CSCI 1951C Designing Humanity Centered Robots

Fall 2015
9:00 AM- 12:00PM T TH
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Blog: http://designinghumanitycenteredrobots.tumblr.com/

Course Description

Our goals for this semester are: 1) To establish a technical foundation for designing and fabricating robots 2) To consider the social contexts in which robots exist, and will exist in the future.

The first half of the semester will be an introduction to these technical and speculative themes. In the second half of the semester, roughly speaking, we will orient ourselves toward our final projects, which will build upon class discussions and earlier iterations of our design process. Our goal for the final project is to produce prototypes that are well considered and well executed, while framing a discussion about the opportunities this kind of technology holds for designing a better society, economy, and culture.

We will be working on our projects in small teams throughout the semester. Everyone comes to the course with a different set of skills. Our hope is that these teams will provide peer resources for problem solving and co-learning. We are all here to learn, and we are all here to share what we know.

The Kit

Our first iteration will be based on “the kit” – which will include instructions, parts, and the necessary code to build your first telepresence robot. As with any design process, unanticipated challenges will arise. Don’t get frustrated when you run into these challenges. There are many resources online (if you are having an issue, chances are someone else out there has had the same issue). When you get stuck, Google it. If Google fails to provide an answer, draw on the creative resources of your peers. Creative problem solving is essential to success in this course.

Documentation

Documentation is an essential part of this class**. YOUR GRADE IS DEPENDENT ON YOUR DOCUMENTATION**. All projects will need to be posted to your blog and you will be required to upload all documentation of product and process to the class Google Drive. It is your responsibility to document and archive your projects. This is important for several reasons: 1) It will help you build your portfolio 2) It will be one of the vehicles for evaluating work 3) It will allow us to share our work with others outside of the class.

Your Tumblr blog should use the **"Beta Prime"** theme. We will link your blog to the class website. You may choose to use your first name only, if you are concerned about privacy.

Instructions to set up your blog can be found here:
http://steamstudio.us/documentation/

We will also be interacting with the emerging design community across campus on the Design@Brown Facebook group. We will post work, tutorials, inspiration, and other resources.

For the purpose of grading, if it isn't documented, it doesn't exist. All documentation must be posted to the blog.

Grading/Participation

Participation is an essential component to this course. **Be on time to every class. Attendance to every class is required**. If you cannot make it to a class, email the instructor, preferably prior to your absence. Expect to spend at least 10-13 hours per week outside of class working on projects.

Field Trips

We may go on field trips from time to time. These may occur outside of our scheduled class time. If you cannot make it on a field trip, meet with the instructor to explore your options for making up the missed trip.

Brown Design Workshop

We will be working in the Brown Design Workshop. Please be respectful members of the BDW community, especially when other classes are using the space. This is still an evolving space, and we may need to adapt to the use of others throughout the semester. We encourage you to become a part of the community. Share what you learn with others, and they will share with you.

You will be asked to become a member, and to attend training sessions outside of class. More information about the BDW can be found here:

http://www.brown.edu/research/projects/design-workshop/home

Projects

Tuesday 9/10
In class: Intro to Designing Humanity Centered Robots
“The Augmented Lego”

Homework:
http://www.designkit.org/
Set up blog

Tuesday 9/15
In class: The Sci-Li Challenge

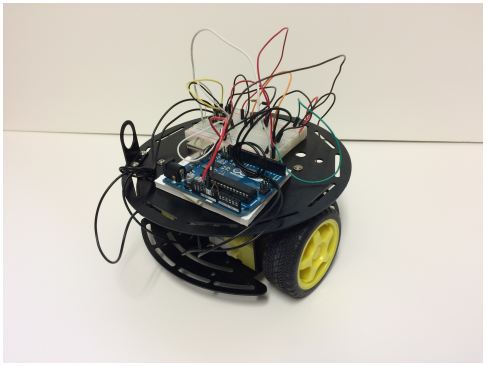
Homework:
Ideation for Design: Develop 5-10 different concept sketches based on different needs that robots can address. Like the Lego exercise the first day, these can be fanciful or practical. The quality of the drawings is not important. What is important is your ability to demonstrate the ability to develop and communicate concepts through visual representation. Post to your blog and come to class prepared to discuss.

Tuesday 9/17
In class: Project #1: Intro to Arduino

Review ideation exercises

Working in small teams, and using the Adafruit tutorials, we will introduce some of the basic principles of using microcontrollers.

https://learn.adafruit.com/adafruit-arduino-lesson-1-blink
https://learn.adafruit.com/adafruit-arduino-lesson-2-leds
https://learn.adafruit.com/adafruit-arduino-lesson-3-rgb-leds
https://learn.adafruit.com/tmp36-temperature-sensor/using-a-temp-sensor
https://www.youtube.com/watch?v=CqrQmQqpHXc



Homework:
Continue working with Arudino. Feel free to push beyond the basic exercises.

