

# HERO Document Demonstration Manual English

From Terasic Wiki

## Introduction

This document describes how to run a demonstration built in the HERO platform, the demonstration deployed an object recognition application which used googlenet model (SSD - GoogleNetV2) through the HERO platform. The USB camera connected to the HERO platform provides the image source, the HERO platform can recognize the object in the input image, the result will be displayed on the application real-time. The label on the image will display the object's name.



Figure 1-1 the image of the object recognition

# Equipment Requirements

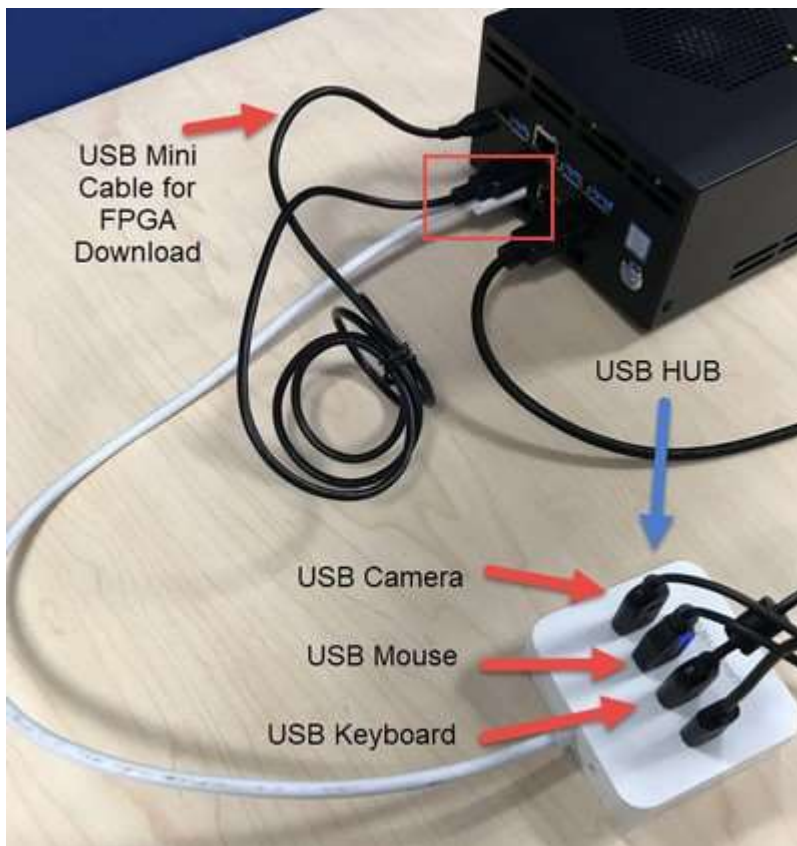
Operating the example in this chapter, the equipments and Settings are required as below:

- Hardware
- HERO Platform
- Mini USB Cable x1 (For FPGA configuration)
- USB webcam x1 (See Figure 1-2, for recognizing the images immediately)
- USB Mouse & Keyboard x1
- HDMI Monitor
- USB HUB (It is not necessary. As shown in figure 1-3, there are only two USB ports in Host PC interface on HERO platform, but as shown in figure 1-4, this DEMO needs to use many USB devices, although not all of them need to be used at the same time, but a USB HUB can avoid repeatedly unplugging USB devices)



**Figure 1-2 USB Webcam**



**Figure 1-3 USB ports in Host PC interface on HERO platform****Figure 1-4 Status of the USB connections in HERO Host PC**

