Some Organizational Stuff

6.810 Engineering Interaction Technologies

Prof. Stefanie Mueller | MIT CSAIL | HCI Engineering Group
class website
class website:

http://hamhash.com/available
enrollment
fill out the sign-up sheet:
(answers to skill questions do not have an influence on enrollment)

http://hamhash.com/when

<5 min>

class website:
http://hamhash.com/available
enrolled (max. 50 students)::
I will send an email today with enrolled / waitlist notifications.
sign up for IDC workshop orientation
IDC Building & Workshop Access

**building:** no card required: Mo-Fr, 8-6pm (weekend closed)
**building:** with card access (granted after orientation): every day, 24 hours (but not the workshop)

**workshop with shop manager:** 9am - 5pm  
**workshop with TA:** after 5pm depending on TA availability:

**Monday:** 5-10pm Lotta Blumberg (TA)  
**Tuesday:** 5-10pm Loren Maggiore (LA)  
**Wednesday:** no evening shop hours  
**Thursday:** 5-10pm Xin Wen (UTA)  
**Friday:** no evening shop hours  
**Saturday:** 1-5pm Loren Maggiore (LA)  
**Sunday:** probably no shop hours
sign up for a 40 min IDC workshop orientation:

http://hamhash.com/web
your todo’s
for this friday class
friday: laser cutting!
HW: Preparation for Laser Cutting
(due Friday, Sept. 7, 1pm)

Deadline: due Friday (September 7, 2018) at 1pm, upload a 2D drawing created with your drawing program here.

2D Drawing Programs

Recommended:
- Adobe Illustrator (but only 30 day test version)
- OpenDraw
- Inkscape

If your drawing program doesn't open because of your 'security preferences' (mostly on Mac), you can go to your systems settings (Apple -> System Preferences -> Security and Privacy, then at the bottom of the window say 'open anyway').
### 6.810 Locations for Laser Cutting on Friday (Sept. 7)

**Location 1:**

**Stefanie’s Labspace**

32-211 (don’t take the elevator, take the small staircase opposite the Dreyfoos elevator and we are just around the corner). The 3rd floor is a perfect spot for our laser cutting needs.  

- run by: Dishita Turakhia & Doga Dogan (Stefanie’s PhD students)

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We will split across IDC, EDS, and my lab space!
locations for class:
- default: IDC
- IDC names: garage, courtyard, front and middle conference room
- sometimes class is in EDS, or my lab-space

### Schedule

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<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Room</th>
<th>Notes</th>
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| 1    | Sept 5 (wed) | • lecture: Course Overview  
• lecture: Multitouch Technology  
• in class sign up for: Workshop Orientation and fill out: Skills Survey  
• after class: we will email you if you are enrolled, check final enrollment list here | IDC garage    |                      |
|      | Sept 7 (fr) | • HW1 due 1.00pm: install a 2D drawing tool for laser cutting  
• skills lab: laser cutting (check location here)  
• in class: fill out the team partner survey  
• HW2 due 2.30pm: version 1 of business card (we do it in-class) | IDC garage, EDS, and Stefanie's labspace |                      |
International Design Center (IDC)  Engineering Design Studio (EDS)

N52-387  38-501
wear **closed** shoes!
(no flip flops, sandals)
staff
TA: Lotta-Gili Blumberg
took the course last year when it was 6.S063
UROPed with me, now MEng-ing
UTA: Xin Wen
took the course last year when it was 6.S063 UROPed, SuperUROPed
LA: Loren Maggiore
took the course last year when it was 6.S063
UROPed
LA: Mark Chounlakone
took the course last year when it was 6.S063
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course structure
wednesdays:
new interactive technology
brain computer interfaces
haptics
wearable computing
fridays:
different skills labs
laser cutting
3D printing
electronics
rotooscoping and information graphics
video recording / editing
Freehand laser cutter creates instant flat-pack design

Video: Interactive table lets you make a jar holder
By Colin Barras

You could call it the rebirth of the 2D printer. A new device generates flat pack-like designs in seconds using a laser pointer and a laser cutter – the latest addition to the new field of "interactive fabrication", which promises to further help ordinary consumers become product designers.
group project
(2 students per team)
inspired by
digital adaptive interfaces
Adaptive Physical Tools
sense user performance -> adapt accordingly

Adapting Hoop Size and Height in Basketball
we adapt physical tools to change difficulty based on learner's performance
example:
Adaptive Wobbleboard for rehabilitation
example:
Adaptive Wobbleboard for rehabilitation

100% Inflated support - Beginner level

40% Inflated support - Intermediate level

Ultrasonic distance sensors to check balance

Inflatable support cushion

Pump actuator
example:
Adaptive Bike

Adapting Pen Grips for Writing
speed: 2x
**project components:**

- **sensors** detect user performance
- **actuators** adapt the tool
- **visualization** shows progress

what and how you build it is up to you
deliveries:

• a website showcasing your work
• a video of your prototype
• photos of your prototype
• a rotoscope (conceptual drawing) of your idea
• results of a user study
• code and build files
project budget
• project $100 per team
• + micro-controller, breadboard etc.

buying materials
• enter your parts into our spreadsheet
• Lotta then orders it for you

free resources
• we will have a bunch of things on stock for you to use + 3D printing material etc.
grading:
• **50% group project**
• 40% problem sets
• 10% homework & in-class participation
• no exams, no nanoquizzes
homework for next wednesday:

read paper + fill out form

Using 3D Printing and Actuation to Adapt Physical Tools to Facilitate Motor Skills Learning
Dishita Girish Turakhia, Yini Qi, Lotta Blumberg, Kevin Reuss, Stefanie Mueller
MIT CSAIL, Cambridge, MA, USA
dishita, qyn, blumberg, kreuss, stefanie.mueller@mit.edu

ABSTRACT
Many motor skills that people learn throughout their lives involve mastering a physical tool, such as riding a bike, writing with a pen, or playing basketball. To reduce the level of difficulty, learners use physical learning aids, such as training wheels for a bike, that provide physical support. To date, these learning aids only come in predefined levels: For instance, training wheels are either mounted or taken off. This jump from beginner to expert level makes the transition difficult for learners.

In this paper, we address this challenge by adapting the physical tool according to the learner’s progress. For instance, while learning to ride a bike, we monitor learners’ balancing skills and as they improve, we gradually lift the training wheels to reduce support and increase the difficulty. Thus, our approach enables a step-by-step transition from beginner to expert level that, similar to existing adaptive learning systems for math and language skills, is personalized for each individual learner.

To illustrate our idea, we built an end-to-end system that allows designers to setup adaptable tools that physically change when a learner’s skill level increases. Our system uses sensors integrated with the tools to measure progress; parametric 3D modeling to adapt the tool; and then either actuation or refabrication to deploy the physical change.

Author Keywords: personal fabrication; adaptive learning.
ACM Classification Keywords: H.5.2 [Information interfaces and presentation]: User Interfaces.

INTRODUCTION
Adaptive learning systems (ALS) aim to achieve an optimal learning curve by allowing every learner to learn with their own personalized system made specifically for their strengths, weaknesses, and learning pace [23]. To accomplish this, ALS continuously monitor the learner’s performance and adapt the level of difficulty of the task based on their progress. ALS have been implemented extensively in online education. For instance, the DreamBox [5] learning system tracks students’ performances and adjusts the level

1) Which other application areas can you think of besides the ones mentioned in the paper and on the group project website?

Application Area #1: *
Your answer

Application Area #2: *
Your answer

Application Area #3: *
Your answer
this is a new course!
this is a new course!

this is the second time we give this course, not everything will be perfect but we will try our best!
questions?