SIMTRUM
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Multispectral Imaging System

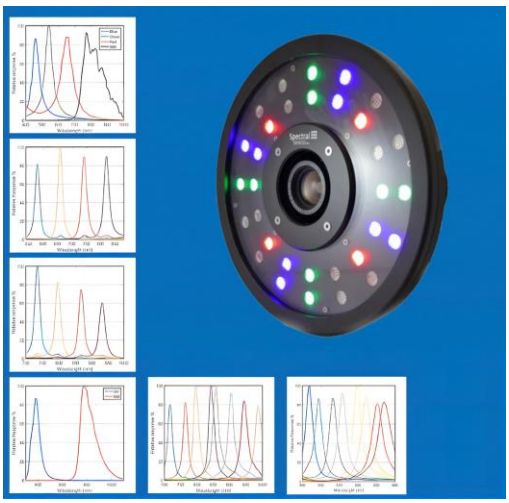
2023 V1

For customized projects please Contact us:

sales@simtrum.cn

Multispectral Imaging System

The multispectral imaging system is a multispectral imaging system incorporating an multispectral snapshot camera and mult-channel LED illuminator into a single waterproof and dustproof camera head. The camera head provides an adjustable mount for fixing the camera head to a user-supplied fixture and adjusting the pointing direction of the camera head in increments of 4.5° around a central axis. The system is shipped with an external waterproof control module that houses thestrobe controller and an embedded computer. Control of the system is through easy-to-use mode and start/stop buttons on the control module, or simple text commands using a network connection. The system is self-contained and requires 48VDC power supplied through an optional desktop power supply, or user supplied battery system. The system is CNC machined from 6061 aluminum with black anodization.



The LED illuminator amd the LED channels

The LED illuminator contains 16 or 32 high power LEDs arranged in a ring pattern surrounding the lens of the camera. The camera and LEDs are protected by a 5 mm thick polycarbonate window. The LEDs are arranged into 4 channels. The four LED channels are matched to the spectral transmission characteristics of the snapshot multispectral camera. Each LED channel is controlled with a strobe circuit capable of overdriving the LEDs to achieve high light output.

Anti-X-Talk™ technology

Anti-X-Talk™ technology works at the filter level and prevents light leakage between individual filters. Without Anti-X-Talk™ technology, stray light between spectral channels is significant, often exceeding the light leakage due to spectral overlap between adjacent filters. Without AntiX-Talk™ technology, images suffer from low contrast and spectral ambiguity. we invented Anti-X-Talk™ technology to overcome these problems. It works by blocking stray light between adjacent filters, so the pixel response is predictable and directly related to the actual spectral response of the overlying pixelated filter. The result is multispectral images with better spectral discrimination and higher contrast. Furthermore, high quality image data from the multispectral imaging system can be used as is without the need for proprietary post-processing algorithms and the camera can be used with a wide range of lens types, even at large apertures (e.g. f/2).

Feature

- Capture spectral images simultaneously(snapshot operation)
- High Frame Rate (up to 180 FPS at full frame)
- 4MP Global Shutter CMOS Sensor
- USB3 Vision & GenICam Compliant
- High power pulsed LED light source
- Compact waterproof and dustproof camera head (IP67)
- All cable connections removable and waterproof (IP67)
- Waterproof control module with computer and all software included
- Users can monitor video feed from camera in real-time over HDMI
- Enhances contrast and spectral performance(Anti-X-Talk™ Technology)
- Easy camera configuration using configuration file on SD card
- External ports for keyboard and monitor if direct access needed
- Headless operation (no keyboard or monitor required)
- Illuminated and color-coded buttons for instant feedback and control
- All necessary cables included
- Images saved to removable SD card and can also be retrieved over a network connection

Camera Types

RGB-NIR Multispectral Imaging System

- With RGB and NIR bands ,includes an RGB-NIR multispectral amera with red, green, blue and NIR spectral bands
- The illuminator contains 4 channels of LEDs

