Human-Centered Robotics

CSCI 473/573, Spring 2018
Alderson Hall 230, Tue/Thurs 8:00 AM – 9:15 AM

Class Website: http://inside.mines.edu/~hzhang/Courses/CSCI473-573/

Instructor: Dr. Hao Zhang, Computer Science Dept.
Office: BB 250
Phone: (303) 273-3581
Email: hzhang@mines.edu
URL: http://inside.mines.edu/~hzhang
Office Hours: 5-6 PM Thursdays or by appointment (send email)

Teaching Assistant: Brian Reily
Location: Alamode Lab (BB 136)
Email: breily@mymail.mines.edu
Office Hours: 3:00-5:00 PM on Thursdays or by appointment (send email)

Course Description:
This course focuses on the new field of Human-Centered Robotics (HCR), bridging together research and application of methodology from robotics, human-machine interaction, and cognitive psychology. This course covers basic concepts and computational models of 3D sensing, robot learning and cognition to perceive humans, understand human behaviors, and decision making and planning in response to humans or environment events.

Prerequisites:
CSCI 262 and Math 201: As a Computer Science robotics course, understanding of fundamental concepts of computer science (e.g., data structures) and experience of programming in C++ or Python in Linux is necessary. Mathematical maturity is also needed to understand the computational models. In this course, the instructor will not teach programming and will assume sufficient math knowledge.

Required Textbook:
None. The history of human-centered robotics is short. The course is project-based and research-oriented, generally focusing on the cutting-edge concepts and techniques from recent research papers. Due to this reason, many texts, pictures, and slides we use in the lecture are collected by the instructor from a wide variety of online sources. Major references will be provided.

Schedule and Assignments:
All materials (lecture, schedule and assignments) will be available on the course website. If you miss a lecture, it will be your responsibility to check the course website (make sure you refresh the webpage).

Class Communication:
Assignments will be submitted to Canvas. You will also check your grades on Canvas. If you want to chat with the instructor, please stop by my office during the office hours. Or if the office hours do not work for you, send an email to the instructor to schedule a meeting, or simply talk with the instructor before or after the classes.

**Evaluation:**
Grading will be 100% based on projects (Project 1: 20%, Project 2: 35%, and Final Project 45%). Students in CSCI 473 will be given the same projects, as those taking CSCI 573. However, the quality and/or quantity of the work expected is higher for CSCI 573 than for CSCI 473, and thus will be graded more strictly. Additional problems will also be provided to CSCI 573 students to solve in projects.

Final grades will be determined by overall average as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>90 – 100</td>
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<tr>
<td>B+</td>
<td>85 – 89.9</td>
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<tr>
<td>B</td>
<td>80 – 84.9</td>
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<tr>
<td>C+</td>
<td>75 – 79.9</td>
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<tr>
<td>C</td>
<td>70 – 74.9</td>
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<tr>
<td>D</td>
<td>60 – 69.9</td>
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<tr>
<td>F</td>
<td>0 – 59.9</td>
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</tbody>
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Decisions on borderline grades will be based on class attendance and participation. The instructor considers borderline as ~0.75 point (at most 1 point).

**Class Policies:**
- **Class attendance:** Class attendance will be taken. Decisions on borderline grades will be based upon exceptional class attendance and participation, as deemed merited by the course instructor. Of course, if you have a good reason to miss class (e.g., you are sick, or you need to present a paper at a research conference, or you have a job interview, etc.), then it is not a problem. Please don’t come to class if you think you have a contagious illness. We will work with you to help keep you posted on class activities and material covered. In any case, it is your responsibility to catch up (or keep up) with all course material and announcements covered in class.
- **Class participation:** Please participate in class discussions. The course is so much more interesting that way! Again, decisions on borderline grades will be based upon exceptional class participation, as deemed merited by the course instructor.
- **Project assignments:** Projects write-ups will be posted on the course website, along with the due dates. All projects will involve programming; using C++ or Python is required (you will learn why we have this requirement in the course).
- **Due dates and Late Assignments:** All assignments are due at the date and time stated. The individual Project 1 and Project 2 have a four-day grace period for each deliverable, and late submission will lose 25% points per day for that specific deliverable. The team-based Final project does NOT have a grace period, and any deliverable submitted five (5) minutes past the due time will receive a grade of zero.
- **Exams:** There will be no exams 😊.
• **Grading corrections:** Bring any assignment grading correction requests to the instructor within 1 week of receiving the grade, or before the end of the semester, whichever comes first. After that, your grade will not be adjusted. If you find any mistake in grading, please let the instructor know. Your grade will not be lowered.

