# ECE 438/439 Lab #1
Introduction to the CVIP Toolbox for Matlab

1) Review Chapter 2 to become familiar with CVIPtools and the Matlab CVIP Toolbox. Note that the Online Doc *Matlab CVIP Toolbox Functions.pdf* has descriptions of all functions, organized by category.

2) Read Section 2.4 and run the CVIPlab to load an image, threshold the image (Menu Option 2), and display the output image.
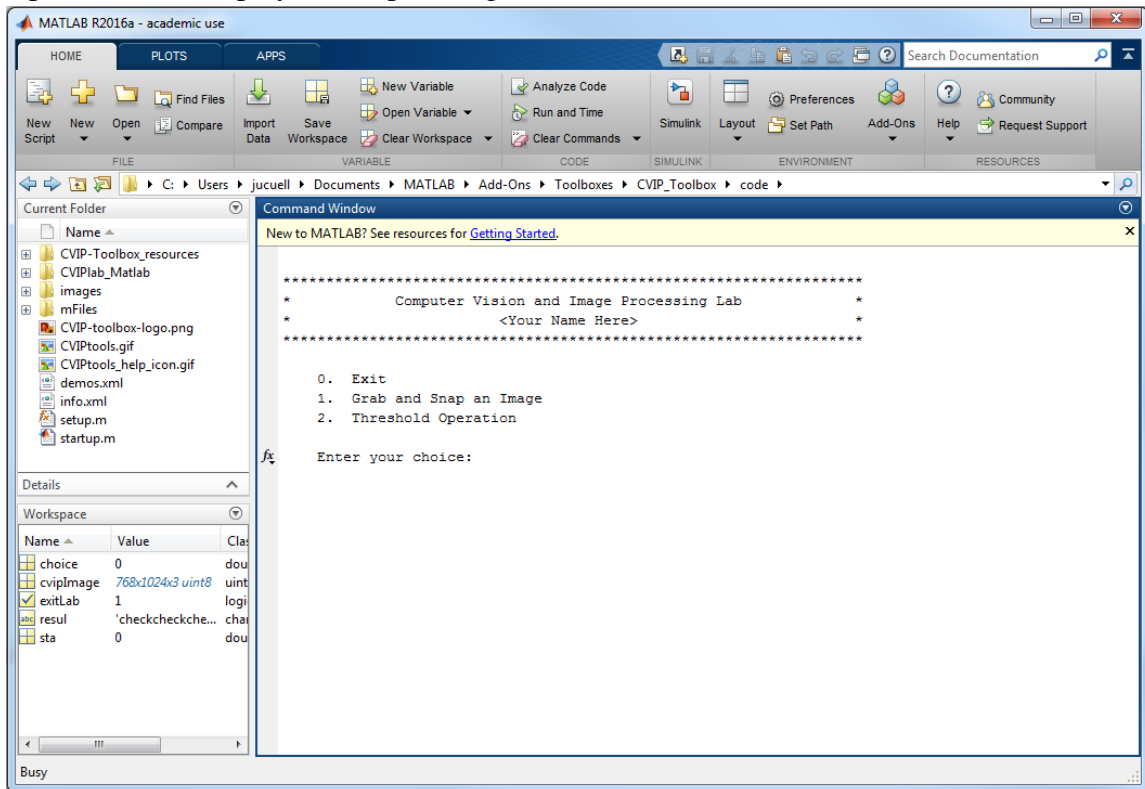
3) Compare the time for the loop-based method and vectorization method. Which method is faster? Why? How does the time change if a larger image is used?

4) Edit the CVIPlab.m program to include your **name** and **current date** in the header. Study the CVIPlab.m, input_image.m, and threshold_lab.m files and understand how CVIPlab is organized and how the threshold function works. In particular, learn how images are read, manipulated and displayed.

5) Modify your CVIPlab to save the output image after it is displayed. The image is saved with the *imwrite* function. The basic method of using this function is:
```
>> imwrite(A,FILENAME,FMT)
```

This will write (save) the image A to the file specified by FILENAME in the format specified by FMT. More information for imwrite, or any Matlab function, can be found by typing:

```
>> help imwrite
```

After incorporating *imwrite* into CVIPlab, run the program and save the output from at least 3 different threshold values.

