Demo Application UI Guide (NxRearCam)

Version 1.0.0

Display Audio

Solution Team

Release information

The following changes have been make to this document.

Change History

Date	Change
28 Feb. 2019	First release for v1.0.0

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Chap 1. Overview

1.1 Overview

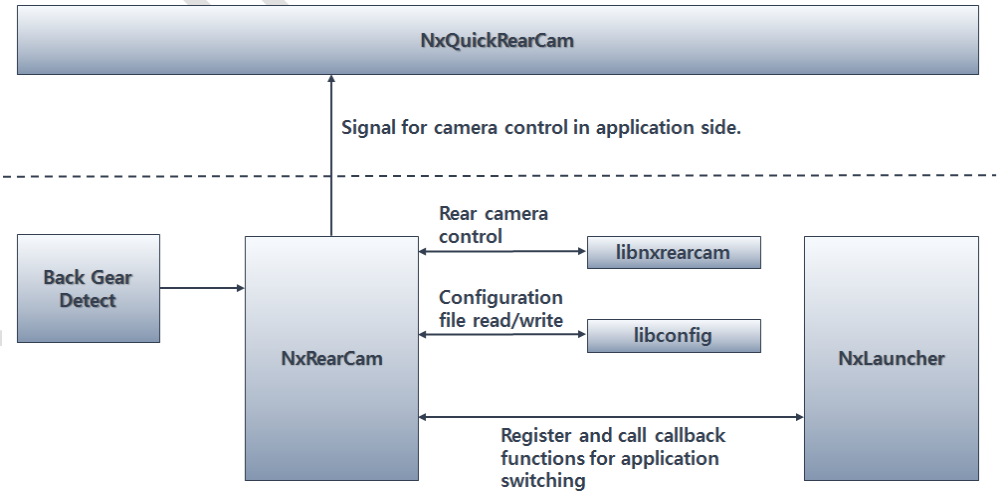
이 문서는 Display Audio 의 Demo Application 인 NxRearCam 에 대해서 설명한 문서이다. NxRearCam 은 NxQuickRearCam application 의 동작을 이어받아서 동작하도록 되어있다.

Demo Application 에서는 차량용 Rear Camera System 을 modeling 하기 위하여 GPIO pin 한 개를 후방 기어로 modeling 하였으며, 이를 통하여 application 이 camera 영상은 display 하도록 되어 있으며 software deinterlace engine 을 포함하고 있다.

* NxQuickRearCam : booting 완료(NxLauncher 실행을 포함) 전, backgear 와 연동되는 camera service 를 제공하기 위한 application.

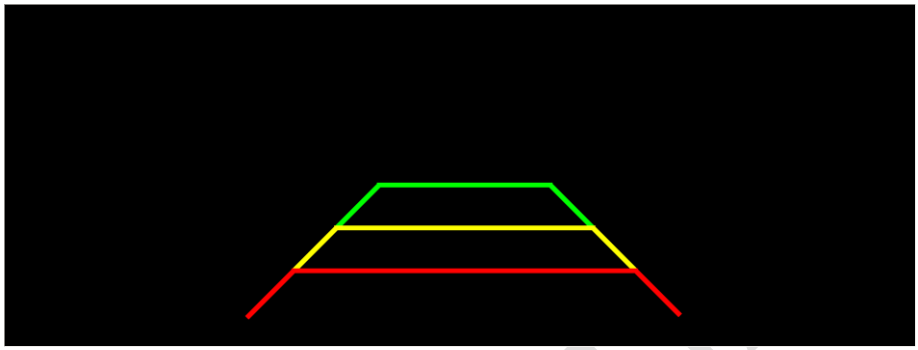
1.2 Block Diagram

NxRearCam 은 아래와 같이 구성되어있다. Application 시작시에 QuickRearCam Application 으로부터 제어권을 얻어 오기 위한 signal 을 발생시킨다. 이로부터 NxRearCam 은 자체적으로 back gear 롤 detection 하며 camera 영상을 display 하도록 구성되어 있다.



1.3 Application UI

Application 화면은 다음과 같으며 화면상에 Camera 영상과 Parking Guideline 이 같이 주사된다.



1.4 Configuration File

Configuration file(rearcam_config.xml)은 camera 및 display 를 위한 configuration 값들이 포함되어 있다. Configuration file 은 "/nexell/daudio/NxRearCam/"에 위치한다 파일이 존재하지 않을 경우, application 은 default value 들로 실행된다.

Configuration file 의 형식은 다음과 같다.

