

CS 2110 Timed Lab 6: GBA ”Arts and Crafts”

Your TAs

Fall 2019

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Please take the time to read the entire document before starting the assignment. It is your responsibility to follow the instructions and rules.

1 Timed Lab Rules - Please Read

1.1 General Rules

1. You are allowed to submit this timed lab starting at the moment the assignment is released, until you are checked off by your TA as you leave the recitation classroom. Gradescope submissions will remain open until 7:15 pm - but you are not allowed to submit after you leave the recitation classroom under any circumstances. **Submitting or resubmitting the assignment after you leave the classroom is a violation of the honor code - doing so will automatically incur a zero on the assignment and might be referred to the Office of Student Integrity.**
2. Make sure to give your TA your Buzzcard before beginning the Timed Lab, and to pick it up and get checked off before you leave. **Students who leave the recitation classroom without getting checked off will receive a zero.**
3. Although you may ask TAs for clarification, you are ultimately responsible for what you submit. **The information provided in this Timed Lab document takes precedence.** If in doubt, please make sure to indicate any conflicting information to your TAs.
4. Resources you are allowed to use during the timed lab:
 - Assignment files
 - Previous homework and lab submissions
 - Your mind
 - Blank paper for scratch work (please ask for permission from your TAs if you want to take paper from your bag during the Timed Lab)
5. Resources you are **NOT** allowed to use:
 - The Internet (except for submissions)
 - Any resources that are not given in the assignment
 - Textbook or notes on paper or saved on your computer
 - Email/messaging
 - Contact in any form with any other person besides TAs
 - Any compiler that outputs LC3 code
6. **Before you start, make sure to close every application on your computer.** Banned resources, if found to be open during the Timed Lab period, will be considered a violation of the Timed Lab rules.
7. We reserve the right to monitor the classroom during the Timed Lab period using cameras, packet capture software, and other means.

1.2 Submission Rules

1. Follow the guidelines under the Deliverables section.
2. You are also responsible for ensuring that what you turned in is what you meant to turn in. After submitting you should be sure to download your submission into a brand new folder and test if it works. No excuses if you submit the wrong files, what you turn in is what we grade. In addition, your assignment must be turned in via Gradescope.

3. Do not submit links to files. We will not grade assignments submitted this way as it is easy to change the files after the submission period ends.

1.3 Is collaboration allowed?

Absolutely NOT. No collaboration is allowed for timed labs.

2 Instructions

In this timed lab you will be helping complete a paint application the GameBoy! You will be responsible for completing 5 functions in the provided t106.c file. The functions are:

2.1 drawSquareImage

USING DMA draw the square image passed in at the location (x,y) on the GBA screen.

2.2 drawSquareImageFlippedBoth

USING DMA draw the square image passed in at the location (x,y) on the GBA screen, but flipped both horizontally and vertically.

2.3 3 Filter Methods

/* Each of these methods take in an unsigned short pixel */

```
filterRed()      - Return a pixel with the blue and green values zero'd out.
filterBlue()     - Return a pixel with the red and green values zero'd out.
filterGreen()    - Return a pixel with the red and blue values zero'd out.
```

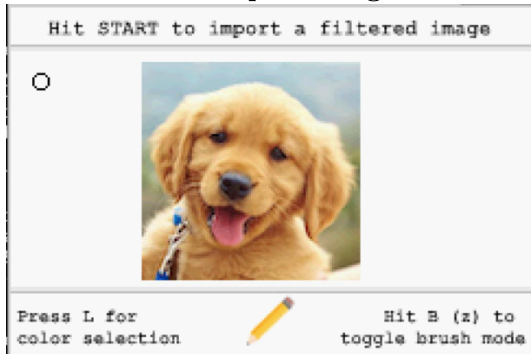
Recall, this is how a pixel is broken up into bits:

| | | | | | | | | | | | | | | | |
|----|------|----|----|----|----|-------|---|---|---|---|-----|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| - | Blue | | | | | Green | | | | | Red | | | | |

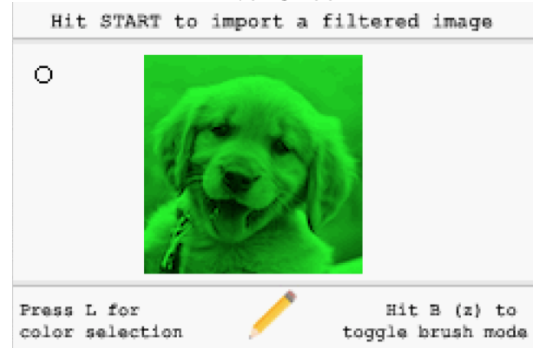
3 Expected Outputs

The following images are expected outputs for each function:

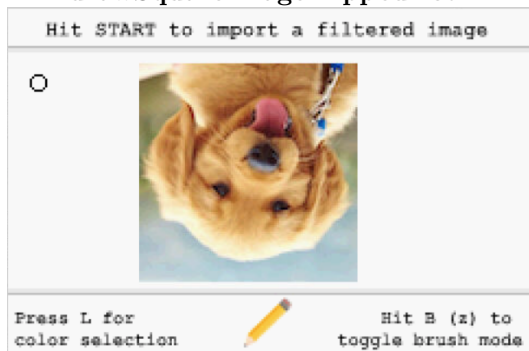
drawSquareImage



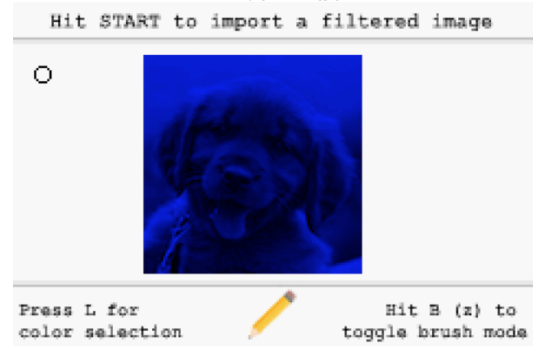
FilterGreen



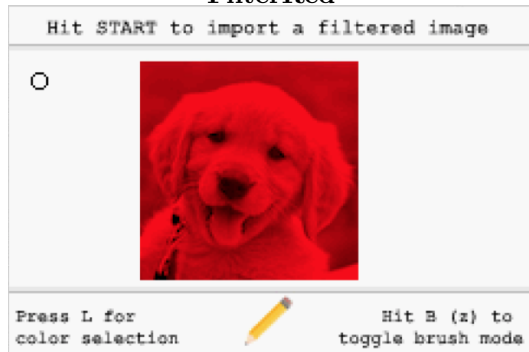
drawSquareImageFlippedBoth



FilterBlue



FilterRed



4 Testing your work

Check your work using:

```
make emu
```

This will run the Paint 2110 application! To test the functions you've written, you can press L (which is the a key on a keyboard), use the arrow keys to hover over a filter or drawFlippedBoth, and then press enter to apply that function to an image of an apple! If all is working well, you should see a red, blue, and green apple for filterRed, filterBlue, and filterGreen, respectively. And for drawFlippedBoth the apple should be flipped both horizontally and vertically.

4.1 Autograder

There is **no** local autograder for this timed lab. Submit to Gradescope to run the autograder on your submission (as always you have unlimited submissions during the timed lab period).

5 Important Notes

1. Do not modify any other files besides tl06.c.
2. Do not alter the #include list or add any global variables.

6 Deliverables

Please upload the following files to Gradescope:

1. tl06.c

Download and test your submission to make sure you submitted the right files