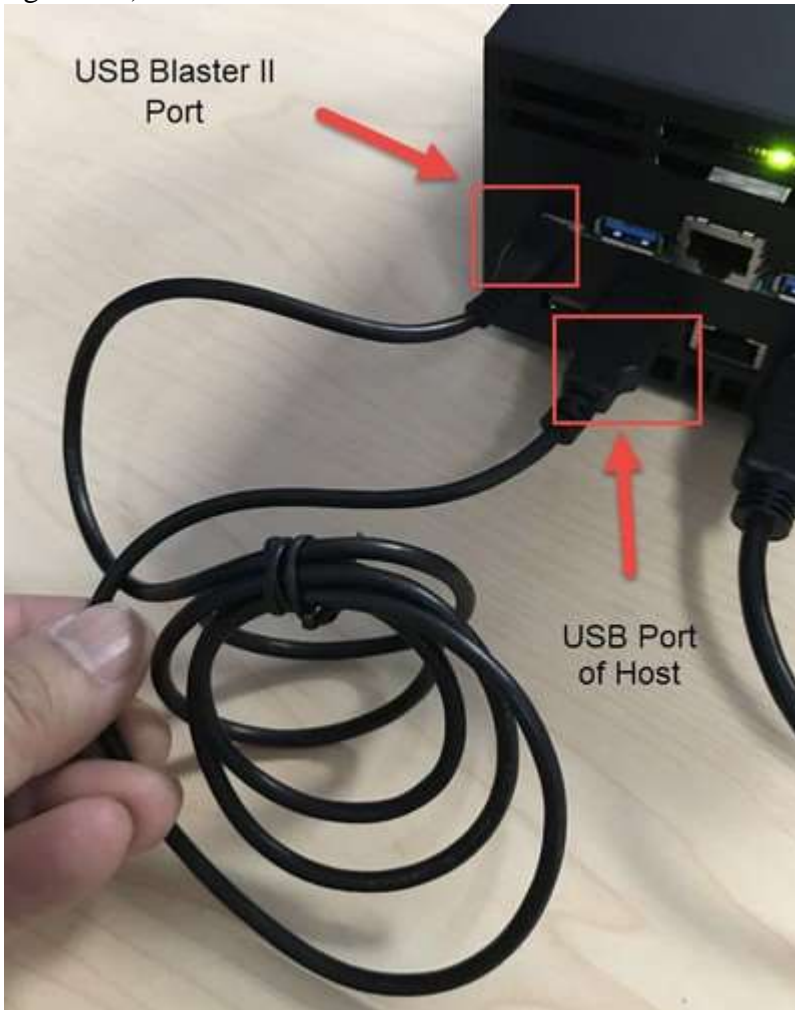
- Software

OpenVINO\_Demo.tar.gz : The zip file for the example script. The user can download this file and copy it to the operating system desktop of the HERO platform under the link below.

Download link: [http://mail.terasic.com.tw/~johnny/release/hero/OpenVINO\\_Demo.tar.gz](http://mail.terasic.com.tw/~johnny/release/hero/OpenVINO_Demo.tar.gz)[1]  
([http://mail.terasic.com.tw/~johnny/release/hero/OpenVINO\\_Demo.tar.gz](http://mail.terasic.com.tw/~johnny/release/hero/OpenVINO_Demo.tar.gz))

# Operating Steps

1. Follow steps 1 to 3 in the quick start guide to connect the HERO platform with a USB keyboard mouse, an HDMI display, and the 12V DC power supply.
2. Connect the FPGA accelerated USB Blaster II Port to the HERO's USB Port by using the Mini USB cable (see figure 1-5).



**Figure 1-5 USB Blaster connection**

3. Connect the USB webcam to the USB interface on the PC of HERO platform.
4. Turn on the FPGA power switch.



**Figure 1-6 Turn on the HERO platform power switch**

5. Open the Host PC motherboard power.



**Figure 1-7 Open the Host PC motherboard power**

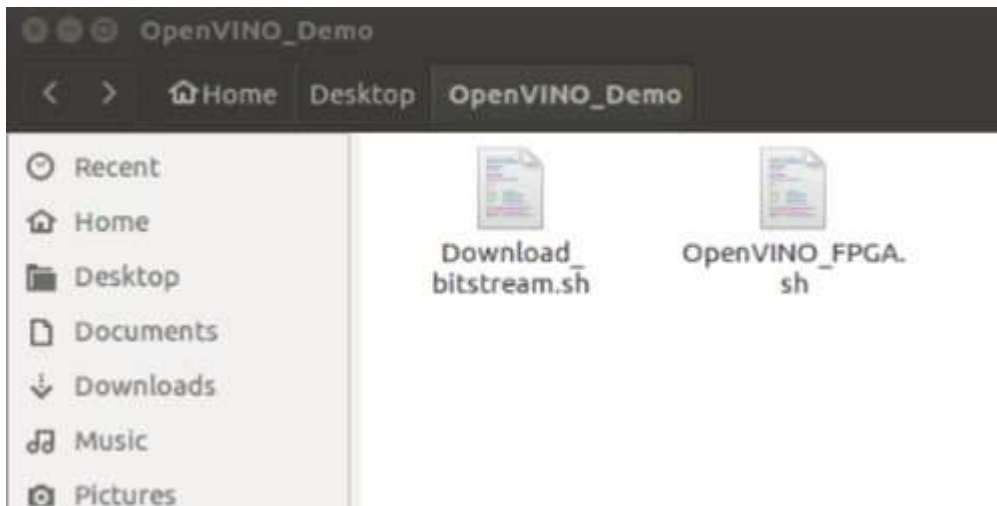
6. Access the Ubuntu login, enter **Intel123** as password.

