

Monarch Pro – UNS310709

Linux API Manual

- C -

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1). Prerequisites


- 1.1). Make sure that the camera is upgraded with the latest FW version (v23)
 - For upgrading the FW - refer to the [MONARCH PRO FW Upgrade Manual](#)
- 1.2). Supported OS platform


OS name	OS version	Kernel version	System
Raspberry Pi OS with desktop	Debian 11(bullseye)	5.15	32-bit
Raspberry Pi OS with desktop	Debian 11(bullseye)	5.15	64-bit
Ubuntu	20.04	5.13	64-bit

Download the new SDK according to the OS platform from >>> [here](#)<<<

- Download the tar.gz file

 [linuxsdk-1.1.0_raspberrypi-32bit.tar.gz](#)

 [linuxsdk-1.1.0_raspberrypi-64bit.tar.gz](#)

 [linuxsdk-1.1.0_ubuntu20.04-64bit.tar.gz](#)

- Decompress the tar.gz file.
`tar -zxvf linuxsdk-1.1.0-*.tar.gz`

2). SDK folder content

- **bin folder** - installation script, sample code and executable files after installation
- **inc folder** - header files
- **lib folder** - libUCam.so and other dependent libs for compiling sample code
- **README.md** - guide of how to compile and run SDK

3). Camera initialization

3.1). Import the CameraCardController library from the "inc" directory.
#include "../inc/CameraCardController.h"

3.2). CameraCardController
Connects and initialize the camera module.

Note:

The initialization process time may take up to 15 seconds.

- Input: --
- Output: ---
- Example: **CameraCardController myCamera;**

4). Control methods

4.1). SetExposureFps
Sets the camera module exposure time in FPS units.

Note:

FPS (frames per seconds) = $1000/\text{exposure_time}$

- Input: fps (2-1000)
- Output: ---
- Example: **SetExposureFps(100)**

4.2). GetExposureTime
Gets the exposure time in milliseconds [ms].

- Input: ---
- Output: exposure time
- Example: **exp_time = GetExposureTime()**

4.3). SetGain
Sets the gain value to the camera module [1-10].

- Input: gain value (1-10 float)
- Output: ---
- Example: **SetGain(2.6)**

4.4). GetGain
Gets the gain value.

- Input: ---
- Output: gain value
- Example: **gain_value = GetGain()**

4.5). AutoExposure
Adjust the exposure time automatically.

- Input: pointer to an integer
- Output: exposure time
- Example: **int maxBand = 0; AutoExposure(&maxBand);**

5). LUT methods

LUT - Look Up Table of voltages values per matching wavelength

- For each wavelength there are pre-defined voltages values stored in the camera module.

Basic methods:

5.1). SetLineVoltages

Sets the filter voltages values for the desired wavelength.

Usually used for capturing a single band.

- Input: line index [0-9]
- Output: ---
- Example: **SetLineVoltages(4)**
(Sets the line voltages for band 5)

5.2). BuildCustomLUT

Build a custom "playlist" with specified wavelength indexes

- Input: int idxList[10] = { 5,3,6,4,0 }; length = 5;
- Output: ---
- Example: **BuildCustomLUT(idxList, length)**

5.3). CaptureLUT

Capture spectral cube.

Performs camera module LUT and store all the frames in a dedicated array.

Note:

- By default, this function sets to capture all 10 bands (0-9 indexes).
- For capturing less than 10 bands, use BuildCustomLUT to create a custom "playlist".
- Input: (1, unsigned short LUT_frames[10*1024*1280]={0};)
- Output: array of 10-bit cube
- Example: **CaptureLUT(1, LUT_frames)**

5.4). RestoreLUT

Restores the capturing custom "playlist" to 10 bands (default).

