



UAV LOW-LIGHT NAVIGATION CAMERA MODULE

IMMERVISION 
see more, smarter

DESCRIPTION

Immervision's UAV (Unmanned Aerial Vehicle) Low-Light Navigation Camera Module is a ready-to-use camera module designed for the autonomous and semi-autonomous navigation of UAVs in all lighting and environmental conditions, with high performance in low-light conditions. Its compact design fits easily in different types of UAV design while having a small impact on power consumption.

KEY FEATURES AND BENEFITS

High performance in low-light conditions, allowing secure navigation

Wide-angle panomorph lens with smart pixel management, providing enhanced image quality

Front lens element in glass for usage in various environments, outdoors and indoors

Off-the-self solution, ready for implementation

Small footprint and light weight for low impact on battery consumption

Easily customizable to other platforms

Well suited for other navigation applications such as land vehicles, water vessels, robots, etc.

SIMULATED IMAGE



The resulting simulations are based on the sensor resolution, lens footprint, FoV and distortion only and will not include impacts of other optical and sensor properties (image quality like MTF, tolerances departure, sensor noise, spectral response, relative illumination, etc).

NAVIGATION AND OBJECT AVOIDANCE

Today's Unmanned Aerial Vehicles (UAVs) and small Unmanned Aerial Systems (sUAS), such as drones, have a variety of navigation options available to them, including GPS, vision, radar, and lidar. Each has its strengths and weaknesses. In rural environments, for example, GPS works well when it comes to location, like telling a drone where it is in relation to a forest, but it's of little use when it comes to object avoidance, like informing a drone flying through a forest as to the location of the trees. Similarly, in urban environments, when drones are used for tasks like inspecting infrastructure such as bridges or buildings, these structures can obstruct and/or degrade GPS signals (have you ever tried using Google Maps with GPS in New York City?). In a worst-case scenario, such as flying through an underground tunnel, GPS signals will be non-existent,

To augment GPS, in addition to a drone's inertial navigation systems in the form of accelerometers, gyroscopes, and magnetometers, the best all-round performer with regard to navigation and object avoidance is a visual camera system.

IMMERVISION'S UAV LOW-LIGHT NAVIGATION CAMERA MODULE

By leveraging the hundreds of thousands of hours of expertise that led to Immervision's proprietary simulation and analysis suite, the world-leading team of multidisciplinary scientists, optical designers, and image processing engineers in the InnovationLab have designed a state-of-the-art UAV Low-Light Navigation Camera Module.

This camera module has been designed from the ground up to satisfy the demanding requirements of operating in low-light conditions. The camera module sensor pixel size ($2.0 \times 2.0 \mu\text{m}$) and resolution (5-Mpixel) were carefully selected to maximise low-light sensitivity and image quality. This module is of particular interest for deployments like drones with their stringent size, weight, and power consumption limitations. In addition to the UAV's dawn-to-dusk (daytime) performance, platforms equipped with these navigation camera modules can also operate from dusk-to-dawn, both outdoors and indoors.

The camera module (weighing only 4.7g), includes the lens assembly, sensory, and MIPI interface. Unlike a regular fisheye lens, this camera module uses a custom ultra-wide-angle 190° field-of-view (FOV) panamorph lens whose distortion profile has been crafted to provide more usable pixels containing better data. Moreover,



A simulated image verifying the lens and sensor subsystems.

these pixels are tailored in number and size to provide optimal results in low-light conditions, thereby providing images suitable for use by human operators and/or the artificial intelligence (AI) and machine learning (ML) systems used in fully autonomous vehicles.

OFF-THE-SHELF AND OUT-OF-THE-BOX

Immervision's UAV Low-light Navigation Camera Module is driver ready for industry's leading robotic platform and flight controller. This plug-and-play solution gives access to Immervision's image processing software capability directly ported on the platform. Easy integration leaves you free to focus on selecting the right number of cameras for your application, typically ranging from, but not limited to 4 to 6 units.

CUSTOM DEPLOYMENTS

Although its initial target is UAV and sUAS platforms, Immervision's low-light navigation camera module is applicable to a wide range of applications, including robots, land vehicles, and water vessels -- anything that can benefit from the ability to operate in low-light conditions.

As part of this, the module has been designed in such a way that it can be quickly and easily customized. Immervision will be happy to collaborate with customers to provide custom solutions that work with the processors and navigation applications of the user's choice.

IMVISIO-ML		
Module Size	Module head: 16.0 x 16.0 x 18.65mm	Total length (with cable): 56.0mm
Interface	MIPI 4 Lane	
Field of View	190°	
Sensor Model	Sony	IMX335LLN (MONO)/IMX335LQN-C (Color)
Sensor Nb. of Recommended Recording Pixels	2592 x 1944 px	1/2.8"
Sensor Pixel Size	2.0 x 2.0 μ m	
Maximum Image Circle Diameter	3.9 mm	
Focal Length	1.38 mm	
Wavelength	Visible + NiR	Fully corrected up to 950 μ m
Aperture/F-number	1.8	
Aperture Type	Fixed	
Minimum Focus	0.25 m	
Distortion Profile	Panomorph	
Number of Lens Element	7	2G5P
Operating Temperature	-30 ~ 85°C	-22 ~ 185°F
Relative Illumination	\geq 78%	
Module Weight	4.7 g	

OUR UAV LOW- LIGHT NAVIGATION CAMERA MODULE OFFERS A READY-TO-USE SOLUTION

for the autonomous and semi-autonomous navigation of unmanned aerial vehicles and other devices.

This camera module is available as an off-the-shelf product, ready for integration, and can also be customized to meet specific requirements.

immervision.com

IMMERVISI  N
see more, smarter