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, the user will be able to set exposure and gain values, set illumination for a specific CWL, and save the images for further analysis.
2 Physical Button

2.1 Description

The user can find the physical green/black button (depending on camera version) on the top side of the EVK and use it to power up the camera, shut it down, or toggle between the EVK’s software and desktop screens.

2.1.1 Power Up

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

2.1.2 Shut Down

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

2.1.3 Toggle

When the camera is on, double click on the green/black button in order to toggle between the software and desktop screens. This function will let the user see saved images and other functions, all 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 – supported center wavelengths
- PLAY – play live
- SAVE – save images to drive
- ANL – analysis options (sold separately)

By pressing once on a touchscreen button, the user will be forwarded to the desired control screen. By pressing one more time, the 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 the user can set the exposure and the gain values of the camera.

3.2.1 Set Exposure

The user can choose between two modes of setting exposure:

- Manual exposure
- Auto exposure

In manual mode the user can edit the value of the exposure as needed. Use the plus (+) and minus (-) buttons to increase or decrease the exposure value, respectively. If the user wishes 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 the user set.

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

In auto mode the user will be forwarded to the main screen in order to choose a 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. The user will be forwarded to the CWL modes’ screen to 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 1ms to 500ms.

In auto mode, the exposure time is calculated by the ROI spot and set for all pixels in the frame. The exposure time for some pixels may get over the 500ms maximum limit. This might happen when the ROI is taken at a very dark spot of the frame, while there are also very bright spots in the frame.

In this case, an error window will pop up. The user should press OK and choose again a better ROI spot.
3.2.2 Set Gain

The user can edit and set the gain value of the camera. Use the plus (+) and minus (-) buttons to increase and decrease the gain value, respectively. If the user wishes to set a fixed value, a keyboard should be used.

Note that if the value reaches the maximum or the minimum limits, the plus or the minus buttons will accordingly become blank and disabled.

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

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

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

Note that the 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.

![Mode Table]

The 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, the user should go to the first column of the table and press on the check mark to the left of the desired CWL.

The user can press on every CWL value at the second column of the table, in order to 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, the user can use the plus (+) and minus (-) buttons to increase or 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 the user wishes to change only the value of the current mode, the up and down arrows beside the exposure value in the table should be used. In this case, use a mouse for a convenient setting. Using a keyboard will give the user the ability to enter a fixed desired value as well.
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 the user can set the timeout between capturing consecutive images. The default timeout is 100ns.

After concluding, the Play Sequential button is ready to use. When the button is pressed, the control screen will disappear so the user could see the results for each mode on the viewport. The progress bar below the viewport will show the progress of the sequential 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 the **Saved Images** folder on the desktop. By physically connecting a flash drive to one of the USB ports, the user will be able to activate the **Save to my flash drive** option and to choose a device from the enabled list.

If somehow the user’s flash drive was not recognized by the software, 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.

In order to save the current view in the viewport, the user needs to press the **Save Current** button.

In order to save the whole sequence of modes that have been chosen in the CWL table, the user needs to press the **Save Sequential** button.

In order to save several images from each mode, so that the changes over time for the same mode can be viewed, the user can set the value of the **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 only enabled if the user has purchased the SW module of Dimension reduction – false colour display.

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

4.1 Description

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

Several add-ons can be purchased separately, so the user has the freedom to choose which analysis process is more relevant for him. The user can purchase these add-ons at any time.

For every add-on purchased, a button will appear in the Analyze screen, so the user can get the most from Unispectral’s camera.
4.2 Control Screen

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

In the Desktop/Addons folder, the user will have all the add-ons purchased. The according button will show up here in the analyze screen.

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

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

Some analysis options require some more data from the user. In this case, when pressing the SET button after drawing the ROI, the user will be forwarded to a second screen to choose the desired settings.

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

4.3.1 Face in ColorIR

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

![ColorIR™](image)

4.3.2 Face in Wideband IR

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

![Wideband IR](image)

4.3.3 Face in Single Color IR

Example of facial image taken in a RGB camera.

![Single color IR](image)
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, the user can use a remote control setting via net connection.

A recommended software for Windows and other platforms is AnyDesk. It can be downloaded [here](#).

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

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

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

The camera unique ID can be found by opening the Anydesk app on the camera. The 9-digits camera ID can be found in the This Desk section.

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

Once the connection is set, AnyDesk on PC will show the 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 this might takes a few time.
By default, the camera screen is displayed in its original dimensions. If the user wishes to stretch the screen and enlarge the display, it can be done from the display menu in the menu bar.

Note that the Unispectral app hides the mouse cursor by default, to allow the user to have a smooth touch screen experience. It may be uncomfortable to work with the camera without a mouse cursor in remote control mode, so the user should consider switching to cursor mode in the camera.

To accomplish this, the user should press on the Change shortcut in the camera desktop. A window will pop up, allowing the user to choose which variable to change.

The user should enter “2” to change the value of blankCursor, and then enter 0 to enable a cursor when working with a monitor. Following Change app introductions, the user should reboot the camera in order to apply the changes.
5.3 Files Transporting

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

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

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

While transporting files, a progress and notification window will be displayed on the right side of the screen. It will remain there to view the load history.