# SIMTRUM

Multispectral Drone Cameras

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For customized projects please Contact us:
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Multispectral Drone Cameras

The multispectral drone camera is a turnkey multispectral imaging solution for easy integration into drones with PixHawk flight controllers enabling capture of geotagged aerial images for further analysis in data mapping software.

Note:If errors or omissions in this sheet are found during use, please contact us for the most up to date information.
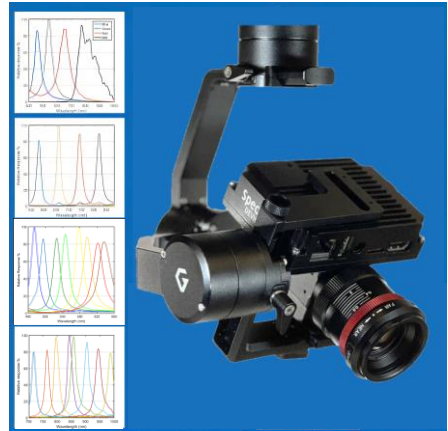
Feature
- Includes a snapshot multispectral camera, a lens,a vision computer, and a high
- performance 3-axis gimbal (optional)
- Compatible with common drone platforms
- Energy-efficient, lightweight
- Fully configured with camera control and image capture software
- Images can be saved to SD card at up to 10 FPS
- Start and stop buttons control image capture on demand.
- A live multispectral video feed is available for downlink.

Camera types
RGB-NIR Drone Camera
- Hve red, green, blue, and NIR spectral channels(NIR channel is sensitive to near infrared light from 750 nm to 1000 nm)
- The amount of cross-talk between channels is much lower

Agriculture Drone Camera
- Offer multispectral imaging across 4 bands(separately sensitive to live vegetation,the NDVI red channel,the 'red edge' channel and the NDVI NIR channel)
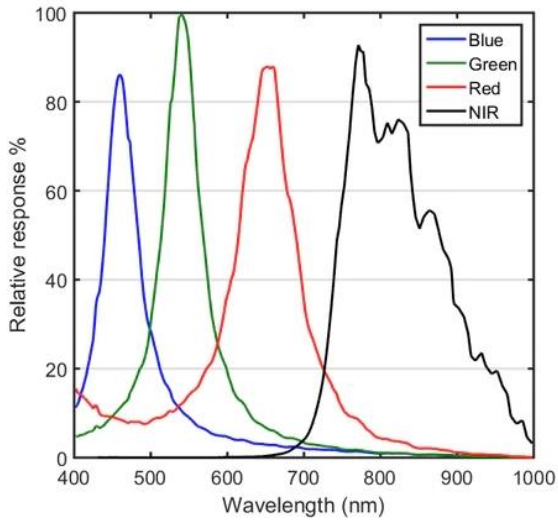
8-Band Visible Drone Camera
- Provides nearly equally spaced bands across the visible spectral range
- Compared to our 4-band cameras, the 8-band visible camera offers 3-fold higher sensitivity
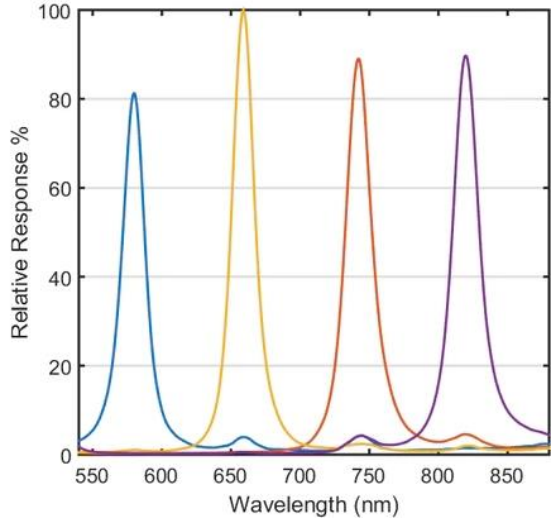
8-Band NIR Drone Camera
- 0ffer nearly equally spaced bands across the near-infrared spectral range
- Compared to our 4-band cameras, the 8-band NIR camera offers 3-fold higher sensitivity

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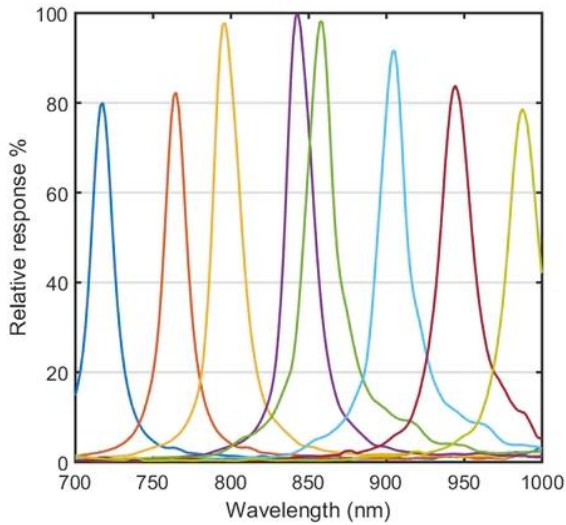
Spectral Characteristics

