



# CMUcam4

## Feature List v1.00

For CMUcam4 v1.00 Firmware

### Overview

*The goal of the CMUcam project is to provide simple vision capabilities to small-embedded systems in the form of an intelligent sensor. The CMUcam4 is a fully programmable embedded computer vision sensor. The main processor is the Parallax P8X32A (Propeller Chip) connected to an OmniVision 9665 CMOS camera sensor module.*

### Features

- Fully open source and re-programmable using the Propeller Tool
- Arduino Shield Compatible
  - w/ Supporting Interface Libraries and Demo Applications for the Arduino and BASIC Stamp
- VGA resolution (640x480) RGB565/YUV655 color sensor
  - Image processing rate of 10 frames per second
  - Raw image dumps over serial or to flash card
    - (640:320:160:80)x(480:240:120:60) image resolution
    - RGB565/YUV655 color space
- Onboard Image Processing (QQVGA 160x120)
  - Track user defined color blobs in the RGB/YUV color space
  - Mean, median, mode and standard deviation data collection
  - Segmented (thresholded) image capture for tracking visualization (over serial or to flash card)
    - 80x60 image resolution
    - Monochrome color space
  - Histogram generation (up to 128 Bins)
  - Arbitrary image clipping (windowing)
- $\mu$ SD/ $\mu$ SDHC/ $\mu$ SDXC flash card slot with FAT16/32 full file system driver support
  - w/ Directory and File manipulation
- I/O Interfaces
  - Two-port servo controller (pan and tilt w/ 1us resolution at a 50 Hz refresh rate)
    - Pan and/or Tit servo channels can be configured as GPIOs
  - Indicator user controllable LED (red) and power LED (green)
  - TTL UART (up to 115200 baud – 19200 baud by default)
- **Monochrome baseband analog video output (NTSC/PAL) of 160x120 resolution for tracking visualization (segmented (thresholded) image w/ color centroid and bounding box overlay at 10 FPS)**
- CMUcam4 GUI for viewing images on the PC