

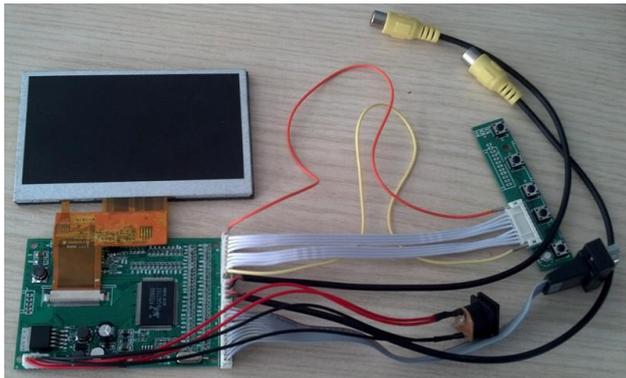
Demo Mode of CMUcam4

Today I will introduce a new device to you. It is a fully programmable embedded computer vision sensor called CMUcam4 which is created by Carnegie Mellon University. The main processor is the Parallax P8X32A (Propeller Chip) connected to an OmniVision 9665 CMOS camera sensor module.



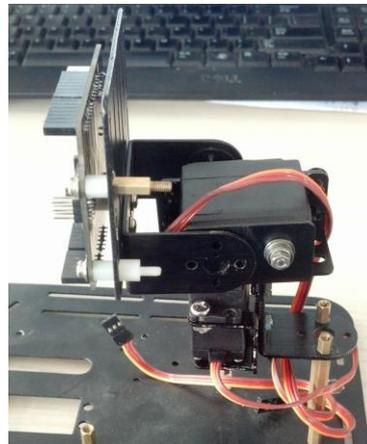
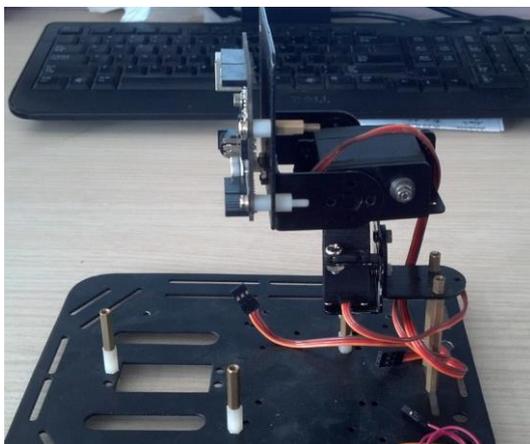
Hardware used:

- 1, CMUcam4 x 1
- 2, Arduino UNO x 1
- 3, Servo x 2
- 4, NTSC TV(or compatible television monitor) x 1



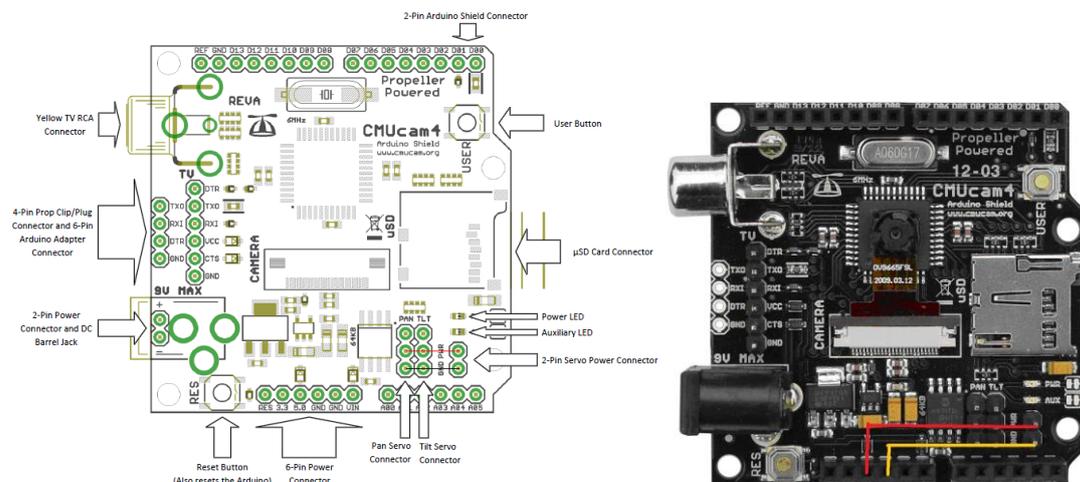
- 5, Video output line x 1
- 6, USB cable x 1

First of all, I build up a platform for CMUcam4, use one servo to control horizontal movement and the other to control vertical movement.

