

# ***Beyond Webcams***

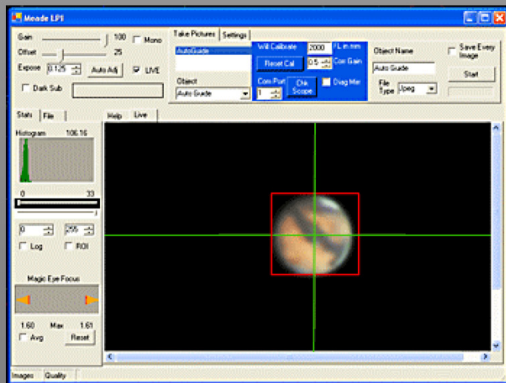
Lunar & Planetary Imaging

A Presentation for RTMC

Walt Lickteig & Ralph Megna

# A Bit of Background

- The last couple years we have given a popular presentation on the use of webcams for lunar and planetary imaging
- The use of devices such as the Meade LPI have greatly increased the number of amateurs who have tried planetary photography



# More Advanced Webcamming

- Devices such as the Philips ToUcam have been the mainstays of many planetary imagers



# Limitations of Webcams

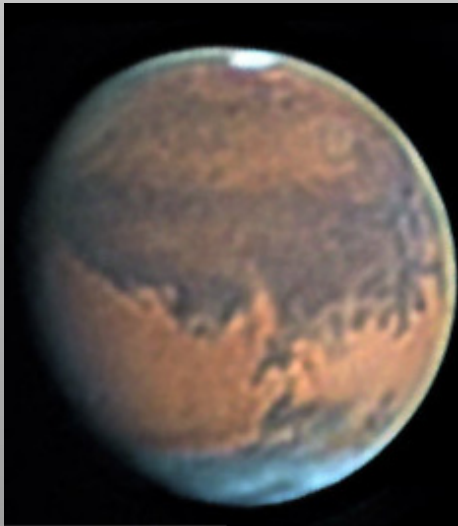
- **Bayer color filter:** Reduces light reaching sensor, imperfect color rendition
- **USB 1.1:** Most webcams use slow version of USB and compress images before sending them to the computer; this introduces artifacts
- **USB workaround:** Reducing frame rates to less than 5 fps turns off compression, but limits the number of captured frames
- **Noise:** Most webcams are pretty noisy

# Desirable Traits for Planetary Cam

- Low noise
  - Maybe even cooled
- Small pixels
- 10-bit or greater ADC (analog to digital convert)
- Fast interface
  - Either USB2 or Firewire (1384)
  - Capable of subframe imaging
- Monochrome with filter wheel

# CCD Cameras as Alternative

- Some imagers have used cameras such as SBIG's ST-402 with good success



- Ed Grafton (Houston, TX) Mars, 09/19/05

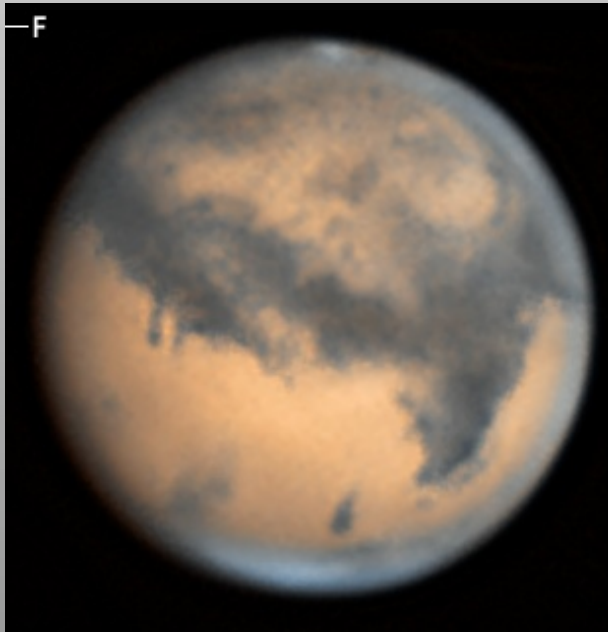
# Pros & Cons, ST-402

- Strengths
  - High quality, low-noise CCD
  - TEC cooling with fan
  - 16-bit ADC
  - USB2 interface
  - Integrated color wheel
- Weaknesses
  - Slow frame rate (<1 fps)
  - Fan vibration



# Another Option: Lumenera Cameras

- These Canadian CCD/CMOS cameras have quickly become popular with serious imagers



- Damien Peach (UK)

# Lumenera Pros & Cons

- Strengths

- Very high quality
- Low noise
- USB2 interface
- Good software support (Windows)



- Cons

- Monochrome camera requires 3rd party color wheel
- *Very* fast laptop needed for capture
- No support for MacOSX