6) Run the CVIPtools program. Open the original image and the output images from CVIPlab with the file open icon near the top left of the main window. Select *Utilities*, then select the *Convert/Binary Threshold* option, and perform the same threshold operations that were done in CVIPlab. Next, compare CVIPtools results to your CVIPlab results to verify correctness. Use the *Utilities->Compare* option to compare the images. Are they the same? Why or why not? At the end of this exercise you should understand the CVIPlab environment and be able to write your own functions by using the threshold function as a prototype.

7) Run CVIPlab.m script, select menu choice 1, "*Grab and Snap an Image*". This will invoke the "WinTV" application.
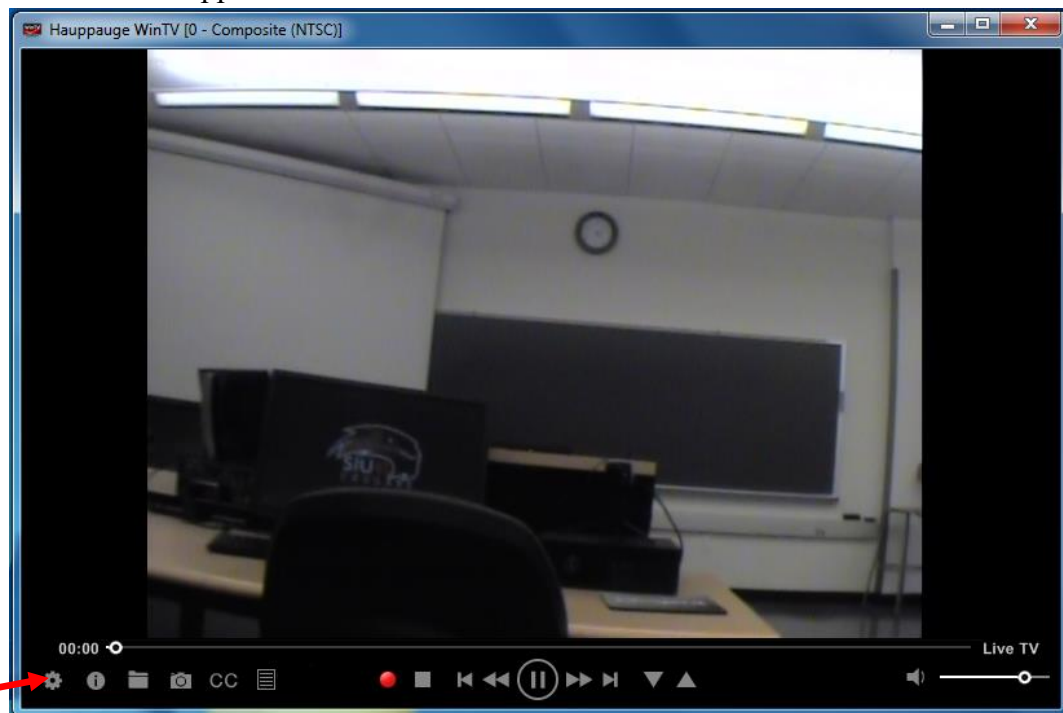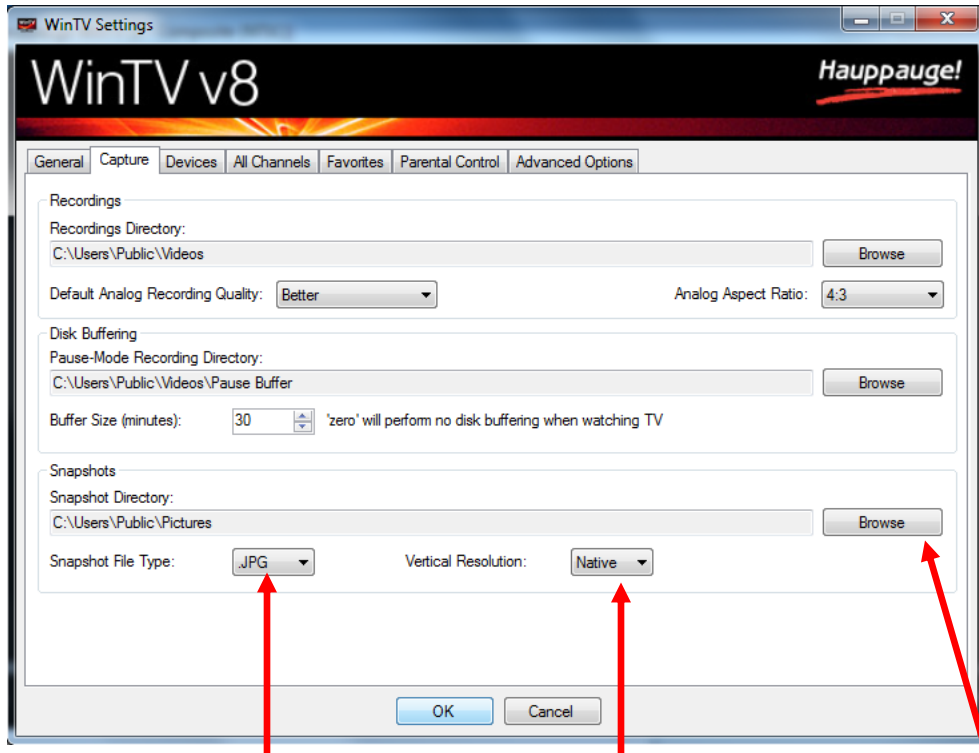

