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**Project 6 – Stream Live Video from Raspberry Pi**

**Requirements**

1. Mount a USB web cam connected to a Raspberry Pi on the Quadcopter

2. Capture live video on the Raspberry Pi

3. Stream the video from the Raspberry Pi via WiFi to your host

4. Display the video on your host

**Design**

**Hardware**

1 Quadcopter (built per the instructions in project 4)

1 USB web cam

1 Raspberry Pi

1 Raspberry Pi Case

1 MicroSD card (mine was pre-installed with NOOBS)

1 Keyboard w/ USB

1 Mouse w/ USB

1 HDMI cable

1 portable charger

1 USB to USB-C cable

1 USB-C power adapter

1 Laptop

Plug the USB web cam into the Pi and fasten the Pi (connected to its portable charger) to the drone. Below is a photo of my setup:

A motorcycle parked in front of a bicycle

Description automatically generated A picture containing indoor, sitting, bicycle, table

Description automatically generated

**Software**

* [If you want to use your Windows laptop as a monitor for your Raspberry Pi](https://www.instructables.com/id/How-to-Use-Windows-Laptop-As-Monitor-for-Raspberry/)
  + Install [PuTTY](https://www.putty.org/)
  + Install [VNCViewer](https://www.realvnc.com/en/connect/download/viewer/)
* Install Raspbian on your Raspberry Pi
  + My MicroSD card came pre-loaded with NOOBS, so I don’t have to download anything
    - If not, you should follow [these instructions](https://www.instructables.com/id/HOW-TO-INSTALL-RASPBIAN-OS-IN-YOUR-RASPBERRY-PI/)

1. Setup the Raspberry Pi
   1. Put the Pi into its case and insert the MicroSD card
   2. Connect the Pi to a monitor via the HDMI cable, and attach a keyboard and a mouse to the USB ports.
   3. My SD card was pre-loaded with NOOBS, so once I plug in the Pi, it prompts me to load Raspbian. Follow the prompts to download Raspbian and related updates.
   4. Connect your Pi to the same WiFi network your laptop is connected to
   5. Install any other updates
   6. Find out the IP address of your Pi by opening a terminal and typing “hostname -I”
   7. Enable SSH and VNC: Preferences -> Raspberry Pi Configuration -> Interfaces -> Enable SSH and Enable VNC -> OK
   8. Use PuTTY to ssh into your Raspberry Pi
   9. Login to the Pi. Default username: pi, Default password: raspberry
   10. Install the VNC server on the Pi by opening a terminal and typing “sudo apt-get install tightvncserver”
   11. Type “vncserver” and choose a password
   12. Note the desktop number “New ‘X’ desktop is raspberrypi:#”
   13. Open VNCViewer and start a new connection with Pi\_IP:Desktop# (i.e. 192.168.1.1:1)
   14. You should now be able to access the Pi via VNC Viewer on your laptop.
2. Connect and set up the USB web cam
   1. Type “sudo apt-get install motion”
   2. Type ‘lsusb’ and you should see the name of your camera
   3. Change the settings in the /etc/motion/motion.conf file (you will need sudo to do this)
      1. Daemon on
      2. Framerate 1000
      3. Stream\_port 8081
      4. Stream\_quality 100
      5. Stream\_localhost off
      6. Webcontrol\_localhost off
      7. Quality 100
      8. Width 640
      9. Height 480
      10. Post\_capture 5
      11. Stream\_maxrate 100 (this is not in the PDF but was a suggestion offered by Tae Kim which greatly improved my video quality)
   4. Change the settings in /etc/default/motion (you must use sudo)
      1. Set start\_motion\_daemon to yes
   5. Restart the motion software with “sudo service motion restart” and “sudo motion”
3. View your live feed in your laptop browser
   1. Open a browser and type rasp\_ip:8081 (e.g. 192.168.0.0:8081)
   2. You should now see the live stream!
4. Power the Pi via a portable charger and secure it and the camera to the drone to capture live video from your drone!

**Demo**

Demo can be found on YouTube at <https://youtu.be/hHCYbIjM4_E>

**References**

Source 1: <https://www.instructables.com/id/HOW-TO-INSTALL-RASPBIAN-OS-IN-YOUR-RASPBERRY-PI/>

Source 2: <https://www.putty.org/>

Source 3: <https://www.realvnc.com/en/connect/download/viewer/>

Source 4: <https://www.instructables.com/id/How-to-Use-Windows-Laptop-As-Monitor-for-Raspberry/>

Source 5: <https://blackboard.jhu.edu/bbcswebdav/pid-7439656-dt-content-rid-86103553_2/courses/EN.605.715.81.SP20/EN.605.715.81.SP20_ImportedContent_20191216013848/EN.605.715.81.FA19_ImportedContent_20190801014537/How-to-Make-Raspberry-Pi-Webcam-Server-and-Stream-.pdf>

Source 6: Classmates! (Thank you!)