# Other Cameras

- Atik



- Meade DSI



# Comment on DSLRs

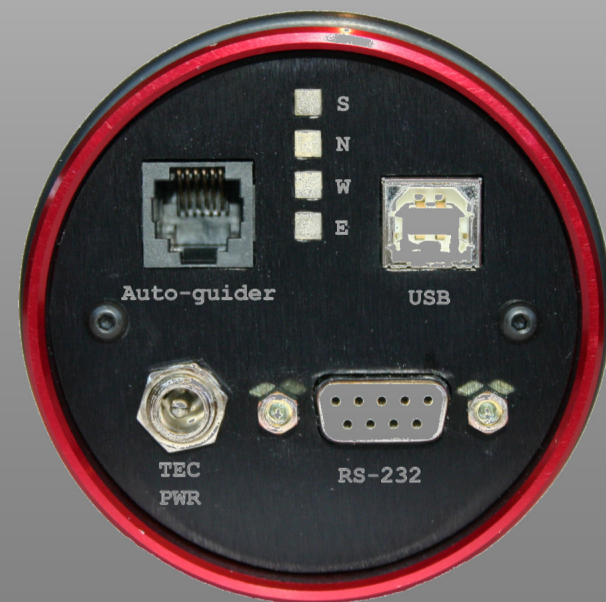
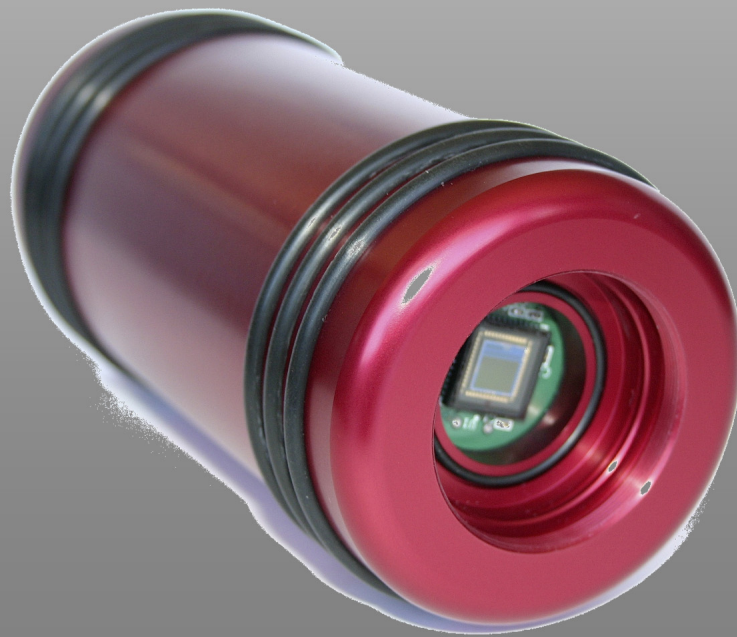
- DSLRs are revolutionizing deep sky, but their impact is much less dramatic in planetary
- Problems with DSLRs
  - Bayer filters
  - Hard to take multiple exposures
    - Long downloads to computer
  - Huge files for more than 8-bit depth
    - No support for subframe imaging



# Walt on Firewire Imaging & AstrolIDC Software

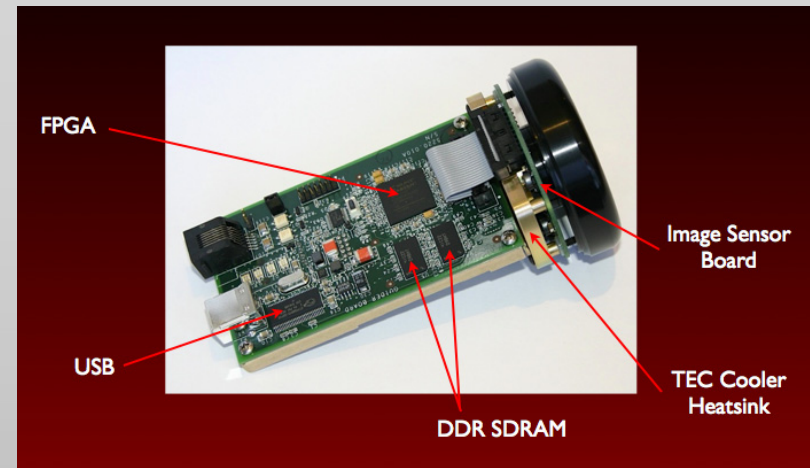
# Starfish Camera

- New entry into planetary camera arena
- Engineered & built in California
- Bob Piatek is at RTMC with demo



# Starfish Stats

- 1.2 megapixel
- 10-bit ADC
- TEC cooling
- Small pixels
- USB2 interface
- Subframe imaging
- 20 fps
- Low noise CMOS
- On-board memory
- Programmable

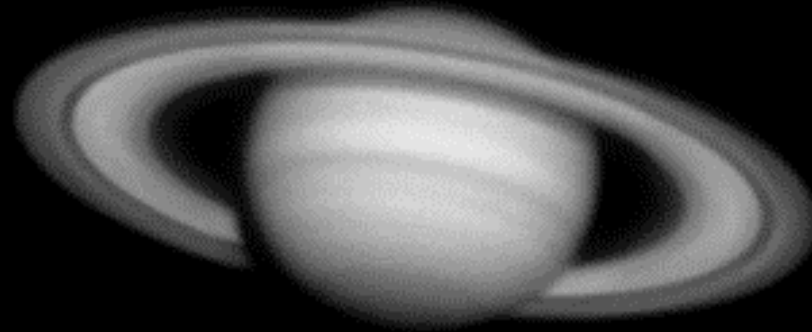


## Specifications:

Optical Format:	1/2 inch (4:3)
Array Format:	1280 x 1024
Pixel Size:	5.2um
Responsivity:	> 2.1V/lux-sec
Q.E.:	56%
Dimensions:	2.75" diameter x 2.8" long
Lens Mounting:	T-thread nose piece
Back Focus:	0.46"
Computer Interface:	USB 2.0 High Speed
Auto-guider interface:	ST-4 style
Serial Interface:	RS-232
Indicators:	N, S, W, E, Status LEDs
Power:	+5v via USB for camera +12V external for TEC

# Starfish Beta Testing

- Testing of camera & Starlink software underway



R. Megna/W. Lickteig \* 03-04-06 \* 10-in SCT @  $f/25$  \* Chino Hills, CA  
Starfish CMOS (prototype) \* Stack of 54 frames (100 shot) v2

# Starfish Changes to Come

- Redesign to be shorter, lighter
- Downloadable “personality” software
- Plug-ins for MaximDL, CCDSoft
- Faster frame rates

# Questions

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