7. When starting up completed, using a U-disk to copy the **OpenVINO\_Demo.tar.gz** and paste it to the desktop, unzip the file.



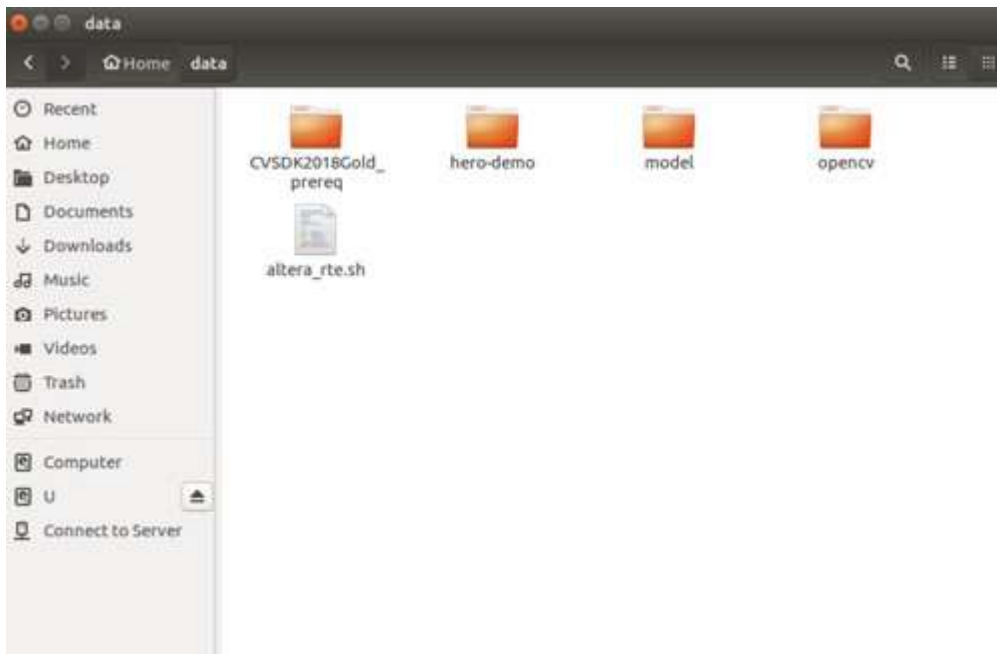
**Figure 1-8 Paste the Demo script onto the desktop and unzip it**

8. The unzipped directory contains two script files. **Download\_bitstream.sh** is the configuration file for the FPGA development kit. **Openvino\_fpga.sh** is the script file to execute this example.



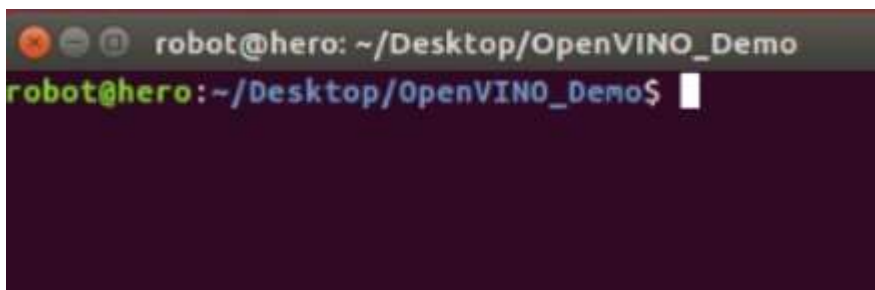
**Figure 1-9 Demo Scripts**

The project described in this chapter has been written to the hard disk as factory setting, and it is located in the path **/home/data/hero-demo/**. Users who are interested it can enter this path for the details.



