

## Homework 9 – CUDA Color2Gray

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1. Object of the project:
  - a. use CUDA to redo convert color image to gray image homework.
2. Details:
  - a. Use CUDA functions which use communication between CPU and GPU to parallelize the program with a different method. Start by letting the host read the image, then allocate needed memory in the device. We then copy the colors from the host to the device, launch the kernel, and let each thread on the device convert one pixel. Afterwards, copy colors back from device to host and write the file. I found the best times came with <<<128, 128>>> called for the kernel function.
3. Results:
  - a. Methods: [OpenMP, MPI, CUDA]
  - b. Time Elapsed (ms): [4.9, 8.8, 192.63]
4. Performance Improvements:
  - a. Quite obviously from the timing comparisons, this CUDA implementation is extremely slower than the other methods. If this is because of bad implementation of CUDA practices, then fixing those would bring the time more in line with the others.
5. Bugs Encountered:
  - a. The comparative slowness of my program could be considered a bug.