FISHCAMP ENGINEERING

'STARFISH'

Astronomical Guider and Imaging Camera

Overview - The *STARFISH* camera is a versatile imaging camera for the visible light frequency spectrum. It uses a 1/2" optical format, 1.3-megapixel resolution, CMOS image sensor that provides exceptional performance. In fact, it rivals CCD quality based on signal-to-noise ratio and low-light sensitivity. The camera provides all of the benefits (high data rate, low power, cost) that only a CMOS image sensor can provide. And it does this without sacrificing image quality.

Integrated System - Fishcamp Engineering has designed a camera around this remarkable sensor to give the user a completely integrated, highly functional imaging device. All required logic elements including embedded CPU, frame grabber, and USB interface have been designed into a package just 2.75" in diameter by 3.125" long. Data and power are provided over the USB port on the back of the camera and a T-threaded coupling on the front allows direct connection to standard lens accessories. An external power connector is available when the internal TEC cooler is used to cool the image sensor for those applications requiring long exposures. Optically coupled relay outputs and an RS-232 serial port allow the camera to drive external filter wheels and telescope mounts.

Embedded Image Processing - Hardware accelerated logic blocks in the pixel pipeline allow specialized image processing functions right on the camera. This allows for a more balanced system by relieving the host computer from having to handle this workload. Functions such as image statistics calculations, bias frame subtraction, and guide command timing operations are handled directly by the camera. A generous 64MByte memory is available for frame buffer and processing storage requirements.

Software Support - The *STARFISH* comes with broad application and driver support for several popular camera control applications. Both the Microsoft Windows and Mac OS X platforms are supported. A software development kit is provided for those customers that need to write specialized application software.

Fishcamp Engineering - As a company, we have been involved in the design of custom imaging systems for many of our clients. We have experience in systems as diverse as laser scanner and scientific imaging systems for the laboratory and industrial marketplaces. We have experience in the visible, MWIR, and LWIR infrared spectrums. As amateur astronomers ourselves, we are excited to bring our expertise to the development of this camera and to make it available to the wider market.

Camera Back

Camera Features

- CMOS, 1.3M pixel, large format image sensor with excellent sensitivity.
- Planetary imaging with frame rates as fast as 25 fps and 5.2µm pixel size.
- Hardware assisted image processing circuitry in the camera offloads tasks from the host computer.
- Internal frame buffer memory.
- Dedicated guide camera for auto-guiding applications. Standard ST-4 style guider port. Proprietary guide pulse timing circuitry in hardware for accurate guide command timing.

About as large as a 2" Eyepiece

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'*STARFISH*' Camera Specifications

Image Sensor

Manufacturer:	Micron Semiconductor
Part Number:	MT9M001
Optical Format:	1/2 inch (4:3)
Array Format:	1,280H x 1,024V
Total Pixels:	1,310,720
Active Imager Size:	6.83mm(H) x 5.45mm(V)
Pixel Size:	5.2µm x 5.2µm
Color Filter Array:	none, monochrome
Analog Pixel Processing:	Programmable gain and offset
ADC Resolution:	10-bit, on chip
Shutter:	Electronic rolling shutter
QE	56%
Responsivity:	2.1 V/lux-sec (550nm)
Dynamic Range	68.2dB
SNR (max)	45dB
Windowing:	Programmable in size and location
Binning:	None.

Readout Electronics

CPU:	32 bit RISC
Memory:	64 MBytes
Integration Time:	1mS to 5 minutes in 1mS steps
Frame Grabber:	Internal
Frame Buffer:	Internal
Image Processor:	Embedded Hardware Accelerator
Modes:	Single Exposure with/without frame buffer
Image Calibration:	bias frame calibration and read noise reduction operations performed by camera

Physical

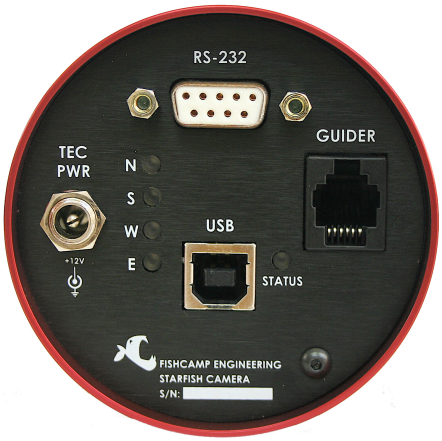
Dimensions:	2.75" diameter x 3.125" long
Lens Mounting:	T-thread nose piece
Mounting:	1/4-20 threaded tripod mount
Weight:	10.9 oz
Back Focus:	0.46"

Guider Port Interface

Type:	ST-4 style, optically isolated relay
Pulse cmd resolution:	1ms (+/- 20.8ns)

System

Computer Interface:	USB 2.0, High Speed 480 MBits ~12M, 16bit pixels/sec download
Full Frame Download Time:	< 0.2 seconds
Frame Rates:	3.5 fps (1280 x 1024) 14.3 fps (640 x 480) 25 fps (320 x 240)
Power:	+5V via USB for camera +12V for TEC Cooler
Cooling:	Single Stage TEC Internal heat sink and fan
Cooling Performance:	-15°C from ambient typical
Temperature Regulation:	±0.25°
Auto-guider Interface:	ST-4 style, optically isolated relay
Serial Interface:	RS-232
Auto-guider Indicators:	Four Status LED's: N, S, W, E
Camera Indicators:	Status LED's: Power, Exposure



Back of camera showing I/O connectors

ORDERING INFORMATION

Contact fishcamp engineering offices at the address below or by calling:

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All information preliminary and subject to change without notice December 18, 2006