Agricultural Multispectral Imaging System

- Include agriculture multispectral camera with 4 bands
- The LED illuminator is equipped with 4 independent channels(live vegetation channel,NDVI red channel,'red edge' channel,NDVI NIR channel)

8-Band Visible Multispectral Imaging System

- Include an 8-Band visible multispectral camera offering nearly equally spaced bands across the visible spectral range
- The LED illuminator is equipped with 8 independent channels that are matched to camera
- Compared to our 4-band systems, the 8-band visible camera offers 3-fold higher sensitivity

8-Band NIR Multispectral Imaging System

- Includes an 8-Band NIR multispectral Camera offering nearly equally spaced bands across the near-infrared spectral range
- The LED illuminator is equipped with 8 independent channels that are matched to camera
- Compared to our 4-band systems, the 8-band NIR camera offers 3-fold higher sensitivity

Biomedical Multispectral Imaging System

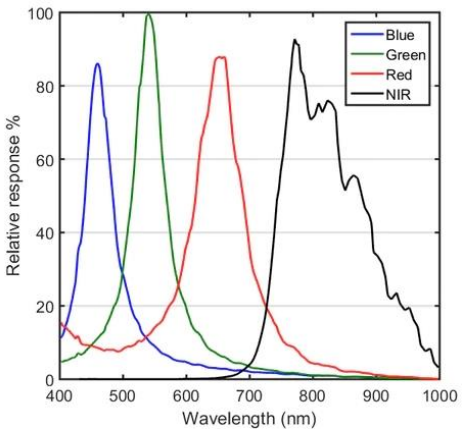
- Includes an biomedical multispectral camera with 4 bands
- The LED illuminator is equipped with 4 independent channels(separately sensitive to
- deoxyhemoglobin,total hemoglobin,oxyhemoglobin, lipid)

UV-NIR Multispectral Imaging System

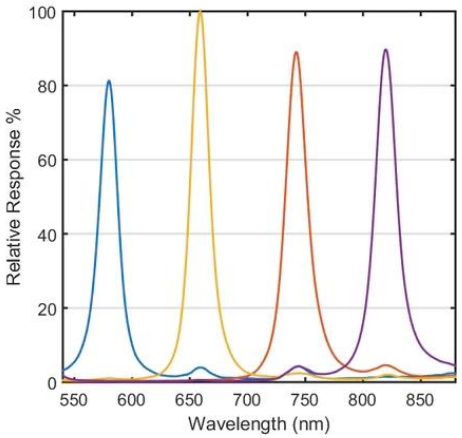
- Includes an UV-NIR multispectral camera with 2 bands of spectral discrimination
- The LED illuminator includes 2 independent LED channels(One channel is centered in the UV region and the other covers the near infrared region)

Spectral Characteristics

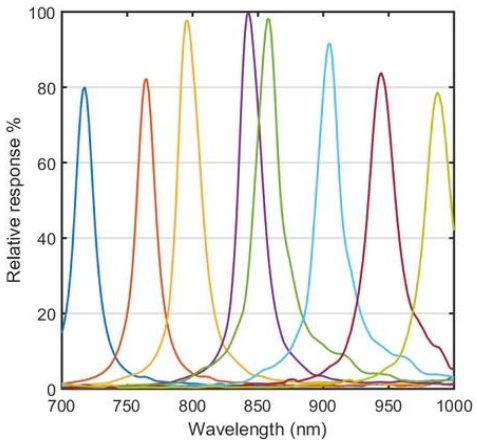
Spectral response of different filter set



