

SE 423 Mechatronics Homework Assignment #5, Spring 2018

Multiple Due Dates for HW5:

Question 2 is due in Lecture April 11<sup>th</sup>

Question 3 Project Demonstration Check-Off is due by 3PM Tuesday April 17<sup>th</sup>. Commented code and an email of a picture of the project are due in Lecture April 18<sup>th</sup>

1. Read the computer vision chapter posted at the web site: <http://coecsl.ece.uiuc.edu/ge423/datasheets/vision.pdf>
2. (30 points) For this homework assignment you are going to explain much of the source code given to you in the file ColorVision.c of your OMAPL138 projects. For the two parts of this question the source code has been divided by line number. Perform the tasks specified for each section of code.
  - a. In `userProcessColorImageFunc_laser` lines 300 to 429, perform a “paper run” to understand what this code is doing. This paper run also includes the functions you will explain in part b below. Hand in your “paper run” crib sheet. The crib sheet is attached to this homework assignment. You can print out extra copies of the crib sheet at the web site. **Make sure to read the notes at the bottom of the crib sheet.**
  - b. `int Fix_Equivalency(int num_equivalencies_used)`. Lines 638 to 708. Explain what this function does. The explanation should include the overall picture of what the connected parts algorithm in the function `userProcessColorImageFunc_laser` is accomplishing.
3. (70 points) This homework assignment is up to you. (same as question 7 of HW #4). Use your creativity to build something using the either two RC servos or two continuous turn geared DC motors. Of course you will also need to use the G2553 microcontroller to control the RC servos. Make something that you will be proud of and put on your desk at home or something that will scare your friends when they try to raid your refrigerator. Anything goes but keep in mind that you also have a final project with the DSP/Robot to complete by the end of the semester. So in other words, I am not expecting it to be an elaborate and finely polished design.

Items that you **CAN** use that are in the Mechatronics Lab: *(This is not a complete list so ask if there is a part that you need).*

- a. Any of the parts (resistors, capacitors, sensors, etc) used in previous homework assignments.
- b. Anything (hardware, sensor, actuator or integrated circuit) that you purchase.
- c. A second G2553 microcontroller that you sampled. (This is an easy way to get points for your design).
- d. The lab has a speaker that you can use/have.
- e. The lab has a microphone you can use/have. It is a cheap microphone so don't expect too much from it. It can pick up loud noises.
- f. Raw plastic and aluminum, “Super Velcro”, nuts and bolts. Cheap items that can be purchased from McMaster-Carr. I will be the judge of what is cheap.

Items that you **CANNOT** take from the lab.

- a. Pretty much any of the pre-made parts for the RC servos. Unfortunately these items are relatively expensive and I can't give them to you.
- b. IR and Ultrasonic sensors used by the robot car.
- c. Gears, pulleys, belts.
- d. Other items? Ask before you plan on using them.

**What needs to be turned in for HW #5?**

- a. Demonstrate your project working.
- b. All the source code you developed for this project. This source code must be commented well!
- c. Take a video or picture of your final design and email it to your instructor.