[rearcam_config.xml]

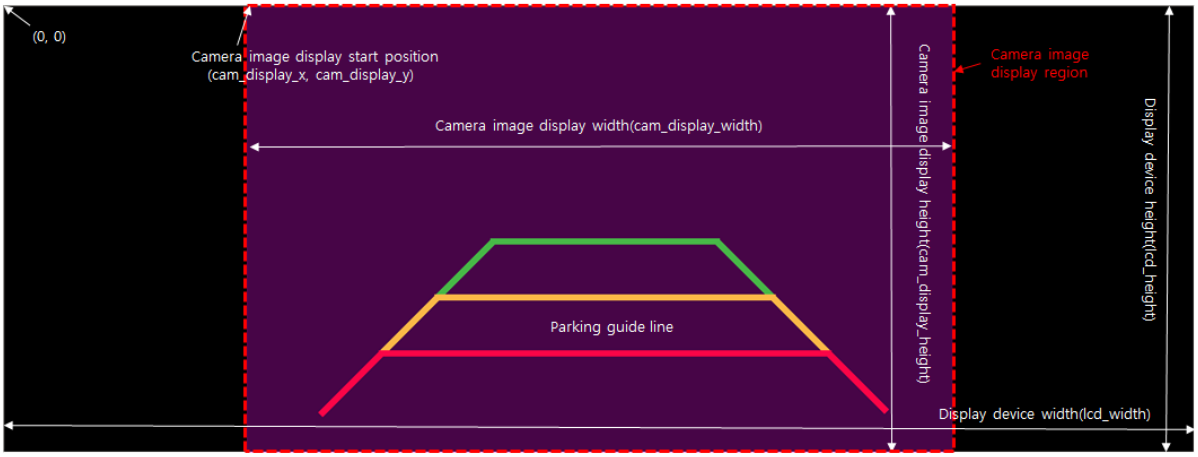
```
<?xml version="1.0" encoding="UTF-8"?>
<map>
    <string name="module">1</string>
    <string name="use_intercam">1</string>
    <string name="cam_width">704</string>
    <string name="cam_height">480</string>
    <string name="video_layer_idx">0</string>
    <string name="crtc_idx">0</string>
    <string name="cam_display_x">0</string>
    <string name="cam_display_y">0</string>
    <string name="cam_display_width">1024</string>
    <string name="cam_display_height">600</string>
    <string name="deinterlace_engine">1</string>
    <string name="deinter_param">3</string>
    <string name="lcd_width">1024</string>
    <string name="lcd_height">600</string>
```

```
        <string name="pgl_enable">1</string>
        <string name="backgear_enable">1</string>
        <string name="gpioIdx">163</string>
        <string name="quick_running">1</string>
</map>
```

Configuration	Description
module	Camera senor module number
use_intercam	Interlace camera 사용 여부 0 : not use interlace camera 1 : use interlace camera
cam_width	Camera image width
cam_height	Camera image height
video_layer_idx	Camera image가 rendering될 layer index. 본 application에서는 video layer에 rendering되므로 0으로 setting되어야 함
crtc_idx	몇 번째 crtc를 사용할 것인지에 대한 index로 하나의 display device만 지원되면 0으로 setting되어야 하며 두 개 이상의 display device를 사용할 경우 선택적으로 원하는 display device의 index를 setting
cam_display_x	Camera image를 display할 위치의 시작 x position
cam_display_y	Camera image를 display할 위치의 시작 y position
cam_display_width	Camera image display width
cam_display_height	Camera image display height
deinterlace_engine	Interlace camera를 사용할 경우 적용할 deinterlace engine 0: none 1: Nexell deinterlace engine 2. TS deinterlace engine
deinter_param	Motion detect sensitivity. TS deinterlace engine을 사용할 경우 적용되는 parameter
lcd_width	display device의 display width
lcd_height	display device의 display height
pgl_enable	Parking guide line을 drawing할 것인지 결정

	0 : parking guide line을 그리지 않음 1 : parking guide line을 그림
backgear_enable	Backgear 연동을 할 것인지 결정 0 : backgear 연동하지 않음 1 : backgear 연동 함
gpioIdx	Backgear와 mapping되어 있는 gpio의 number
quick_running	QuickRearCam의 사용 여부 0 : QuickRearCam을 사용하지 않음 1 : QuickRearCam을 사용함

아래는 display position 및 size 와 관련된 configuration parameter 들을 설명하기 위한 그림이다.



Camera image 가 display 되는 region 은 display device 가 지원하는 full 영역을 사용할 수도 있고, camgera image 의 aspact ratio 를 고려하여 camera image 가 display 되는 region 을 설정할 수도 있다.

Chap 2. Camera Library

2.1 Overview

Camera 의 동작을 제어하기 위한 library libnxrearcam.so 가 제공되며, API 들은 아래와 같다.