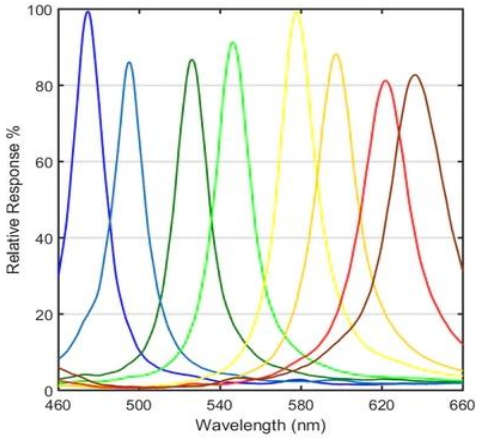
RGB-NIR Camera



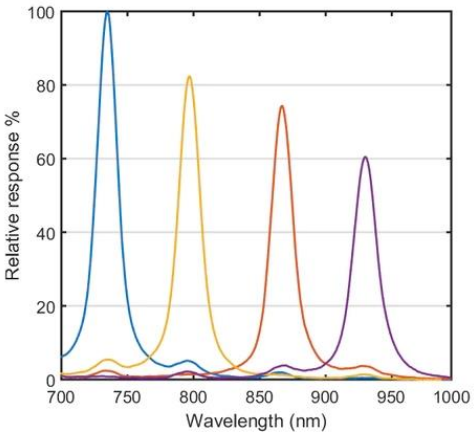
Agriculture Camera



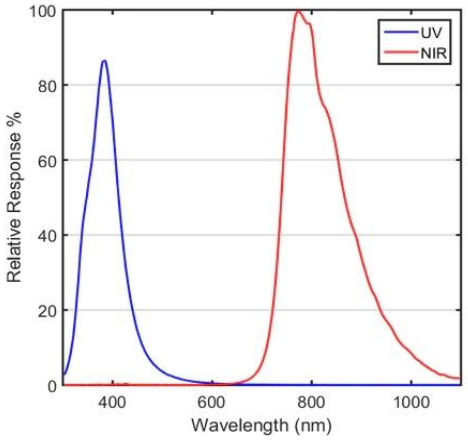
8-Band NIR Camera



8-Band Visible Camera