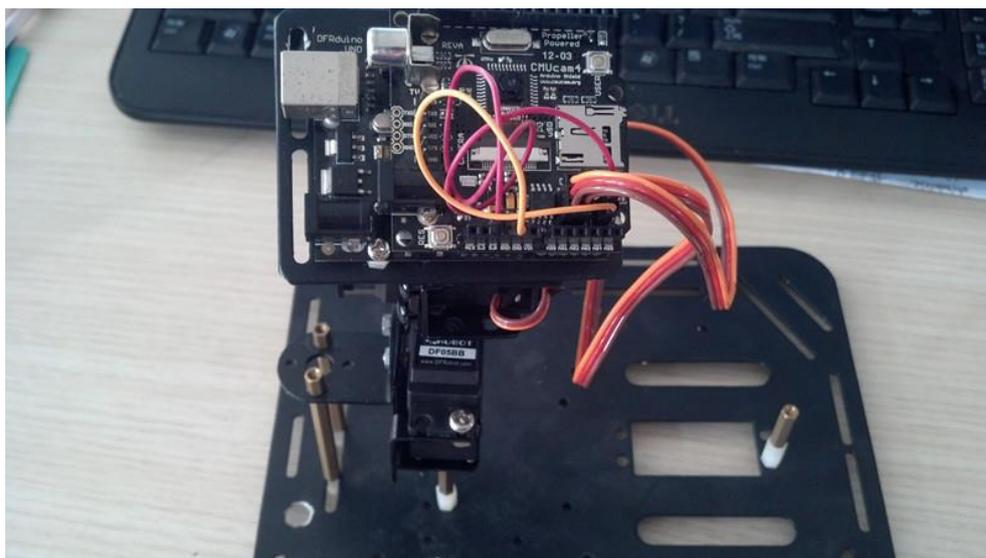


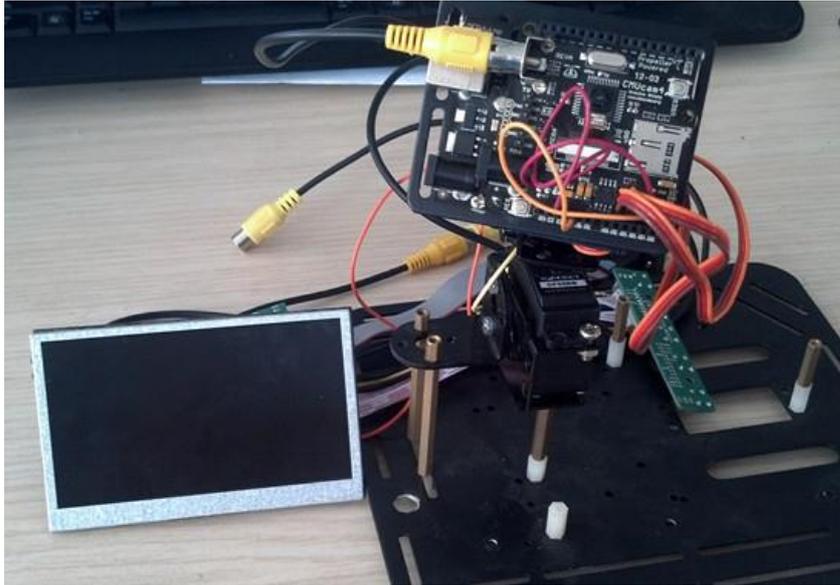
To use the CMUcam4 with your Arduino you need to connect the CMUcam4 to one of the Arduino's serial ports. You can connect the CMUcam4 to the Arduino from either the 4-Pin Prop Clip/Plug Port , the 6-Pin Arduino Adapter Port , or the 2-Pin Arduino Shield Port located on the CMUcam4.

For serial communication to work you need to connect one and only one RXI pin from the CMUcam4 to a TXO pin on your Arduino, one and only one TXO pin from the CMUcam4 to a RXI pin on your Arduino (the RXI and TXO pins must be from the same serial port on your Arduino), and the CMUcam4 and your Arduino must share a common ground. Additionally, you need to power the CMUcam4 with a power supply capable of delivering at least 250 mA at between 4V to 9V DC .



