UNS EVK- UNS52000 Multispectral Camera

SW user guide – UNS61400

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1 Overview

This software enables the user to evaluate Unispectral's MEMS technology. By using Unispectral's new EVK, user will be able to set exposure and gain values, set illumination of a specific CWL, and save the images for further analysis.
2 Physical button

2.1 Description

User can find the physical green button on the top side of the EVK. User can use it to power up the camera, to shut it down, and toggle between the EVK software screen and desktop screen.

2.1.1 Power up

When camera is off, press on the green button in order to turn it on. The MCU will power up and show a blank screen, Unispectral GUI will follow. The green LED indicator of the Power Up button will let user know that the camera is connected.

2.1.2 Shut down

When camera is on, in order to turn it off, press and hold the green button for 2 seconds, then release, the device will shut down and the LED indicator will turn off. This procedure will take few seconds to complete.

2.1.3 toggle

When camera is on, double click on the green button, in order to toggle between software screen and desktop screen. This function will let user see user saved images and other functions, while the software is running.
3 Control screens

3.1 Control buttons

The left side bar includes six buttons related to 6 control screens:

- **CAM** – camera configurations such as exposure and gain
- **LED** – illumination by LEDs
- **CWL** – Center Wavelength supported
- **PLAY** – play live
- **SAVE** – save images to drive
- **ANL** – analyze (sold separately)

By pressing once on a touchscreen button, user will be forwarded to the desired control screen. By pressing one more time, user will return to the view port.
3.2 Camera configuration

The Camera Settings screen will show up by pressing the CAM button on the left side bar. In this screen user can set the exposure and the gain values of the camera.

3.2.1 Set exposure

User can choose between two modes of setting exposure:

- Manual exposure
- Auto exposure

In **manual** mode user can edit the value of the exposure as needed. Use the plus (+) and minus (-) buttons to increase and decrease (respectively) the exposure value. If user wish to set a fixed value, a keyboard should be used.

When exposure values are set, press the **Set** button to apply the changes. Note that all the CWL modes exposure values will be updated to fit the new value user set.

Pressing the **Set Same** button will set all the CWL modes with the same exposure value user set.

In **auto** mode user will be forwarded to the main screen in order to choose user desired value. Draw a rectangle ROI on the image to get the average grayscale value of it. The exposure value will be chosen automatically so that this value will become 255 grayscale value, and all the image pixels will be updated to fit that value.
In this mode, the exposure value field and the Set Same button are disabled.

After concluding, press the **SET** button to start the auto exposure process. User will be forwarded to CWL modes screen so user could see the updated exposure value of each mode in real time. Note that in this mode all the CWL modes exposure values will also be updated, in order to fit the new value.

Note that exposure time can be set **manually** from 1 [ms] to 500 [ms].

In **auto** mode, the exposure time is calculated by the ROI spot and set for all pixels in frame. Sometimes the exposure time for some pixels gets over the 500 [ms] maximum limit. This happens when ROI is taken at a very dark spot of the frame, while there are also very bright spots in the frame.

In case like that, an error window will pop up. User should press OK and choose again a better ROI spot.
3.2.2 Set gain

In order to set the gain value of the camera, user can edit the value of the gain. Please use the plus (+) and minus (-) buttons to increase and decrease (respectively) the gain value. If user wish to set a fixed value, a keyboard should be used.

Note that if the value reached the maximum or the minimum limits, the plus or the minus buttons (respectively) will become blank and disabled.

Once concluded, press the **Set** button to apply the changes. Note that since the gain value has been set to camera, all the CWL modes will be affected by that.
3.3 Illumination

The Illumination screen will show up by pressing the LED button on the left side bar.

In dark environment, user can use the LEDs as source of light. User needs to choose which LED working in different wavelength to turn on. User can light one of the special LEDs in a specific CWL. The 4 LEDs cover the whole NIR spectrum.

Note that user can turn on up to two LEDs working in different wavelength at once.
3.4 Modes

The mode screen will show up by pressing the CWL button on the left side bar.

User can **check all** the modes or **uncheck all** of them by pressing the button on the right section. Note that by default “Check all” is chosen.

In order to check and uncheck a specific mode, user should go to the first column of the table and press on the check mark at desired.

User can press on every CWL value at the second column of the table, so user can see their real time effect in the viewport that is in the background.

While a table row is chosen, by pressing CWL column or exposure column, user can use the plus (+) and minus (-) buttons to increase and decrease (respectively) the exposure value of that current mode. Note that all the modes exposure values will be updated to fit the new value.

If user wish to change only the value of the current mode, use the arrows up and down besides the exposure value in the table. In this case, use a mouse for a convenient setting. Using a keyboard will give user the ability to enter a fixed desired value too.
3.5 Play

The play screen will show up by pressing the PLAY button on the left side bar.

After choosing the desired CWL modes, in the play screen user can set the timeout between capturing an image to another. The default timeout is 100 nano seconds.

After concluding, user is ready to push the **Play Sequential** button. As user push the button, the control screen will disappear so user could see the results coming to the viewport for each mode. The progress bar below the view port will show the progress during the play.
3.6 Save

The save screen will show up by pressing the SAVE button on the left side bar.

