

# EECE 2160 - Embedded Design: Enabling Robotics

## Spring 2016 – Homework #1 Due: Sunday, February 14<sup>th</sup> (End of day)

**Note:** Submit, in a zipped folder, all individual files, and a single PDF file with all the C programs, a sample output from each, and the input file. Your code should be well commented.

1. Download and use the included “CarRecords.txt” file from Blackboard as your input file. The file has 10 random used car records. Each record has 4 fields with the following format: car make, car model, year, color e.g.

Toyota, Matrix, 2006, silver
Volvo, XC70, 2009, blue
.
.
etc

MENU - Select an option:
1. Print the cars array
2. Insert car records into a sorted array
3. Sort cars by year
4. Print duplicates
5. Exit

Implement the tasks below for an **array of structs** of car records in a C program. Create a struct with the 4 fields described above. Create an interactive main program that asks the user to select an element from a menu (above) containing a set of actions associated with the tasks below.

- a.) Provide a function `insert_sorted_array( )` that reads and stores the 10 records from file in an a **sorted array of structs**. The array should be sorted based on the **car make**. Each new record from file should be inserted into its correct sorted location by shifting other records if necessary.
  - b.) Provide a function `print_cars_array( )` that prints out the car records in the array list.
  - c.) Provide a function `sort_cars_by_year( )` that sorts the records in descending order based on the **year** field.
  - d.) Provide a function `print_duplicates( )` that identifies any repeated records, and prints them out when found. Repeated records means that all the fields are the same.
2. In a new C program, and using the same “CarRecords.txt” input file, implement the tasks below for a **linked list** of car records. Create a linked list node with the car fields and a pointer. Provide a similar menu as the one used above with the necessary modifications to reflect the tasks below.
    - a.) Provide a function `insert_sorted_list( )` that reads the 10 records from the file into a **sorted singly linked list**. The linked list should be sorted based on the **car model**. Each new record from file should be inserted into its correct sorted location in the linked list.
    - b.) Provide a function `print_cars_list( )` that prints out the car records in the linked list.
    - c.) Provide a function `sort_cars_by_color( )` that sorts the records in ascending order based on the **color** field. The sorting should be done by **pointer manipulation**.
    - d.) Provide a function `print_duplicates( )` that identifies any repeated records, and prints them out when found. Repeated records means that all the fields are the same.

**Note:** The above functions can have arguments and return types as you see fit.