Next, we should connect the CMUcam4 to the television monitor by the video output line. Connect the servo which control horizontal movement to the PAN pin and the other to the TLT pin. The 2 pins right to TLT are used to power up the 2 servos, so connect the PWR pin to 5.0V and the GND pin to GND.

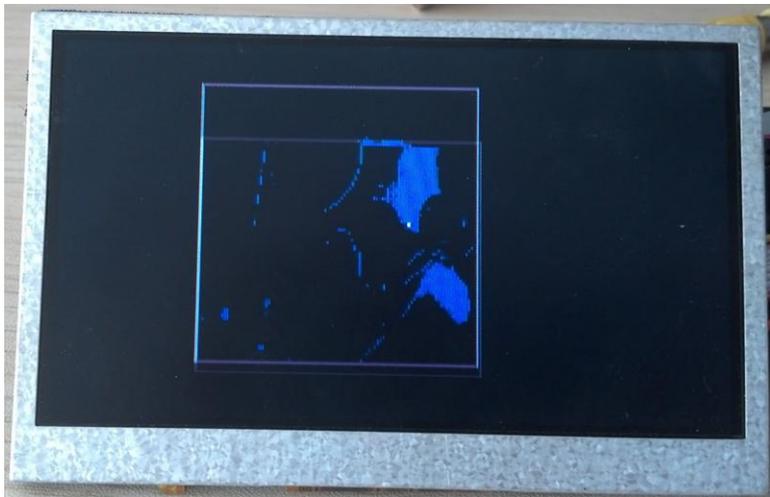
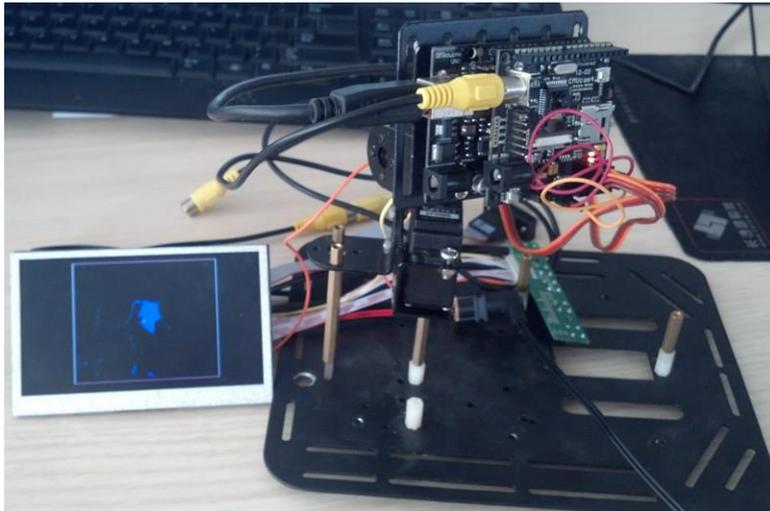




Let's start the Demo Mode. Demo mode allows you to demo the CMUcam4 without a master processor. In demo mode, the CMUcam4 executes the "TW" (Track Window) command and then drives two standard hobby servos towards the object being tracked while at the same time displaying the tracked object on a standard TV. Once the CMUcam4 enters demo mode it will not exit demo mode until it is reset. Follow the steps below to enter **demo mode**:

1. Press and hold the **reset button** on the CMUcam4
2. Press and hold the **user button** on the CMUcam4
3. Release the **reset button** (do not release the **user button**)
4. Wait until the red auxiliary LED turns on (**2 seconds**)
5. Wait until the red auxiliary LED starts blinking at **10 Hz** and then release the **user button**
6. The CMUcam4 will now adjust to the lighting conditions for the next **5 seconds**
 - Do not place the object you want to track in front of the CMUcam4 for the next **5 seconds**
7. Wait until the red auxiliary LED stops blinking at **10 Hz**
 - The CMUcam4 is now done adjusting to lighting conditions
 - The pan and tilt servo pins should output **1500 μ s** pulses at **50 Hz**
8. Place the object you want to track in front of the CMUcam4 and press the **user button**
 - If the red auxiliary LED begins blinking at **10 Hz** examine the **OV9665** camera module connection
9. You should now see the tracked object (or similar) displayed on the TV if the CMUcam4 is connected to a TV
 - The pan and tilt servos, if connected, will also try to drive the camera towards the tracked object
10. Please try this procedure with different objects in different environments to see what works the best
11. The CMUcam4 is now running in demo mode

Press the **reset button** to exit demo mode.



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