- Input: ---
- Output: ---
- Example: **RestoreLUT()**

Advanced methods:

- 5.5). EnableLowPower
Disable/enable video-stream Output from camera module.
- Input: true/false
 - Output: ---
 - Example: **EnableLowPower(false)**
- 5.6). GetLUTLine
Read the line - number given by index - in LUT sequence that store it in camera module.
- Input: line index, converted voltages vector (4), d1, d2, cwl :
unsigned short c1[4];
unsigned short d1;
unsigned short d2;
unsigned short cwl;
 - Output: converted voltages vector (4), fps, gain, cwl.
 - Example: **line_data = GetLUTLine (5, c1, &d1, &d2, &cwl)**

6). Camera methods

- 6.1). InitCam
Initialize camera module
- Input: ---
 - Output: ---
 - Example: **InitCam()**
- 6.2). SkipFrames
Skip frames (x number_of_frames) from buffer to stabilize the filter position.
- Input: number of frames
 - Output: ---
 - Example: **SkipFrames(2)**
- 6.3). GetFrame10
Get grayscale frame of 10-bit in 16-bit package.
This is the processed raw image from camera.
Usage: for raw and envi formats.
- Note:
while in initialization process, an image frame won't be delivered, it will return the remaining time [sec] for completion.
- Input: unsigned short data10[1024][1280]
 - Output: grayscale frame of 10-bit
 - Example: **GetFrame10(data10)**
- 6.4). GetFrame8
Get grayscale frame of 8-bit.
Usage: for display and png format.

Note:

while in initialization process, an image frame won't be delivered, it will return the remaining time [sec] for completion.

- Input: unsigned char data8[1024][1280]
- Output: grayscale frame of 8-bit
- Example: **GetFrame8(data8)**

6.5). GetPreview

Get a preview grayscale frame of 8-bit.

Usage: for display only.

- Input: unsigned char data_preview[1024][1280]
- Output: grayscale frame of 8-bit
- Example: **GetPreview(data_preview)**

6.6). Release

Release camera connection

- Input: ---
- Output: ---
- Example: **Release()**

7). Other methods

7.1). PowerLED

Toggle LED light on camera module PCB.

- Input: true/false
- Output: ---
- Example: **PowerLED(true)**

7.2). GetTemperature

Get the temperature value in Celsius.

(The temperature sensor is located on the camera module PCB)

- Input: ---
- Output: temperature.
- Example: temp = **GetTemperature()**

7.3). GetSerialNumber

Get serial number of the camera module.

- Input: ---
- Output: serial number.
- Example: SN = **GetSerialNumber()**

7.4). GetFwVersion

Get serial number of the camera module.

- Input: ---
- Output: FW version.
- Example: FW = **GetFwVersion()**

7.5). GetApiVersion

Get serial number of the camera module.

- Input: ---
- Output: API version.
- Example: API = **GetApiVersion()**

7.6). Reset

reset camera module controller.

- Input: ---
- Output: ---
- Example: **Reset()**

8). Sample Code

For full sample code, please see the open code of **TestSdk.cpp**

- Located in: SDK/bin/TestSdk.cpp

For compiling and running the sample code, please see the README.md

- Located in: SDK/README.md

9). Appendix A – Comparison between Windows C API and Linux C API

Please see below the API methods names comparison of the Windows version vs the Linux version.

Windows Version 1.39	Linux Version 1.0.0	Linux Version 1.1.0
SetExposureFps	SetExposureFps	SetExposureFps
GetExposureTime	GetExposureTime	GetExposureTime
SetGain	SetGain	SetGain
GetGain	GetGain	GetGain
SetLineVoltages	SetLineVoltages	SetLineVoltages
BuildCustomLUT	BuildCustomLUT	BuildCustomLUT
CaptureLUT	CaptureLUT	CaptureLUT
RestoreLUT	RestoreLUT	RestoreLUT
EnableLowPower	EnableLowPower	EnableLowPower
EnableVideoStream	EnableVideoStream	EnableVideoStream
GetLUTLine	GetLUTLine	GetLUTLine
InitCam	InitCam	InitCam
SkipFrames	SkipFrames	SkipFrames
GetFrameRaw	GetFrameRaw	GetFrameRaw
GetFrame10	GetFrame10	GetFrame10
GetFrame8	GetFrame8	GetFrame8
GetPreview	GetPreview	GetPreview
Release	Release	Release
PowerLED	PowerLED	PowerLED
GetTemperature	GetTemperature	GetTemperature
GetSerialNumber	GetSerialNumber	GetSerialNumber
GetFwVersion	GetFwVersion	GetFwVersion
GetApiVersion	GetApiVersion	GetApiVersion
Reset	Reset	Reset
--	--	AutoExposure