Biomedical Camera



UV-NIR Camera

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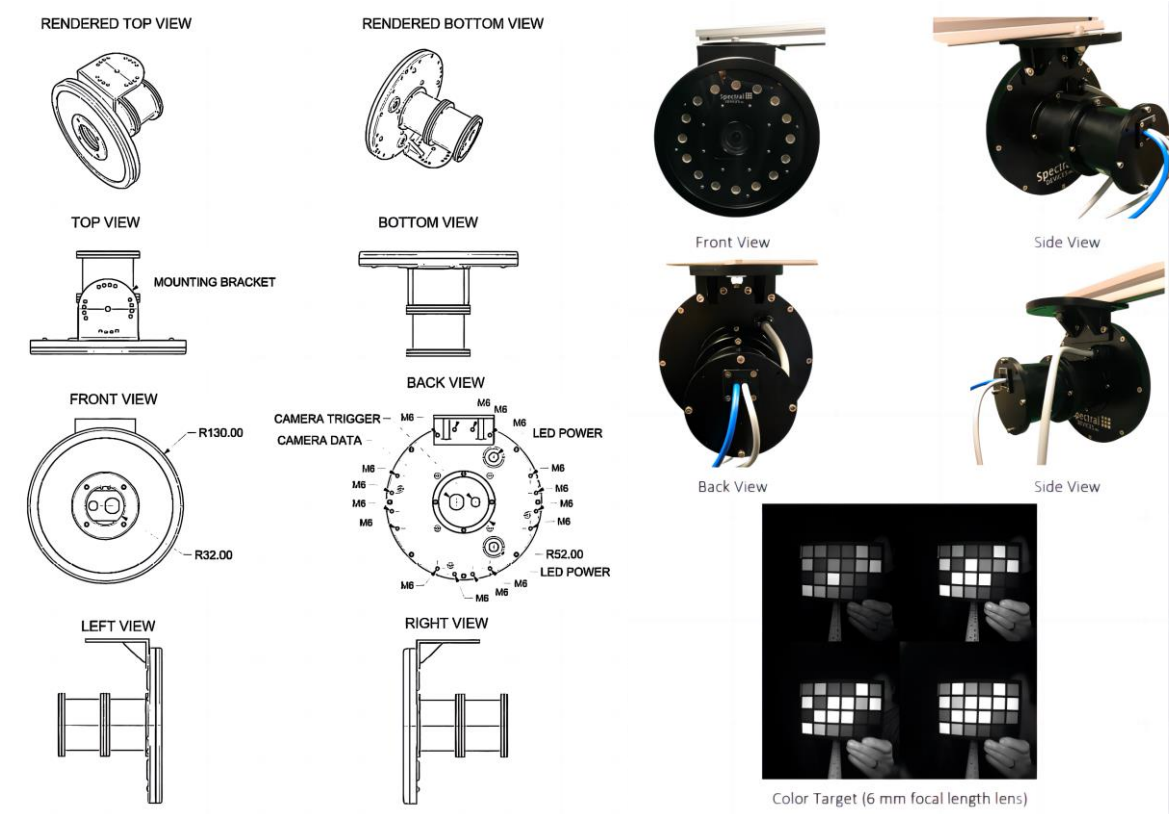
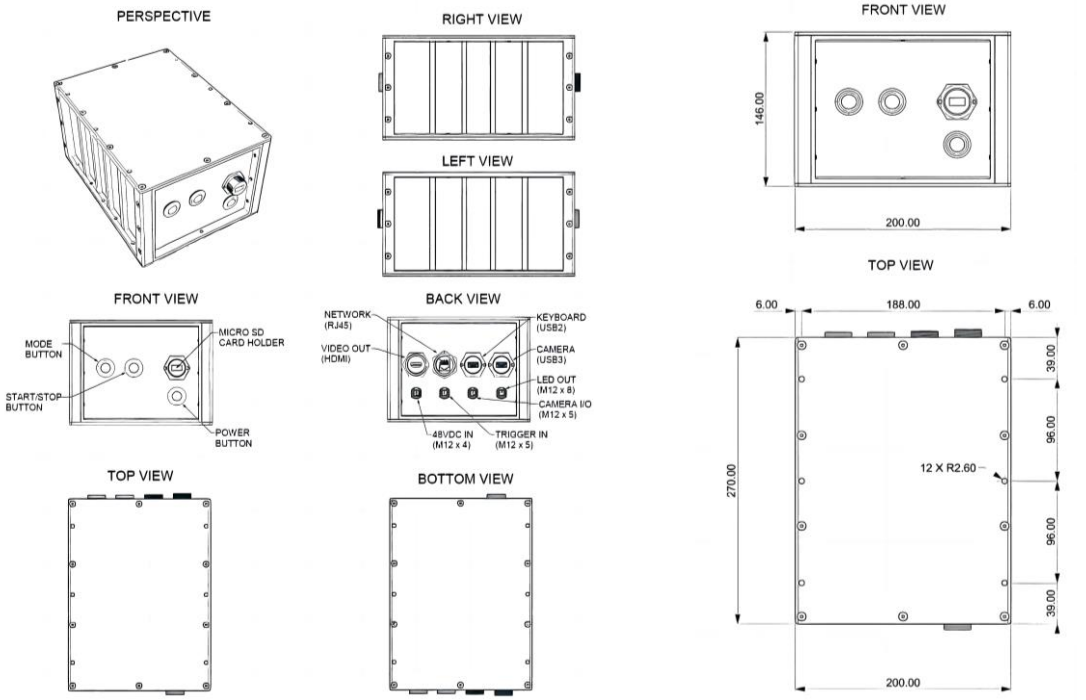
Specification