**Figure 1-10 Demo path**

9. Open the Terminal to access the unzip directory (Path: `~/Desktop/OpenVINO_Demo`).



**Figure 1-11 Script Path**



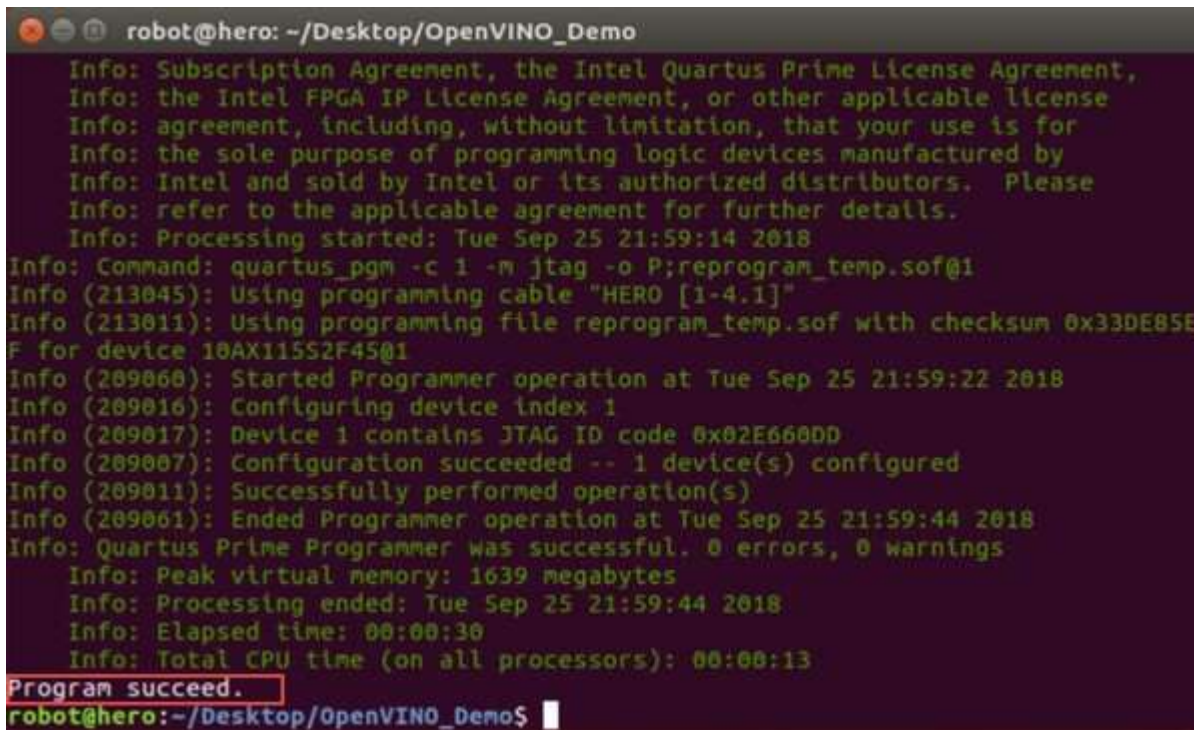
10. Enter the command: **source download\_bitstream.sh** in the terminal, and the script will download the FPGA configuration file into the FPGA accelerator in the HERO platform. (Make sure that the Mini USB cable is connected as described in step 2 before downloading).



```
robot@hero: ~/Desktop/OpenVINO_Demo
robot@hero:~/Desktop/OpenVINO_Demo$ source Download_bitstream.sh
```