SETTINGS

8) An image grabbed by the camera will appear on the WinTV display window, which can be adjusted by moving the camera/object. Also the image can be focused by adjusting the controls on the camera itself if necessary.

9) Click on the "*Settings icon*" button located on the left side of the window of the WinTV. This will invoke the Video Snapshots Settings window. Then click on Capture icon.
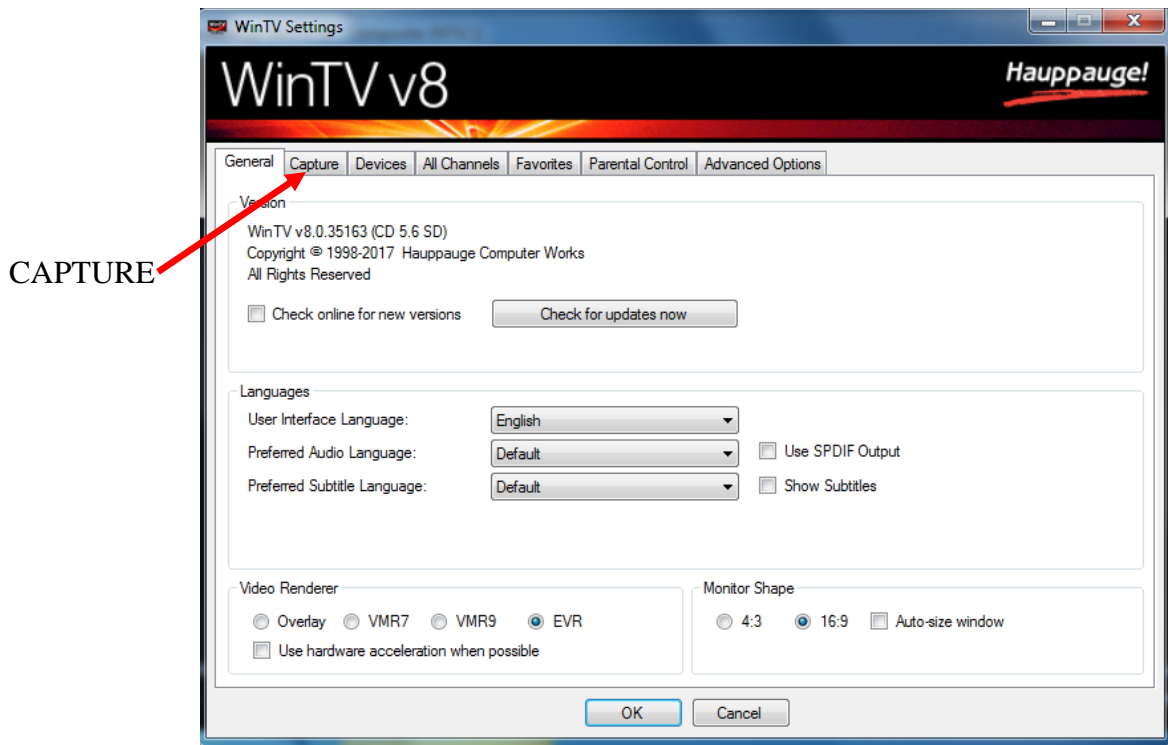
CAPTURE

10) Select capture resolution, image type, and location of the image to be saved in the *Snapshot Settings*. Click on the "*Ok*" button to confirm the selection.