The default directory for saved images is Saved Images folder in desktop. By physically connecting flash drive to one of the USB ports, user will be able to activate the Save to my flash drive option and to choose user's device from the list beside.

If somehow user flash drive has not been recognized by the software, please consider closing and reopening the Save screen (by pressing the SAVE button in the left side bar) in order to refresh the available flash drives list.

If user would like to save the current view in the viewport, user needs to choose the Save Current button.

If user want to save a whole sequence of modes that have been chosen in the CWL table, user needs to choose the Save Sequential button.

In order to save several images of each mode, so user can see by the changes over time of the same mode, user can set the value of Copies of Sequence option. The default value of Copies of Sequence option is 1, so only one image will be saved for each mode.
3.7 Analyze

This Section is enabled if user purchased the SW module of Dimension reduction – false colour display.

Chapter 4 – 'UNS61000 Analyze' – provides more details about the product.
4 UNS61000 Analyze

4.1 Description

This feature provides the most valuable and important data from the images that were taken with Unispectral camera.

Several add-ons can be purchased separately, so the user have the freedom to choose which analyzation process is more relevant to him. User can purchase these add-ons at any time.

For every add-on which purchased, a button will show up in the Analyze screen, so the user can get the most from Unispectral camera.
4.2 Control screen

The analyze screen will show up by pressing the ANL button on the left side bar.

In **Desktop/Addons** folder user should have all the add-ons he purchased, so their button will show up here in the analyze screen.

Before saving any sequence of images, the background of this analyze screen will be black, and its buttons will be disabled. After saving a sequence of images in the **save screen**, the background of this analyze screen will be the image from the last saved sequence and its buttons will be enabled to use.
By pressing one of analyze buttons user will be forwarded to the viewport in order to choose user desired spot by drawing a rectangle ROI on the image.

After concluding, press the **SET** button in order to get the analyze results. A popup window with results will show up.
In order to go back to main app, user can minimize the popup window or close it by pressing the right option on the up-right corner of the window.

Some analyze required more data from the user. In this case, by pressing the SET button after drawing the ROI, user will be forwarded to a second screen to choose.

After concluding, press the SET button in order to get the analyze results. A popup window with results will show up.
4.3 Examples

4.3.1 Face in ColorIR

Example of False Color face image taken in multiple wavelengths in NIR spectrum.

![ColorIR™](image1)

4.3.2 Face in Wideband IR

Example of face image taken in single wavelength in NIR spectrum.

![Wideband IR](image2)

4.3.3 Face in Single color IR

Example of face image taken in RGB camera.

![Single color IR](image3)
4.3.4 RGB avocado/apples vs FalseColor avocado/apples

Example of Avocado image taken in RGB camera (left) compared to False Color avocado image taken in multiple wavelengths in NIR spectrum (right).
5 Remote control

5.1 Description

In order to use the device in a non-touch way, user can use remote control via net connection.

A recommended software for Windows and other platforms is AnyDesk. It can be downloaded from here.

Note that this software is already in camera. User can access it by pressing on the red-orange square icon near to the Bluetooth icon.
5.2 Setup

Once AnyDesk is installed and opened in PC, user should see a screen with two main desks: This Desk and Remote Desk.

In order to set up a new connection, user should enter camera address – 9 digits unique ID - to Remote Desk edit field.

Camera unique ID can be found in Anydesk on camera. User should open AnyDesk on camera and find the 9-digits camera ID in This Desk section.

Once camera ID entered to Remote Desk in PC, user should press Connect. A prompt will be shown in camera suggesting options: Accept and Reject. User should choose Accept to let the PC make a connection with camera.

Once the connection is set, AnyDesk on PC will show camera screen. If more than one screen is connected, it is easy to toggle the display by choosing 1 or 2 in the left side of the bar above. Note that for big screens it might takes some time.
By default, camera screen is displayed by its original dimensions. If user wish to stretch the screen and display it bigger, it can be done from the display menu from the menu bar.

![Display Menu](image)

Note that Unispectral app hide the mouse cursor by default to let the user a smooth touch screen experience. While using remote control, it can be uncomfortable to work with the camera without a mouse cursor, so user should consider switching to cursor mode in camera.

To accomplish that, user should press on Change shortcut in camera desktop. A window will show up letting the user choose what variable he wants to change.

![Change Window](image)

User should enter 2 to change the value of blankCursor, and then enter 0 to work with monitor. Following Change app introductions, user should reboot camera to apply changes.
5.3 Files Transporting

Transporting files from camera to PC and vice versa, can be done by choosing from menu bar. A split screen will show up with files in PC and files in camera.

To send files from PC to camera, user should choose files and folders in PC section (left) and then press the Upload button. Copied files and folders will be shown up in camera section (right).

To send files from camera to PC, user should choose files and folders in camera section (right) and then press the Download button. Copied files and folders will be shown up in PC section (left).

While transporting files, a progress and notification will be displayed in the right side of the screen. It will stay there as history.