2.2 APIs

2.2.1 NX_RegisterBackGearEventCallBack()

`void NX_RegisterBackGearEventCallBack(void *pAppData, void (*callback)( int32_t))`
Description Register callback function for action when backgear is detected.
Parameter void *pAppData : pointer of app data void (*callback)(int32_t) : callback function
Return Value None

2.2.2 NX_StartBackGearDetectService ()

`int32_t NX_StartBackGearDetectService( int32_t nGpio, int32_t nChkDelay )`
Description Start backgear detection service.
Parameter int32_t nGpio : index of gpio for backgear int32_t nChkDelay : interval time for checking gpio status
Return Value Zero is successful, -1 is failed

2.2.3 NX_StopBackGearDetectService()

`void NX_StopBackGearDetectService()`
Description Stop backgear detection service
Parameter

None
Return Value
None

2.2.4 NX_RearCamInit()

int32_t NX_QuickRearCamInit **(NX_REARCAM_INFO *p_VipInfo, DISPLAY_INFO* p_dspInfo, DEINTERLACE_INFO *p_deinterInfo)**
Description
Initialization
Parameter
NX_REARCAM_INFO* p_VipInfo : configuration for camera DISPLAY_INFO* p_dspInfo : configuration for display DEINTERLACE_INFO* p_deinterInfo : configuration for deinterlace
Return Value
Zero is successful, -1 is failed.

- NX_REARCAM_INFO

```
typedef struct _NX_REARCAM_INFO{
        int32_t iType;          //camera type : CAM_TYPE_VIP
        int32_t iModule;        //camera module index
        int32_t iSensor;        //sensor
        int32_t iClipper;       //clipper
        int32_t bUseMipi;       //using mipi
        int32_t bUseInterCam;   //using interlace camera
        int32_t iFpsNum;        //frame per sec
        int32_t iFpsDen;        //denominate value of fps
        int32_t iNumPlane;      //number of plane
        int32_t iWidth;         //camera input width
        int32_t iHeight;        //camera input height
        int32_t iCropX;         //crop x position
        int32_t iCropY;         //crop y position
        int32_t iCropWidth;     //crop width
        int32_t iCropHeight;    //crop height
        int32_t iOutWidth;      //decimator width
        int32_t iOutHeight;     //decimator height
} NX_REARCAM_INFO;
```

- DISPLAY_INFO

```
typedef struct tagDISPLAY_INFO{
        uint32_t iConnectorIdx;  //drm connector index
        int32_t iPlaneIdx;       //drm plane index
```

```
        int32_t iCrtcIdx;          //drm crtc indexc
        uint32_t uDrmFormat;       //drm data format
        int32_t iSrcWidth;         //width of input image
        int32_t iSrcHeight;        //height of input image
        int32_t iCropX;            //crop x position
        int32_t iCropY;            //crop y position
        int32_t iCropWidth;        //crop width
        int32_t iCropHeight;       //crop height
        int32_t iDspX;             //display position
        int32_t iDspY;             //crop start x position
        int32_t iDspWidth;         //crop start y position
        int32_t iDdspHeight;       //crop width
        int32_t iCropHeight;       //crop height
        int32_t iPlaneId_PGL;      //plane ID for drawing parking guide line
        int32_t uDrmFormat_PGL; //data format for drawing parking guide line
        void*   m_pNativeWindow;   //only for surface view rendering at android application
} DISPLAY_INFO;
```

- DEINTERLACE_INFO

```
typedef struct tagDEINTERLACE_INFO{
        int32_t iWidth;          //width of input image
        int32_t iHeight;         //height of input image
        int32_t iEngineSel;      //deinterlace engine – 0 : none 1:nexell deinterlace 2: Thunder soft deinterlace
        int32_t iCorr;           // correlation value of motion detection sensitivity for Thunder soft deinterlace
 } DEINTERLACE_INFO;
```

2.2.5 NX_RearCamDeInit ()

int32_t NX_RearCamDeInit()
Description Rear cam deinit
Parameter None
Return Value Zero is successful, -1 is failed.

2.2.6 NX_RearCamStart()

int32_t NX_QuickRearCamStart()
Description Start rendering rear camera images.
Parameter None

Return Value
Zero is successful, -1 is failed.

2.2.7 NX_RearCamGetStatus

`int32_t NX_QuickRearCamGetStatus()`
Description
Get status
Parameter
None
Return Value
0 : stop 1 : init 2 : running

2.2.8 NX_RearCamGetVersion

`int32_t NX_QuickRearCamGetVersion()`
Description
Get NxQuickRearCam version information
Parameter
None
Return Value
Version information Major : ((return value) & 0xFF000000) >> 24 Minor : ((return value) & 0x00FF0000) >> 16 Revision : ((return value) & 0x0000FF00) >> 8 Reservation : ((return value) & 0x000000FF)

2.2.9 NX_RearCamSetDisplayPosition ()

```
int32_t NXDA_StartBackGearDetectService(
        int32_t x,
        int32_t y,
        int32_t w,
        int32_t h
);
```

Description
Set display position of camera images
Parameter
- x : start x-position. - y : start y-position - w : display width.

- h : display height
Return Value Zero is returned.

Chap 3. History

3.1 Known Issue

-. Not yet.

3.2 To do list

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