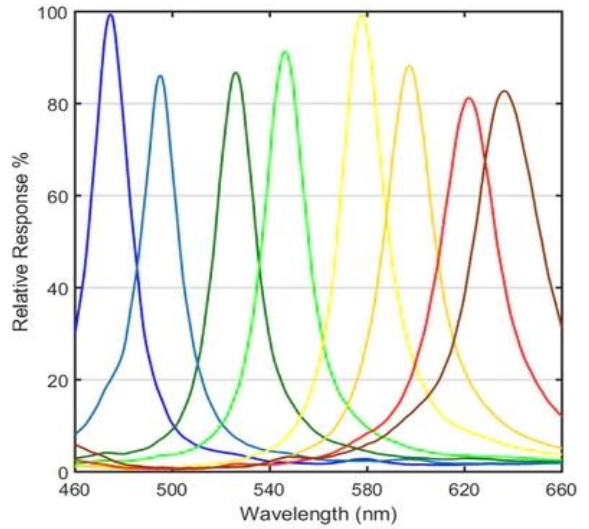Spectral response of different filter set

RGB-NIR Camera

Agriculture Camera

8-Band NIR Camera

8-Band Visible Camera

Specification

Parameters	RGB-NIR Drone Camera	Agriculture Drone Camera	8-Band Visible Drone Camera	8-Band NIR Drone Camera
Camera	Multispectral RGB-NIR camera	Multispectral agriculture camera	Multispectral 8-Band visible camera	Multispectral 8-Band NIR camera
Number of bands	4	4	8	8
Band locations	450, 550, 650, 800 nm	580, 660, 735, 820 nm	474, 495, 526, 546, 578, 597, 621, 640 nm	720, 760, 800, 840, 860, 900, 940, 980 nm
Pixels/Band	512 x 512	512 x 512	256 x 256	256 x 256
Bandwidth	~70 nm	~25 nm	~20-35 nm	~20 nm
Snapshot multispecral camera	Lens mount C-mount			
	Sensor type CMOS			
	Sensor format 1-inch			
	Maximum frame rate 89 FPS (10 FPS sustained)			
	Interface USB3.0			
	Weight 55 g			
Vision computer	Real-time HDMI output of multispectral images			
	Power: 5V/4A input			
	Sustained frame rates of up to 10 FPS (8bit, decimated) with simultaneous recording to SD card			
	Over 8 h of sustained frame recording at 1 FPS			
	Weight 140 g			
Gimbal	Maximum payload 465 g			
	Input voltage UBEX 14 – 52 V			
	Input voltage Gimbal 12V / 5A			
	Connection USB, CAN, UART, HDMI			
	Single operator Follow Mode / LB2			
	Dual operator SBUS / Spektrum / PPM / LB2			
	Pan range +/- 330			
	Tilt range -45 degree / +135 degree			
	Roll range -90 degree / +45 degree			
	Weight 465 g			
Application	Useful for a variety of drone applications where color and NIR imaging must be performed simultaneously	Useful for agricultural applications where measurements on vegetation are performed. a number of spectral analyses can be performed, including NDVI and SAVI.	Well-suited to spectral surveys of vegetation, land use, and mineral content	Suitable for spectral ground surveys of vegetation, land use, and mineral content.

Package contents

The multispectral drone cameras is shipped with several items including a multispectral camera integrated with a vision computer, a lockable ruggedized lens, a 128GB microSD card with microSD adaptor, a Pixy U Gremsy Gimbal (optional), Camera and Vision Computer Cables to the camera gimbal end, Camera Trigger IN/OUT from the QR gimbal end to Pixhawk, gimbal other accessories, power adaptor, a country specific power cord, and a USB Wi-Fi dongle (see the following pictures).

Camera and Vision Computer

Lockable, Ruggedized Lens

128 GB MicroSD card & Adaptor

Gimba

Camera and Vision Computer Cables to Bottom Gimbal End

Camera Trigger IN/OUT from Gimbal to Pixhawk

Gimbal Accessories

5V 4A Power Adaptor

USB WiFi Dongle

Installation and Operation

Hyper Quick Release Mechanism

Mount the top part of the hyper quick release onto the frame or damping isolator on the drone (Fig.7.1). Insert and twist the gimbal portion of the hyper quick release into the top part (Fig. 7.2).Reverse to disconnect. Setup and wiring details available in the MSDC Manual.