The critical development of our design practice and creative process will be a key component of this course: watch http://steamstudio.us/the-creative-process/

Tuesday 9/22
In class: Project #2: Movement

In groups, using the WD Arduino Compatible Mobile Platform Kit, an Arduino, and other parts, create a robot that moves in a particular path based on code. Experiment with

various tasks the robot can do. Take pictures and video of your project, and post it to your blog.

Tutorials:
Basic DC motors
https://learn.adafruit.com/adafruit-arduino-lesson-13-dc-motors

Using a motor shield
https://learn.adafruit.com/adafruit-motor-shield/using-dc-motors
https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/using-dc-motors
https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/install-software

https://learn.adafruit.com/adafruit-motor-shield-v2-for-arduino/using-rc-servos
http://playground.arduino.cc/Main/AdafruitMotorShield

Homework: 1) Continue to develop and refine your robot, exploring a variety of ways to use code to control your mobile robot.

Reading: http://designed.mit.edu/design-online/foamcore.html
https://learn.adafruit.com/tmp36-temperature-sensor/using-a-temp-sensor

BDW Workshop: Sign up to become a member and attend both the lasercutter training and the 3D printing training by 9/24

Thursday 9/24
In class: Project #4 Telepresence Part I

1) Review projects 2) Using the WIFI shield to establish a remote connection with your robot, control the motion of your robot with a remote connection.

Homework:
Continue to develop concept sketches using WIFI as a feature in your design.
Go to Better World By Design http://www.abetterworldbydesign.com/
(panel on Critical Design) (optional but encouraged)

Tuesday 9/29
In class: Project #5: Telepresence Part II

Building upon the last project, design and build a robot that can: 1) be controlled via WIFI 2) Has a foamcore or cardboard mount for a smartphone or tablet that can be enabled with a telepresence enabling app, such as Skype or Facetime.

Homework: Continue to develop and refine your prototype. Take pictures and video. Post to your blog. Develop an application for your design, which can be hypothetical or real, but you must be able to effectively “tell the story”.

Tutorials:
http://designed.mit.edu/design-online/foamcore.html
http://steamstudio.us/prototyping-i/

http://steamstudio.us/prototyping-ii/

Thursday 10/1
In class: Project #6: Telepresence Part III

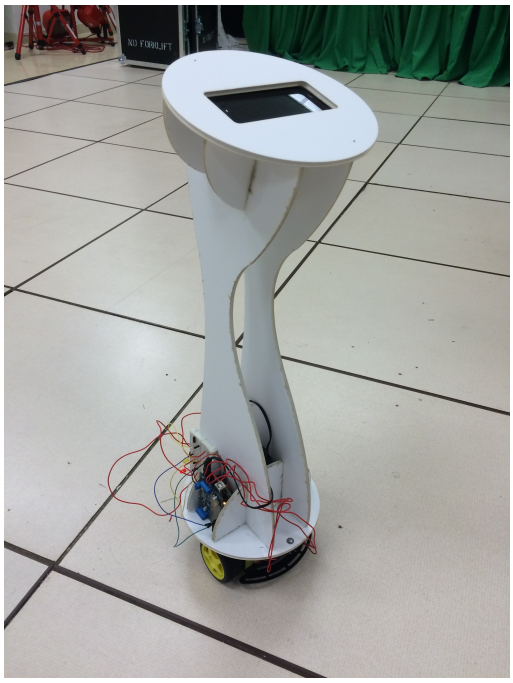
We will demo how to build a simple app for your tablet or phone that can be integrated into your low resolution prototype. You need to identify a user scenario, for which your design creates an affordance for a particular task. You might consider how the technology allows you to rethink work by speculating about future scenarios that new technologies will make possible, or think about how we play, designing an interactive game with your robot. Consider who the user is, and how they will use the robot.

Tutorials: **https://opentokrtc.com/hcri**

Homework: 1)Read A World Without Work:
http://www.theatlantic.com/magazine/archive/2015/07/world-without-work/395294/

2) Write a 1-2 page short story that explores a future scenario where telepresence robot, or some other kind of fictional technology, can be understood in context. Your short story should include at least one image (drawing, photo, video, etc). Make your idea as concrete as possible. Due 10/6

Tuesday 10/6
In class: Design Review



We will evaluate our initial iterations and explore ways we can improve the designs as we speculate about. This will be an opportunity begin giving serious consideration to our final projects.

