# Installing OpenCV for the Raspberry Pi

## Required Equipment:

- Raspberry Pi
- Raspberry Power Cord
- At least 16G free on the SD Card
- A Computer with Remote Access
  OR
- HDMI Cord
- HDMI Compatible Monitor
- Mouse
- Keyboard

## Steps:

1. Boot everything up and get to the command line by either remote access or opening it manually.

2. Update system with the following commands and accept the permissions to save if it has not been updated recently:
   1) *sudo apt-get update*
   2) *sudo apt-get upgrade*
   3) *sudo rpi-udate*
   4) *sudo reboot*

3. Get Pip if not installed already:
   *sudo --H pip3 install pip3 --upgrade pip*

4. Install Numpy if not present or update it:
   *sudo pip3 install numpy*
   OR
   *sudo pip3 install numpy --upgrade*

5. Install a few developer tools with the command:
   *sudo apt-get install build-essential git cmake pkg-confi*

6. Install image I/O packages which allow us to load image file formats such as JPEG, PNG, TIFF, etc. with:
   *sudo apt-get install libjpeg-dev libtiff5-dev libjasper-dev libpng12-dev*

7. Install video I/O packages allows loading various video file formats as well as working with video streams:
   *sudo apt-get install libavcodec-dev libavformat-dev libswscale-dev libv4l-dev*
   *sudo apt-get install libxvidcore-dev libx264-dev*

8. Install the GTK development library the Raspberry Pi can compile the highgui sub-module of OpenCV, which displays images to the screen and build simple GUI interfaces:
   *sudo apt-get install libgtk2.0-dev*

9. Various operations inside of OpenCV (such as matrix operations) can be optimized using added dependencies:
   *sudo apt-get install libatlas-base-dev gfortran*

10. Install the Python 2.7 and Python 3 header files the Raspberry Pi can compile the OpenCV + Python bindings:
    sudo apt-get install python2.7-dev python3-dev

11. Now download the most recent version of openCV in this case it will be 3.1.0 and be put in the default directory. If the most recent version is different change the red text to match the most recent version:
    *cd ~*
    *wget -O opencv.zip https://github.com/Itseez/opencv/archive/3.1.0.zip*
    *unzip opencv.zip*

12. Now go into the new folder and create a build with:
    *cd ~/opencv-3.1.0/*
    *mkdir build*
    *cd build*
    *cmake -D CMAKE_BUILD_TYPE=RELEASE *
    *-D CMAKE_INSTALL_PREFIX=/usr/local *
    *-D INSTALL_C_EXAMPLES=OFF *
    *-D INSTALL_PYTHON_EXAMPLES=ON *
    *-D OPENCV_EXTRA_MODULES_PATH=~/opencv_contrib-3.1.0/modules *
    *-D BUILD_EXAMPLES=ON ..*

13. Make the build and as a warning this process can take 1 to 4 hr. (The "–j4" indicates the number of processors used. *make* works just fine if there are no processors to spare):
    *make –j4*

14. With the make finished install the OpenCV with:
    *sudo make install*
    *sudo ldconfig*

15. Verify the install by enter the command:
    *python3*
    Then type:
    *import cv2*
    *cv2.__version__*
    If the version number is correct then the install was successful. An error will be thrown when importing cv2 if the install was unsuccessful.

For a more in-depth tutorial with virtual environments go to http://www.pyimagesearch.com/2015/10/26/how-to-install-opencv-3-on-raspbian-jessie/.