

Comp 790-062: Autonomous Driving: Moving from Theory to Practice

General Course Info

Term: Spring 2017
Department: COMP
Course Number: 790
Section Number: 062

Time: F, 2:00 – 4:30
Location: SN155
Website: <https://cs.unc.edu/~anderson/teach/comp790car/>

Instructor Info

Name: Prof. James Anderson
Office: FB112
Email: anderson@cs.unc.edu
Phone: 919-590-6057
Web: <http://www.cs.unc.edu/~anderson>

Textbooks and Resources

No required textbooks.

Course Description

Students with experience in Computer Vision, Real-Time Systems, Robotics, or other pertinent areas will be working together to develop a miniature autonomous car. The goal of the course is to compare the more expensive LIDAR and less expensive stereo cameras for sensory input and whether minimal cost hardware can perform just as well as, if not better than, more expensive hardware using complex algorithms (e.g. for object detection and avoidance). The development will be in weekly sprints with graded deliverables each week. Instructor permission required.

Target Audience

This course is targeted for graduate students in the Computer Science department with knowledge of Real-Time Systems, Robotics, or Computer Vision.

Prerequisites

Students must have an understanding of COMP 737, COMP 782, or COMP 776, or an equivalent strong background in graphics, embedded systems, or robotics to do well in this course.

Goals and Key Learning Objectives

Students are expected to learn the basic necessary algorithms and input management for autonomous car navigation. In particular, this course will explore algorithms that allow movement and obstacle detection with low-cost hardware. In addition, students with different backgrounds will be working closely together and are expected to learn from each others' different areas of expertise.

Course Requirements

Every week students will be submitting weekly reports consisting of 1-2 written pages along with a 5-minute presentation. These reports must focus on improving the algorithms driving the autonomous car, including motion planning, obstacle avoidance, and software reliability. Students are expected to meet together on their own time before the class period.

Key Dates

Weekly reports are due every Friday at class time
April 22 - Have a working demonstration for the UNC Science Expo
May 9 - Project due, including a 10-15 page written paper, by 4pm

Grading Criteria

Weekly updates 35%
Project 40%
Attendance 10%
Participation 15%

Attendance and Participation

Attendance will be recorded every week. 3 missed classes are allowed before negatively impacting the student's attendance grade by 1 point per missed class. Since the course is more discussion based and collaborative, the student's participation in the discussion and individual contributions to the overall effort will be recorded.

Course Policies

Late policy: Since weekly updates will be critical to driving course progress, a student who does not submit a deliverable by the class period, will have their deliverables grade decreased by 0.5 points per day late, until the next class period the following week.

Honor Code

Due to the nature of the class, students will be collaborating on the project. Weekly reports, however, must be written independently and reflect each student's own work.

Course Schedule

If possible, a schedule of topics covered by the course organized by course date or week number.

January 13 - Introduction.
January 20 - Weekly report 1 due
January 27 - Weekly report 2 due
February 3 - Weekly report 3 due
February 10 - Weekly report 4 due
February 17 - Weekly report 5 due
February 24 - Weekly report 6 due
March 3 - Weekly report 7 due
March 10 - Weekly report 8 due
March 17 - Spring Break
March 24 - Weekly report 9 due
March 31 - Weekly report 10 due
April 7 - Weekly report 11 due
April 14 - No class
April 21 - Weekly report 12 due
April 22 - Demo at UNC Science Expo
April 28 - Weekly report 13 due
May 9 - Project due and presentation at 4pm

Disclaimer

The professor reserves the right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.