• **Using computers/phones in class:** Please be respectful of your colleagues in class, by turning off your phones and using your computers only for taking notes or keeping up with the material covered in class. Checking your email, working on other non-class related materials, web-surfing, etc., are not appropriate activities for class time. Be a good citizen, and practice courteous cell phone and computer etiquette!

• **Collaboration Policy:** Discussing ideas is encouraged. You may help each other with your strategy for how to solve the projects. You are expected to note significant collaborations by giving the name of your student collaborators on the project material you turn in. However, except if specifically allowed by the instructor, copying from any outside sources (e.g., fellow students, Internet, etc.) on any material to be graded is not permitted, and will be considered cheating. **Cheating will be dealt with harshly**, and will result in failure of the assignment and/or failure of the class.

• **Academic Integrity:** All students are advised to be familiar with university policy on Academic Integrity. In addition, The following Collaboration Policy exists for all CS@Mines courses.
  1. If the project is an individual effort project, you are not allowed to give code you have developed to another student or use code provided by another student. If the project is a group project, you are only allowed to share code with your group members.
  2. You are encouraged to discuss homework and final project assignments with other students in the class, as long as the following rules are followed:
     a. You view another student’s code only for the purpose of offering/receiving debugging assistance. Students can only give advice on what problems to look for; they cannot debug your code for you. All changes to your code must be made by you.
     b. Your discussion is subject to the empty hands policy, which means you leave the discussion without any record [electronic, mechanical or otherwise] of the discussion.
  3. Any material from any outside source such as books, projects, and in particular, from the Web, should be properly referenced and should only be used if specifically allowed for the assignment.
  4. To prevent unintended sharing, any code stored in a hosted repository (e.g., on github) must be private. For group projects, your team members may, of course, be collaborators.
  5. If you are aware of students violating this policy, you are encouraged to inform the professor of the course. Violating this policy will be treated as an academic misconduct for all students involved. See the Student Handbook for details on academic dishonesty.

Violations of this policy result in one of a range of punitive measures, from a zero score for an assignment, up to and including a course letter grade drop for all students involved. All issues of misconduct are reported to the Dean of Students. Academic misconduct associated with an exam grade will likely result in course failure.

• **Discrimination & Harassment:** This course and all learning opportunities at Mines require a safe environment for everyone to be productive, develop professional practices, and to be able to share and learn without fear of discrimination or harassment. Discrimination or harassment of any type will not be tolerated. Sometimes harassment is unintentional, but regardless of intent the instructor will address
any language or behaviors that might discriminate, stereotype, or promote harassment. If you witness discrimination or harassment of others, please bring it to the attention of Mines faculty so it can be addressed immediately.

Title IX is a federal law that protects individuals from discrimination based on sex and gender in educational programs or activities. Mines takes its Title IX obligations seriously and is committed to providing a campus community free from gender-based discrimination. Gender-based discrimination, including sexual harassment, sexual violence, stalking, and domestic violence, is prohibited within the Mines campus community. If these issues have impacted you or someone you know, you can appropriate resources here: http://inside.mines.edu/POGO-Title-IX. You can also contact the Mines Title IX Coordinator, Karin Ranta-Curran, at 303.384.2558 or krcurran@mines.edu for more information.

- **Learning Environment:** Fundamentally, I expect and require respect in this course for yourself, your classmates, and your instructor and TAs.
  - Respect for yourself includes taking care of yourself physically and mentally and advocating for an environment that facilitates learning for you.
  - Respect for your classmates includes recognizing and appreciating the diversity of backgrounds and experiences of your classmates and making it your interest to foster a learning environment for everyone; all are welcome.
  - Respect for your instructors (as well as your classmates) includes not participating in disruptive or distracting behavior: talking, playing games, or web surfing during lecture, for instance, make it difficult for others to focus on the reason we are all here.
  - Respect must be mutual to be effective; we (your instructors) and your TAs will be held to the same standards of respect.

Please let your instructor know if you become aware of an issue with the classroom (or out-of-classroom) environment with regards to these policies.

- **Disability Accommodations:** website http://disabilities.mines.edu outlines the university’s disability services. Any student requiring accommodations must request Student Disability Services deliver each professor a Confidential Letter of Required Accommodations to ensure accommodations are met. Any student requiring accommodations, please contact the instructor via email or schedule an individual meeting to coordinate accommodations.