera is captured after the camera calibration.

7. Compose

- The video image of four camera is composed by the camera parameter generated from the camera calibration.

8. Draw

- The video image of four camera composed is drawn to add 3D vehicle model by projection surface data, viewpoint parameter and boundary position of each camera video image.

9. Display

- The video image of four camera composed and drawn is displayed by set the layer and view change mode, add GUI and guideline.

10. System model (Future)