

How to Capture and Convert JPEG Images with a Webcam, and Dynamically Update a Website Image

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"Logitech HD Webcam C270"

<https://assets.logitech.com/assets/55372/webcam-c270-gallery.png>

How-To-Guide Facts

- Host (desktop) commands starting with \$ are Linux console commands:
\$ echo "Hello world"
- Target (board) commands start with #:
echo "On embedded board"
- Almost all commands are case sensitive
- The following guide worked with the "Logitech HD Webcam C270"

SECTION 1: Capturing Images (.ppm files)

- 1) **# sudo apt-get install libv4l-dev**
sudo apt-get install v4l-utils

These libraries are required for capturing webcam images

- 2) On the BeagleBone, copy the following .so files out of
/usr/lib/arm-linux-gnueabi to somewhere accessible by the host:
 - libjpeg.so
 - libv4l2.so
 - libv4lconvert.so

- 3) Download the code for **grabber.c** from Derek Molloy to your host
(<https://github.com/derekmolloy/boneCV/blob/master/grabber.c>)

- 4) On **lines 73 and 74**, set the pixel width and height according to your webcam's output. For example, with our Logitech HD Webcam C270:

73. fmt.fmt.pix.width = 1280;

74. fmt.fmt.pix.height = 960;

You can find the width and height configuration for your webcam by first plugging it into the BeagleBone, and executing the following command:

v4l2-ctl --all | less

You should find the width and height specifications under the "Format Video Capture" section.

- 5) When compiling **grabber.c** on your host for the BeagleBone, be sure to set the location of the .so files you copied in step 2 and include the following flags:

-lv4l2 -lv4lconvert -ljpeg

e.g. LFLAGS= -L\$(HOME)/cmpt433-project/webcam/libs

-lv4l2 -lv4lconvert -ljpeg

- 6) Make sure the BeagleBone has write permissions in the folder where you run the grabber program. The grabber.c program generates .ppm files. See the next section for adding converting the .ppm files to .jpg files.

SECTION 1: Troubleshooting

- 1) Make sure libv4l-dev v4l-utils installed correctly.
- 2) Make sure your webcam is recognized by the BeagleBone.
 - # lsusb should list your webcam
 - On **line 60 of grabber.c**, *dev_name should be the path to your webcam. Typically, this will be /dev/video0, but it can be different
- 3) If running grabber in a loop at BeagleBone startup, you may need to wait for the USB camera to be detected. On **line 66**, instead of exiting if fd < 0, loop until a valid fd is assigned:

```
while (fd < 0) {  
    fd = v4l2_open(dev_name, O_RDWR | O_NONBLOCK, 0);  
}
```

SECTION 2: Converting .ppm Files to .jpg Files

- 1) **# sudo apt-get install imagemagick**
This provides the command line utility “convert” which will convert the .ppm files to .jpg files
- 2) Add the following code **after line 153 in grabber.c** to convert the .ppm image from the previous section to a .jpg:

```
char cmd[128];  
sprintf(cmd, "convert %s %s", DA_PPM_FILE_NAME,  
        DA_PATH_TO_JPG_FILE);  
system(cmd);
```

DA_PPM_FILE_NAME: full file path of the .ppm file to convert
DA_PATH_TO_JPG_FILE: full file path for where to save the new .jpg

SECTION 2: Troubleshooting

- 1) Make sure you have the correct file paths.
- 2) Make sure imagemagick was installed correctly.

SECTION 3: Updating an Image on a Webpage Dynamically

Requirements

- Webcam images must be .jpg files, because browsers do not support .ppm files.
 - Your webpage uses jQuery
 - An image tag is bound to a jQuery object (i.e. `$DA_IMG_TAG`)
- 1) In your client side JavaScript, include the following in your **`$(document).ready()`** function:

```
setInterval(function() {  
    var newTimestamp = new Date();  
    var newImageSrc = "/images/<DA_IMG_NAME>.jpg?time=" +  
        newTimestamp.getTime();  
    $DA_IMG_TAG.removeAttr("src").attr("src", newImageSrc);  
}, INTERVAL_MS);
```

The timestamp ensures that each request is unique. Without this, the browser will use the cached image from when the page was first loaded.

- 2) In your server side JavaScript, split the request url on "?". The first element will be the path to the requested image, the second will be the timestamp.

SECTION 3: Troubleshooting

- 1) Make sure you have selected the correct image tag from your HTML in the jQuery object. You can `console.log()` the object to confirm.
- 2) Make sure that your server side JavaScript is receiving your requests correctly. You can verify this using `console.log()` statements

ACKNOWLEDGEMENTS

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