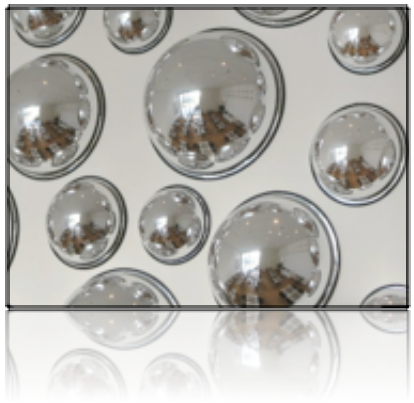
Syllabus



CS 7495
Graduate Computer Vision

Fall 2013
ES&T L1105
Tue-Th 3:05pm - 4:25pm

Coordinator Frank Dellaert
TA: Natesh Srinivasan
Taught by: Frank Dellaert, with guest lectures by:
Aaron Bobick, Irfan Essa, Jim Rehg, Grant Schindler.

Prerequisites
This is a graduate class. If you have not taken an introductory machine vision or computer vision class, this class will be quite difficult. The basic material will mostly be covered only through self-study prior to each module (see below). Good math skills, esp. linear algebra, are essential.

Communication about the class:
All communication from the teaching staff will be done through T-square. Please read all announcements and email promptly. If you want to email an instructor, ***please use "CS7495" in the subject line.***

Class Goals
The desired learning outcomes for the students are:

- **Foundation:** Reviewing and acquiring an advanced foundation in computer vision techniques
- **Skills:** Being able to propose, evaluate, and implement solutions to computer vision problems
- **Integration:** Being able to bring in/suggest the use of signal processing, AI, machine learning...
- **Self-Assessment:** Learn though exposure to different flavors of problems/solutions

Text
We will often be referring to papers rather than books. However, the following books will be helpful to varying degrees:

- Computer Vision: A Modern Approach, **Second Edition**. David Forsyth and Jean Ponce. Prentice Hall.
- Multiple View Geometry in Computer Vision, by Richard Hartley and Andrew Zisserman. Cambridge University Press.
- Computer Vision: Algorithms and Applications, by Richard Szeliski at Microsoft Research. The

latter is available as a free PDF, and, while application oriented, is very beautiful and useful.

Structure and Sequence of Class Activities
This course is probably different from many other courses you have taken at Georgia Tech, in that it does not follow the usual lectures/midterm/final pattern. Instead, while there are also conventional lectures, the course is different in two major aspects:

1) **You are expected to review or study the foundational material outside class time.** You will be asked to read assigned material before the start of each module, as indicated on the schedule. Reading textbook material can be tedious, but it is necessary for you to acquire this foundation. To motivate you (and at the same time reward you with a grade for your hard work) ***an assignment*** based on this reading material is due the day we start with the in-depth discussions needing this foundational material.

2) **The lectures will be reserved for advanced topics and active learning activities.** Research has shown that students are happier and retain material better if they participate actively in the learning rather than simply taking notes in lectures. In this course, in particular, we built in three projects described here that will have substantial in-class activities associated with them. In particular, on the due date of the project paper, we will form mini ***area chair meetings*** in which the best papers are singled out for ***presentation in class***.

Out-of-class Work
There are several activities designed to achieve the learning outcomes above:

- **Foundation:** there will be 10 ***assignments*** on foundational material, due at the beginning of each module. They will be small but will force you to read the assigned material.
- **Skills:** There are three ***projects*** in which *you will choose*, propose and research a problem that you might encounter in *your future career* (be it in academia, industry, or government), propose a solution, implement it, and describe it in a mini-conference paper. Projects should be done in teams of 2 or 3 students (no more, no less). Details here.
- **Integration:** The ***final project*** is expected to be larger in scope and include a non-trivial AI or machine learning component, or to be implemented on a robotics platform.
- **Assessment:** At the end of the course, there will be a ***final exam***, but you will be given the questions in advance, some time after each lecture. This will allow you to reflect on the lectures on a regular basis, as well as thinking back on the entire course near final exam time. Reinforcing the latter even more, you will be asked to write a short ***learning portfolio*** detailing your experience in the class and what you learned over the course of the semester.

There is a page with more details about the projects, including grading criteria and standards.

Schedule
A detailed schedule, subject to change, can be found on the schedule page.

Collaboration Policy

Collaboration on assignments is encouraged at the "white board interaction" level. That is, share ideas and technical conversation, but write your own code. Students are expected to abide by the Georgia Tech Honor Code. Honest and ethical behavior is expected at all times. All incidents of suspected dishonesty will be reported to and handled by the office of student affairs.

Grading

- **Class Participation**: 5%
- **Foundation**: Assignments 40%
- **Skills**: Mini-Projects: 10%+10%+20%
- **Self-Assessment**: Learning Portfolio 5%
- **Final Exam:** 10%