Mode	RGB-NIR Multispectral Imaging System	Agricultural Multispectral Imaging System	8-Band Visible Multispectral Imaging System	8-Band NIR Multispectral Imaging System	Biomedical Multispectral Imaging System	UV-NIR Multispectral Imaging System
Camera	RGB-NIR Camera	Agriculture Camera	8-Band Visible Camera	8-Band NIR Camera	Biomedical Camera	UV-NIR Camera
Number of bands	4	4	8	8	4	2
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	735, 800, 865, 930 nm	400, 800 nm
Pixels/Band	512 x 512	512 x 512	256 x 256	256 x 256	512 x 512	2048 x 512
Lens	C-mount, 1” sensor, focal lengths available (6mm to 50mm) Manual iris, manual focus, locking screws					
Number of LED channels	4	4	8	8	4	2
Number of LEDs per channel	8	8	4	4	8	16
LED control	Each channel controllable via software configuration file on SD card. Strobe output from camera flashes all 4 LED channels simultaneously.					
Exposure modes	Timed exposure (22 µs – 1.5 s). Timed interframe interval (5.6 ms – years).					
External trigger	Hardware trigger 5-24 Vdc signal (rising or falling edge).Externally triggered through 5-pin M12 connector.					
Network	1Gb Ethernet (RJ45)					
Operating system	Ubuntu Linux					
Software	Embedded image acquisition software					
External construction	6061 aluminum, polycarbonate, and 316 stainless steel hardware					
Surface finish	Camera head: black anodization, polycarbonate					
Power requirement	24-75 VDC (180 W),Power supplied through panel mounted 4 pin M12 connector(8A Max).					
Dimensions	Camera head: 200 mm diameter x 170 mm deep.Control module: 146 mm x 200 mm x 270 mm (HxWxD)					
Weight	Camera head: 2.5 kg . Control box: 4 kg					

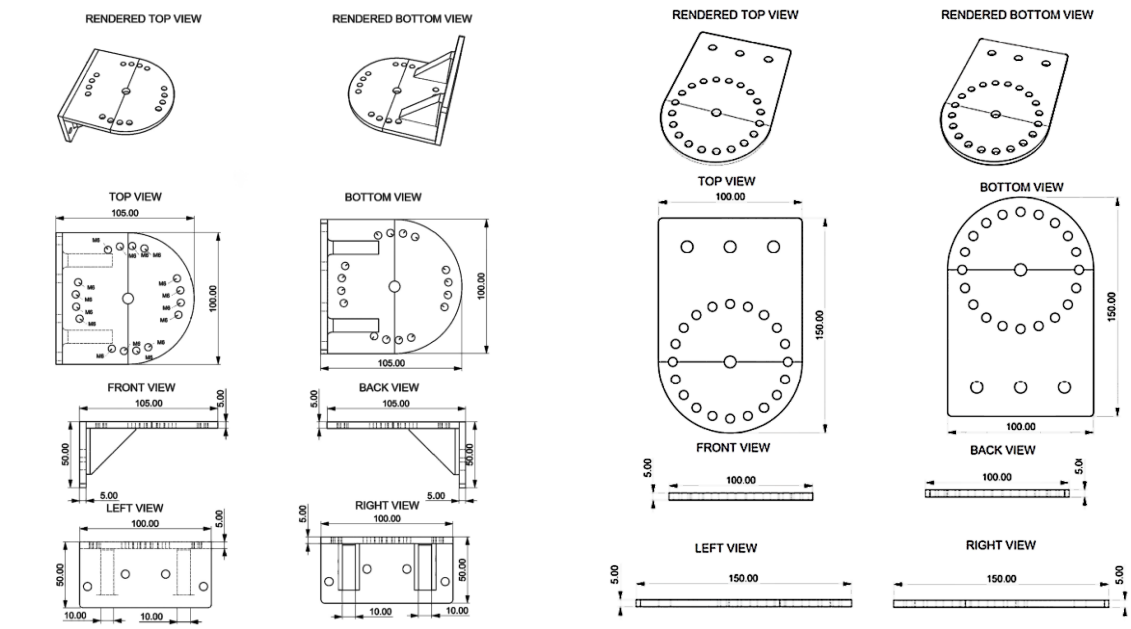
Camera Head



Control Box



Mounting Bracket



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