Fig. 7.1. Hyper quick release mechanism installation

Fig. 7.2. Gimbal attachment using hyper quick release mechanism

Vision Computer

The vision computer offers simple operation using three buttons and four LED indicators located on the side panel (Fig. 7.3). Camera setup is performed with a configuration file on the supplied SD card.Camera output is to the SD card. Alternatively, users can control the camera using simple commands over a network connection. Button operation follows a simple procedure:

1. Access SD card on a computer system, such as a laptop.
2. Modify the configuration file with a text editor such as Windows Notepad modifying the desired acquisition parameters in the /cfg/mscapture.cfg file, such as exposure time (ExposureTime key), interval between frames (InterFrameInterval key), trigger mode (TriggerMode key). See User Manual for complete list of keys.
3. Eject the SD card and insert it into the microSD slot of the vision computer.
4. Power up the vision computer and wait for LED1 to blink slowly. The 5V POWER LED will glow blue when power is applied to the barrel connector even with the vision computer is shutdown. This provides a quick check of availability of external power to the vision computer.
5. Click SWITCH2 to begin acquisition. LED2 will blink during acquisition.
6. Click SWITCH2 a second time to stop acquisition. LED2 will stop blinking.
7. Steps 5 and 6 can be repeated many times to start/stop image acquisition. Files will be saved with unique filenames. However, old files wie on the SD cll be overwritten if the vision computer is shut down and restarted.
8. Click SWITCH1 (1 time) until a fast blink on LED1 is observed. The vision computer is now in shut down mode.
9. Click SWITCH2 once to shut down the vision computer.
10. Remove the SD card from the vision computer.
11. Image and log files available on SD card in /frames and /logs folders for viewing, transfer, and analysis.Power up of the vision computer takes approximately 15 s to complete. Shutdown takes approximately 5 s to complete. Do not remove the SD card while the vision computer is powered on or off since data loss could occur.

Other operational modes such as black level calibration and flat field calibration are accessible through the configuration file on the SD card.
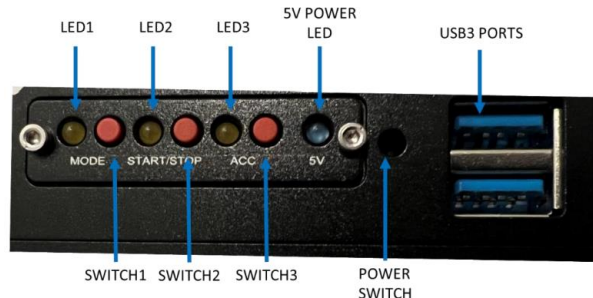

Fig. 7.3. Side panel buttons and LEDs for controlling vision computer. LED3 and SWITCH3 are inactive and reserved for future use.

Summary of acquisition operation

After connecting the system to the power, the vision computer boots up in under 20 seconds and LED 1 on the vision computer starts blinking slowly (normal acquisition mode). To begin image capture, click the start/stop button, the camera goes to capture mode and it waits to receive a trigger from Pixhawk. IF the configuration file has been set for timed mode, the images will be collected at a set Interframe Interval. In this state, both LED 1 and LED2 blink slowly. Once the camera receives a trigger signal from Pixhawk, the camera captures an image and saves the image in the frames folder on the SD card. At the same time, the camera sends a trigger signal back to the Pixhawk that the frame was captured. The pixhawk records a CAM_message that the image was captured successfully. In order to go back to normal acquisition mode and stop capture mode, click on start/stop button again. LED 1 will blink slowly. To shut down the vision computer, click the MODE button. LED1 will blink rapidly. Press the start/stop button. The vision computer will shut down. In this state, only the blue LED will remain on. It is safe to remove the SD card after LED 1, LED 2, and LED 3 go dark.

Real-Time Video Display

During image acquisition, the vision computer provides a real-time multispectral video output to the HDMI port. Users can observe the camera frames as they are acquired as well as supporting information in a table to the left of the frame. This feature is useful for focusing the camera lens and testing camera settings. Pixels in a frame with values at the top of the dynamic range will be highlighted in red. These red pixels may indicate areas of over-exposure. The HDMI port video can be downlinked to the ground controller using one of several available transceivers (contact us for options). Details of downlink setup are available in the MSDC manual.

Geotagging Images with Mission Planner

Users can geotag images post flight using Mission Planner to inject data from telemetry logs into their EXIF image tags. Geo-tagging images makes it easier to merge images taken during a camera mission,and is important for applications including photogrammetry, orthomosaic map generation, 3D terrain modeling, and large surveys

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