Homework: Develop 10-20 different concept sketches for a future scenario.
Read Excerpt from Dunne and Raby's *Speculative Everything* and watch:
http://www.dunneandraby.co.uk/content/books/690/0
https://www.youtube.com/watch?v=sX3pIolTpts

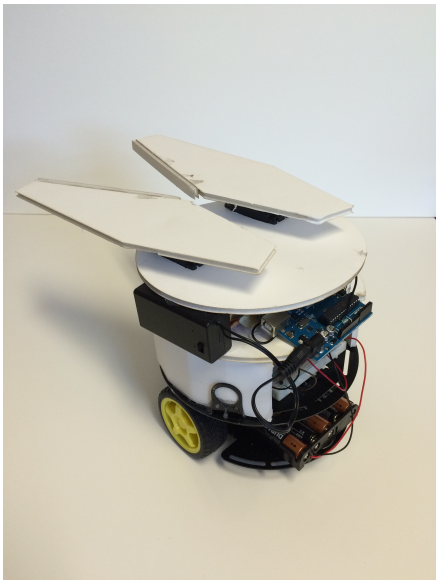
Thursday 10/8
In class: Project #9 Speculative Design/Fictional Tech Part I

We will begin by reviewing concept sketches. Now that we have a basic technical foundation, we will go deeper into speculating about how robots may be used in the future (which includes the near future).

Meet in your group and discuss the readings. Use this conversation as a point of departure to begin imagining a future/near future scenario you would like to design for. You are encouraged to draw on other sources, such as science fiction for example.

From our initial ideation, we will select several ideas we would like to explore further. For the first iteration of this project, develop a storyboard that tells the story of a future/near future scenario using fictional or semi fictional technology. Supplement your storyboard with sketches that demonstrate how your prototype might work. Create sketch models that help us make the idea concrete. Your project doesn't need to be actual, but it does need to be viable. Document all your work and post it to the blog.

Homework: Continue working on your Fictional Tech Project. Review Intro to Prototyping video: http://steamstudio.us/prototyping-i/



Tuesday 10/13
In class: Project #8: Acting on the Environment

Building upon the prior projects, design and build a robot that can act on its environment using servo motors and foam core.

Tutorials:
https://learn.adafruit.com/adafruit-arduino-lesson-14-servo-motors

Homework: Continue working on Fictional Tech and developing your robot prototype.

Thursday 10/15
In class: Assignment #9: Fictional Tech Part II

We will begin by reviewing concept sketches, storyboards, and other materials. Building upon your first iteration, develop your concept further, refining your "looks like" prototype, and the way you tell the story. You might consider using Photoshop, Illustrator, or IMovie as you explore other media that can help you tell the story. Video, photos, and drawings can be integrated in whatever manner you feel is appropriate, but you must have two things for your second iteration that are well considered and more refined: 1) A sketch model 2) A way of telling the story.

Homework: Continue working on Fictional Tech.

Tuesday 10/20
In class: Project #10: Sensors

Building upon the last project, use a proximity sensor to allow your robot to navigate space autonomously.

Tutorials: http://www.robotshop.com/blog/en/arduino-5-minute-tutorials-lesson-4-ir-distance-sensor-push-button-2-3637
http://www.instructables.com/id/Simple-Arduino-and-HC-SR04-Example/

Homework: Prepare for the Design Review. You are expected to give a short presentation that documents: 1) The prototype you've been building 2) Your Fictional

Tech project 3) A possible direction you may want to take for the final project. We will use the Design Review on 10/20 to begin working out how we want to approach our final projects.

Thursday 10/22
In class: Design Review

Homework: Develop a detailed project plan for your final project. This should include a schedule with developmental milestones, parts lists and budget, and concept sketches and models.

Tuesday 10/27
In class: Work in class and review final project proposals
Homework: Work on final project and make any necessary revisions to your project plan.

Thursday 10/29
In class: Work in class on final project/desk crits
Homework: Work on final project

Tuesday 11/3
In class: Work in class on final project/desk crits
Homework: Work on final project

Thursday 11/5
In class: Work in class on final project/desk crits
Homework: Work on final project

Tuesday 11/10
In class: Mid Project Design Review
Homework: Work on final project

Thursday 11/12
In class: Work in class on final project/desk crits
Homework: Work on final project

Tuesday 11/17
In class: Work in class on final project/desk crits
Homework: Work on final project

Thursday 11/19
In class: Work in class on final project/desk crits
Homework: Work on final project

Tuesday 11/24
In class: Work in class on final project/desk crits
Homework: Work on final project

Thursday 11/26
In class: No Class for Thanksgiving

Tuesday 12/1
In class: Work in class on final project/desk crits
Homework: Work on final project

Thursday 12/3
In class: Work in class on final project/desk crits (Ian out of town)
Homework: Work on final project

Tuesday 12/8
In class: We will meet through Reading Period to finalize projects and presentations
Homework: Work on final project and final presentation

Thursday 12/10
In class: We will meet through Reading Period to finalize projects and presentations
Homework: Work on final project and final presentation

Tuesday 12/15
In class: Final Presentation. All work needs to be documented and posted to the blog by this date to receive a grade.