Figure 1-12 Execute the FPGA configuration script

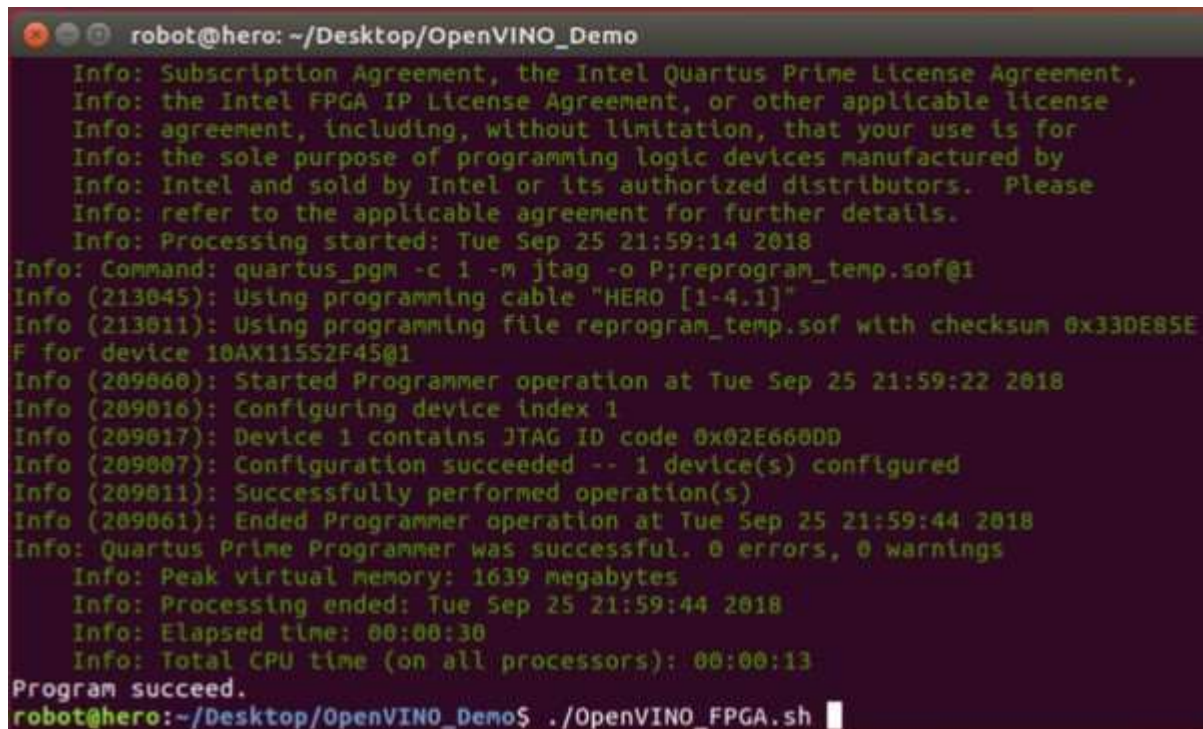
See below Figure 1-13 for the downloading completed.



```
robot@hero: ~/Desktop/OpenVINO_Demo
Info: Subscription Agreement, the Intel Quartus Prime License Agreement,
Info: the Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details.
Info: Processing started: Tue Sep 25 21:59:14 2018
Info: Command: quartus_pgm -c 1 -m jtag -o P;reprogram_temp.sof@1
Info (213045): Using programming cable "HERO [1-4.1]"
Info (213011): Using programming file reprogram_temp.sof with checksum 0x33DE85E
F for device 10AX115S2F45@1
Info (209060): Started Programmer operation at Tue Sep 25 21:59:22 2018
Info (209016): Configuring device index 1
Info (209017): Device 1 contains JTAG ID code 0x02E660DD
Info (209007): Configuration succeeded -- 1 device(s) configured
Info (209011): Successfully performed operation(s)
Info (209061): Ended Programmer operation at Tue Sep 25 21:59:44 2018
Info: Quartus Prime Programmer was successful. 0 errors, 0 warnings
Info: Peak virtual memory: 1639 megabytes
Info: Processing ended: Tue Sep 25 21:59:44 2018
Info: Elapsed time: 00:00:30
Info: Total CPU time (on all processors): 00:00:13
Program succeed.
robot@hero:~/Desktop/OpenVINO_Demo$
```

Figure 1-13 FPGA configuration successfully

11. Continue to enter the command **./OpenVINO\_FPGA.sh**. It will to execute the demo script. (Please confirm that the usb camera has been connected correctly with the HERO before execution).