SELECT FILE TYPE   SELECT RESOLUTION   SELECT FOLDER

11) Click on the "*Snap*" button on the left bottom of the window of the WinTV as shown to capture a snapshot/image. The captured image will be saved in the directory provided in the snapshot settings.
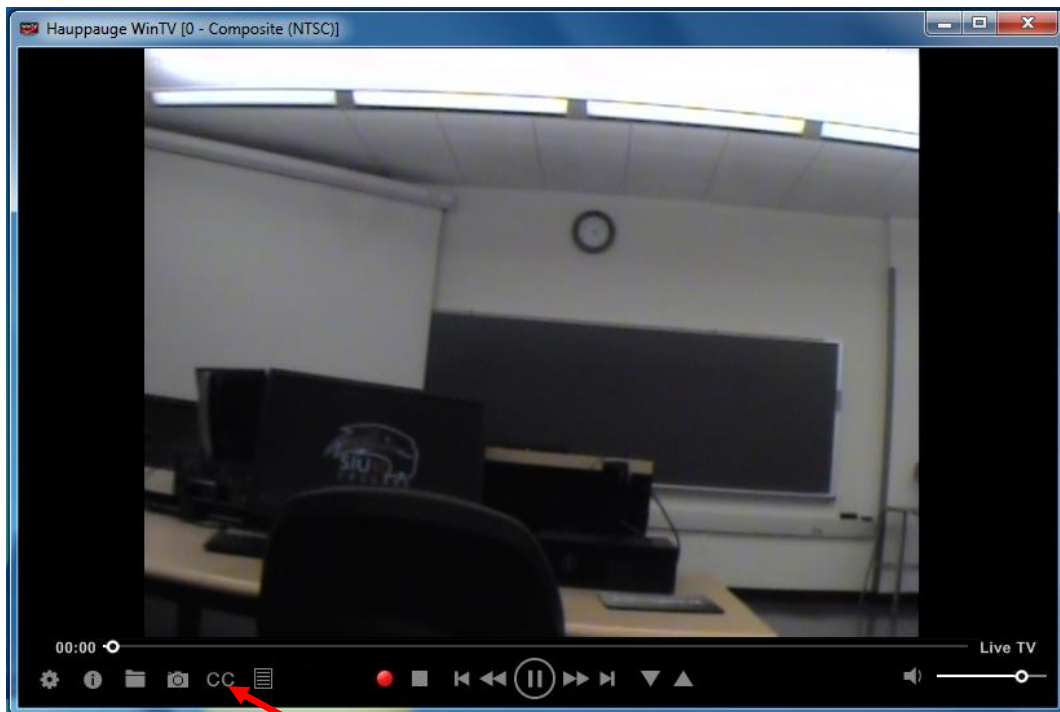
SNAP

12) Close the WINTV window, the open image dialog will appear. Select the image in the directory provided and it will be displayed into a Matlab Figure.

13) Next, click on the "*CVIPtools icon*" on desktop and view the snapshot/image.

14) Save the image and read it into the GUI-based CVIPtools. Perform the threshold function from the GUI, under *Utilities->Convert->Binary Threshold.* Next, *use Utilities->Compare->Compare Two Images* using both *Subtraction* and *XOR.* Are the results what you expected? Why or why not?

15) Next, use *Utilities->Compare-> Object Error Metrics* using *RMS Error, Peak SNR, XOR Error, Dice, Jaccard* and *Overlap*. Are the results what you expected? Why or why not?

Postlab Report:

1) Write a Lab report using the following format, typed, double-spaced using Word:

   a. Cover page: title, class name, student name, 800 number and date
   b. Answers to any lab questions
   c. Screen shoots of your program in action, include images
   d. Source files (.c or .m files), be sure your code is well commented

2) Follow this format for all lab reports
3) Email your report to sumbaug@siue.edu on the due date (not before, not after)