Team eyeCU

User Manual

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**Introduction**

Congratulations! You are now a proud owner of the eyeCU vision based cursor control system.

The eyeCU provides a human-computer interface which allows its user to control the computer cursor with eye movements. This technology has many applications; however, the focus of this system is to enable individuals with limited mobility to easily interact with technology. The system design employs a pair of glasses with an infrared video camera to capture the position as well as the motion of the user’s gaze. To increase the spectral contrast between the salient features of the eye, a near-infrared light array will illuminate the eye. The device processes the images collected by the camera in real-time to generate the corresponding cursor movement which is transmitted wirelessly to the computer.

The eyeCU offers two modes of operation. Mode one consists of using ‘eye gestures’ to control the cursor movement on a computer. In this configuration, when the eye looks left for example, the cursor will move to the left and stop when the eye moves back to the center. Mode two provides an intuitive set of commands in which the cursor follows the position of the user’s gaze on the computer display.

**What’s in the box**

* Glasses with camera module
* Battery
* Power Supply
* Beagle Bone
* Daughter Board
* USB XBEE Explorer
* CD
  + Proprietary software and drivers
  + Digital copy of this user manual
* USB cable

**Instructions for use**

1. Turn on the desired PC running Windows XP/Vista/7.
2. Go to <http://python.org/download/> and download Python 2.7.3 for windows either 32 or 64 bit based on your operating system.
3. For a 32-bit Windows OS, go to <http://www.pygame.org/download.shtml> and down load [pygame-1.9.1.win32-py2.7.msi](http://pygame.org/ftp/pygame-1.9.1.win32-py2.7.msi). Install this library in the Python 27 directory.
4. For a 64-bit Windows OS, go to <http://www.lfd.uci.edu/~gohlke/pythonlibs/#pygame> and download [pygame-1.9.2pre.win-amd64-py2.7.‌exe](javascript:;). Install this library in the Python 27 directory.
5. Go to <http://pypi.python.org/pypi/pyserial> and download [pyserial-2.6.tar.gz](http://pypi.python.org/packages/source/p/pyserial/pyserial-2.6.tar.gz#md5=cde799970b7c1ce1f7d6e9ceebe64c98). Install this library in the Python 27 directory.
6. Go to <http://sourceforge.net/projects/pywin32/files/> and download [pywin32](http://sourceforge.net/projects/pywin32/files/pywin32/). Install this library in the Python 27 directory.
7. Insert the provided battery into the power supply and connect the DC barrel jack into the 5V input of the Beagle Bone.
8. Connect the male USB Type A cable of the camera into the female USB Type A slot of the Beagle Bone.
9. The Beagle Bone requires SSH to operate, if you do not have an SSH client, go to <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html> and download and install [putty.exe](http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe).
10. In Windows XP go to Start -> RUN and type, “CMD” and hit Run. For Windows Vista and 7 go to Start and type, “CMD” in the search bar.
11. Once the CMD window is open type, “ipconfig” and search for the Beagle Bone IP address.
12. Open up PuTTY and
13. Connect the USB XBEE Explorer into an available slot of the PC.
14. Insert the provided CD and go to host\_comp\_software -> GUI and run calibrationGUI.
15. Threshold controls the pupil detection size. Vary threshold until the user has detected most of the pupil and no other areas of the eye.
16. iMin, iMax, jMin, and jMax determine the region of interest. The user should have their eye within the size of this region.
17. Once calibration is complete you are ready to use the eyeCU vision based cursor control system!

**Duck Hunt Instructions**

1. Ensure that python 2.7.3 and pygame is installed. Refer to instructions for use if they are not installed.
2. In the provided CD go to software -> applications -> duck hunt, and open duckhunt.py
3. A duck will fly across the screen from left to right.
4. You have an infinite amount of shots to hit the duck.
5. If the duck makes it across the screen, the game will end and the user has two options.
6. Hit the UP arrow key on the keyboard to restart the game of the ESC key on the keyboard to quit the game.