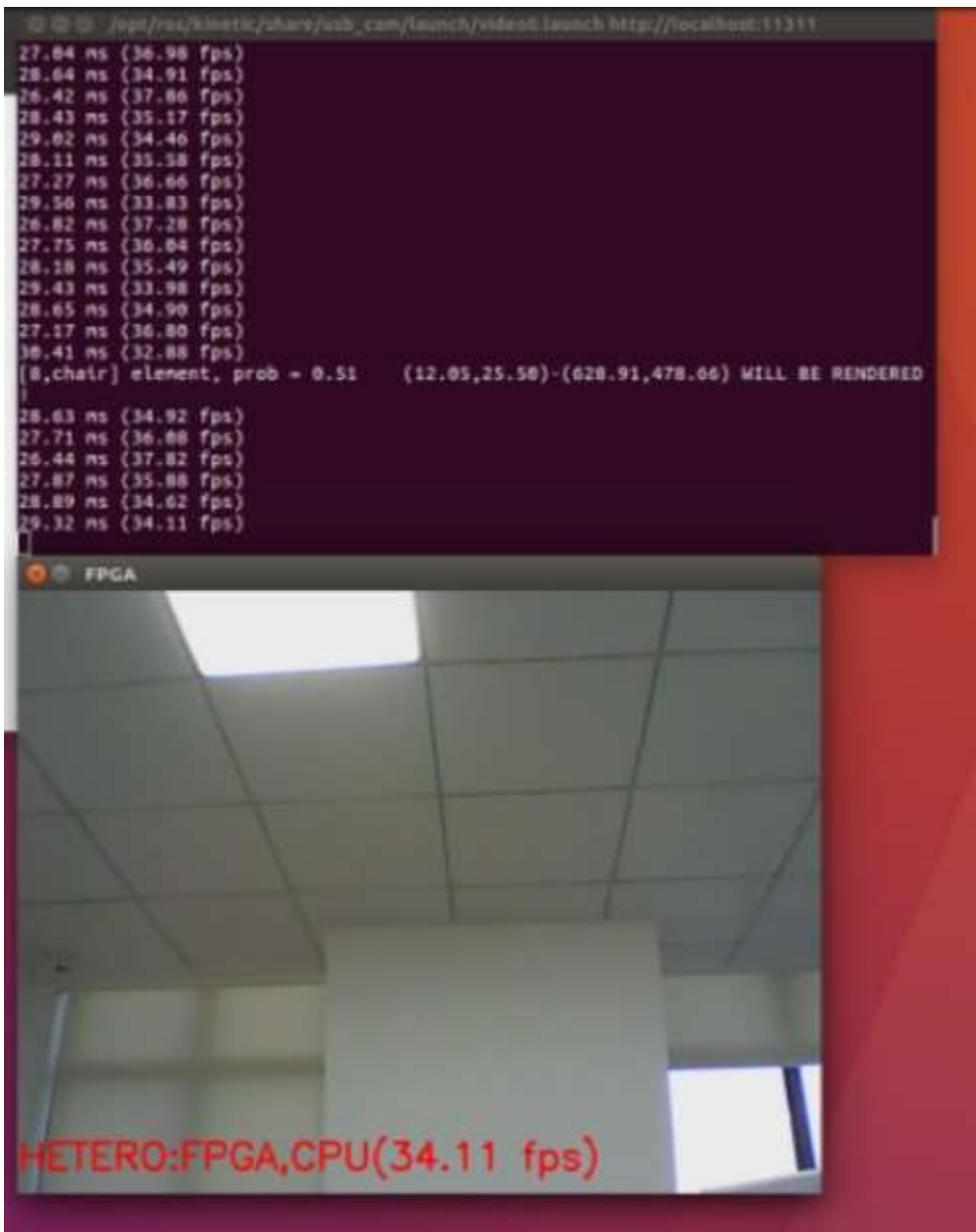


```
robot@hero: ~/Desktop/OpenVINO_Demo
Info: Subscription Agreement, the Intel Quartus Prime License Agreement,
Info: the Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details.
Info: Processing started: Tue Sep 25 21:59:14 2018
Info: Command: quartus_pgm -c 1 -m jtag -o P;reprogram_temp.sof@1
Info (213045): Using programming cable "HERO [1-4.1]"
Info (213011): Using programming file reprogram_temp.sof with checksum 0x33DE85E
F for device 10AX115S2F45@1
Info (209060): Started Programmer operation at Tue Sep 25 21:59:22 2018
Info (209016): Configuring device index 1
Info (209017): Device 1 contains JTAG ID code 0x02E660D0
Info (209007): Configuration succeeded -- 1 device(s) configured
Info (209011): Successfully performed operation(s)
Info (209061): Ended Programmer operation at Tue Sep 25 21:59:44 2018
Info: Quartus Prime Programmer was successful. 0 errors, 0 warnings
Info: Peak virtual memory: 1639 megabytes
Info: Processing ended: Tue Sep 25 21:59:44 2018
Info: Elapsed time: 00:00:30
Info: Total CPU time (on all processors): 00:00:13
Program succeed.
robot@hero:~/Desktop/OpenVINO_Demo$ ./OpenVINO_FPGA.sh
```

**Figure 1-14 Execute the Demo script**

12. When the DEMO is running, you can see an image window that shows a real-time image captured by the USB camera with the current speed of the FPS on running the DEMO.





**Figure 1-15** The output result on the display window

Users can show the photos of cars or birds in front of camera. The system will immediately box out the specific objects and use label to identify object names, as shown in Figure. 1-16 and Figure. 1-17



**Figure 1-16 Identify the bird**



**Figure 1-17 Identify the car**

13. If close the demo, enter CTRL+C on the Terminal.

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