Image-inary Prototype Documentation

Team: Code Busters

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Main:

File: *master.e*

Purpose: This is the main file for the prototype which calls the other functions in the project. It contains the instructions and logic to perform the actions described below.

Usage:

1. Load image to be hidden on SD card (per instructions described in SD card page on ENGR 100 website)
2. Press reset button to start game
3. Aim camera at intended background / setting (will take picture following step 2 or 5)
4. Locate hidden image by tapping on touch screen
5. Move to the next round by switching “on” SW0 and tapping on hidden image
6. *Switch “on” SW1 to stop the program from drawing the squares displaying the average color value of each “chunk”

Functions:

File: *average.e*

Purpose: This file contains the function used to find the average color value of all of the pixels in the smaller hidden image by aggregating the red, blue, and green values of the pixels and dividing them by the number of pixels. This average color value is then used in *master.e* in conjunction with *compare.e* to find the best “chunk" to hide the smaller image.

File: *average_chunk.e*

Purpose: This file contains the function used to find the average color value of all of the pixels within a chunk of the larger picture by aggregating the red, blue, and green values of the pixels and dividing them by the number of pixels in the “chunk.” In *master.e*, the average color value of each “chunk” is then compared to the average color value of the smaller image using *compare.e* to identify the “chunk” that is closest in average color to the smaller image.

File: *compare.e*

Purpose: This file contains the function used to find the location of the pixel in the larger picture that is closest in color value to the average color value of the smaller hidden image. This is achieved by calculating the differences in the red, blue, and green values between the average color value and the current compared pixel in the larger picture, updating the minimum difference and the location of that pixel if applicable. The location of this pixel is then used in *master.e* to draw the hidden image that is currently stored on SDRAM.

File: *SDCardToRam.e*
Purpose: This file contains the function to transfer the hidden image that was previously loaded on the SD card to SDRAM.

File: *SDRAMToScreen.e*
Purpose: This file contains the function to display the hidden image in SDRAM to the VGA controller.

Drivers:
File: *sd_driver.e*
Purpose: This is the driver to interact with picture data stored on the SD card.

File: *sdram_driver.e*
Purpose: This is the driver to interact with picture data stored on the SDRAM.

File: *speaker_driver.e*
Purpose: This is the driver to play sounds on the speakers.

File: *touchscreen.e*
Purpose: This is the driver to allow the user to interact with the touchscreen.

File: *VGAread.e*
Purpose: This is the driver to read pixels from the VGA controller.

File: *VGAwrite.e*
Purpose: This is the driver to write pixels to the VGA controller.

Tests:

File: *multitest.e*

Purpose: This file tests the ability to take a picture, display it on the VGA controller, and recognize when the center of the image is touched by playing a sound on the speakers.

File: *sd_picture_test.e*

Purpose: This file tests the SD card functionality by displaying an image from the SD card onto the VGA controller.

File: *sd_test.e*

Purpose: This file tests the SD card driver by displaying data from the SD card on the LEDs on the board.

File: *VGAtest.e*

Purpose: This file tests the VGA driver by drawing several different colors to it in different places.

File: *sdram_tester.e*

Purpose: This file tests the sdram by writing values to sdram and then reading values from it.

File: *testCompare.e*

Purpose: This file tests *compare.e* by comparing a predetermined pixel to a picture with a few different colors on it and ensuring that the proper result is displayed.

File: *testPicture.e*

Purpose: This file tests displaying a picture taken with the camera on the VGA controller.

File: *testSDstuff.e*

Purpose: This file tests the functionality of the SDRAM and SD card by taking an image from the SD card, moving it to the SDRAM, and then finally displaying it on the VGA controller.