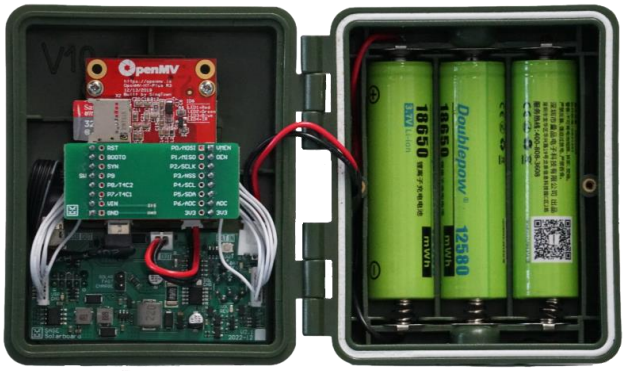
EcoEye – embedded vision camera for environmental monitoring

Features

- Based on high performance Cortex-M7 CPU
- High resolution 5MP (2592x1944) image sensor
- Data storage on micro-SD card
- Focal length versatility with interchangeable
- Automatic power and control management
- Ultra-low power consumption in deep sleep
- Battery compartment with 10200 mAh capacity
- Compact, easily mountable and waterproof
- Power switch and USB-C external user interface
- RGB indicator LED and IR illumination LEDs
- USB-C fast charging and full speed data transfer
- Easy-to-use, readily set-up with the OpenMV

Applications

- Ecosystem service monitoring
- Biodiversity monitoring
- Conservation biology
- Agricultural management
- Landscape ecology
- Plant phenology
- Ethology monitoring
- Environmental education



Introduction

EcoEye is a camera with on-board machine vision capabilities encased in a portable and waterproof housing designed for remote deployments. Based on the openMV H7 Plus Cam, it is easy to set up and a flexible fit for many applications. The internal power management and control system enables long-term operation and allows the integration of solar panels, countless sensors, and other external devices. The camera is thoroughly field tested, and results published in a scientific article.

Hardware Specifications

MCU	STM32H743IIK6
Flash	2MB internal + 32MB external
RAM	32MB SDRAM + 1MB SRAM
Camera	OV5640 (2592x1944)
Image format	RGB565/Grayscale
Frame rate	Up to 50fps at low resolution
Data transmission	USB type-C (12Mbs)
Software support	Micropython on OpenMV IDE
Buttons	1 x multi-function power switch
Data storage	Micro-SD card (100Mbs)
Power supply	2.8V-4.2V Lipo, 5V USB-C, 12V
Charging current	2.65A USB, 2A solar
Active current	350mA @ 3.7V
Sleep mode current	200uA @ 3.7V
Battery	3 x 18650 Lipo batteries
Battery capacity	Up to 10200 mAh
Protection	ESD, USB, battery, solar
Dimensions	85*96*99 mm
Weight	280.4g (no batteries), 417.9g
Temperature	-20°C to 70°C
Certifications	RoHS, FCC, CE

Software Specifications

Motion detection	Frame differencing
Image analysis	Image, objects or blob
Exposure control	Auto, bias, bracketing or manual
Image pre-settings	Windowing; region of interest
Image export	All, triggered or detected
Image info log	Date, time, exposure, gain and
Frame delay	0s – 240s; 1min - inf
Operation time	Day, night or 24h
Operation info	RGB LED; status log

DESCRIPTION

The ecoEye camera is a portable and low power camera with a waterproof housing that protects the openMV H7 Plus on-board machine vision module. Powered by 3 rechargeable lithium-ion batteries, an automatic power management module can provide continuous power supply and enables system deep sleep through an integrated real-time clock and the soft latch circuit that can be controlled by the user through the external push button. An external USB-C connector allows recharging the batteries and manually exchanging data with the openMV board. A multi-pin connector can accommodate a 12V solar panel, I2C and analog sensors, and various other external devices, making it suitable for long term usage and multi-sensor data integration.

The ecoEye housing was carefully designed to fit all the components with some extra space for expansion boards and shields. Its waterproofing seals combined with the secure latch type door closing mechanism, allows the ecoEye camera to operate outside under rainy and harsh environmental conditions. There are four thread inserts in each direction to mount the camera on a regular tripod. The front face not only hosts the image sensor and changeable lens, but also two InfraRed LEDs to illuminate the monitoring target at night, a RGB LED indicator, a clear window for the light shield expansions on the openMV board, and the external connectors with the power switch. Protecting the lens from sun glare and water droplets, the thought-through cap structures also help to prevent water accumulation on the surface when the camera is placed facing upwards.

With the openMV IDE, the camera can be programmed in micropython language with the many available examples or a custom code. Thanks to the serial terminal and the real-time image frame buffer on the interface, it is simple to write code, run, debug and setup the camera. The script code provided for this device offers a user-friendly method to configure the camera for any available monitoring application without advanced knowledge of micropython and the board functions. The user is only required to configure some basic parameters while most others are set up automatically in the background.

PART LIST

- Fully assembled EcoEye camera x1 (batteries and SD card not included)
- USB-C data cable x1
- 1.7mm lens x1
- 2.8mm lens x1
- 6.0mm lens x1
- 12.0mm lens x1