Building a Portfolio:

What it is. Why have one.
How it is done.

MIT Ideation Lab / November 1, 2010

Precap

What is it?

Why should I have one?

How do I create it?

But first, a mini quiz!

What are the five rules of making a portfolio?

just kidding

The notecards are for you to make notes and jot down questions.

What?

visual representation of your work,
complementing your resume

a physical book?
not necessarily.

could be a pdf, a website, anything
consider your audience

Why?

required for your new job or school

efficient

only way to show design detail

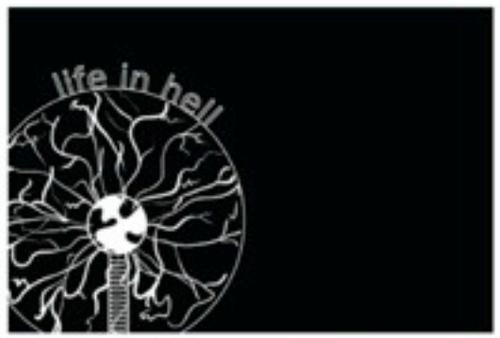
example of your own design work

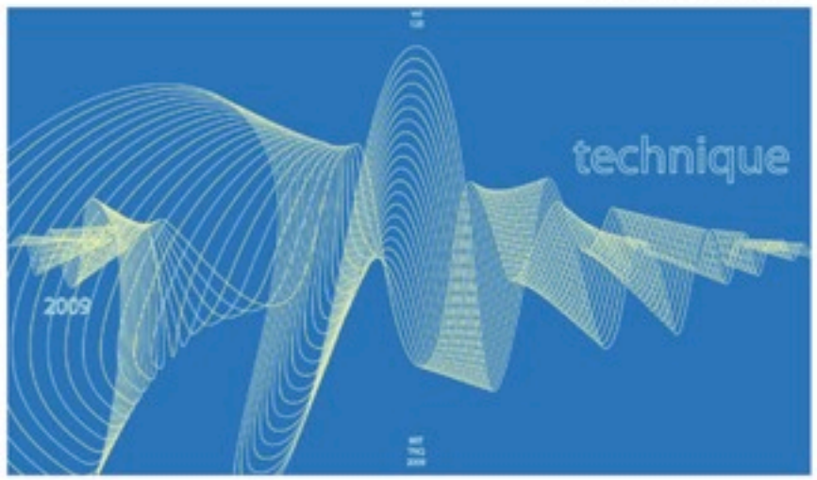
Inside a portfolio

MIT Technique Yearbook Design

2005-2009

[graphic design]





Photographer and designer for the MIT Yearbook.

As Design Editor for the 2009 book, **designed entire 500 page book**, including cover, layout, and breakpages.

Served as Publicity Director for 2008 book. Created posters to advertise for book distribution and senior portraits. Living Group Editor for 2007 book. Responsible for scheduling and photographing living group at MIT.

Tiffany Tseng, MIT 2009

How?

don’t worry about making the actual portfolio now, but...

...start documenting *now!*

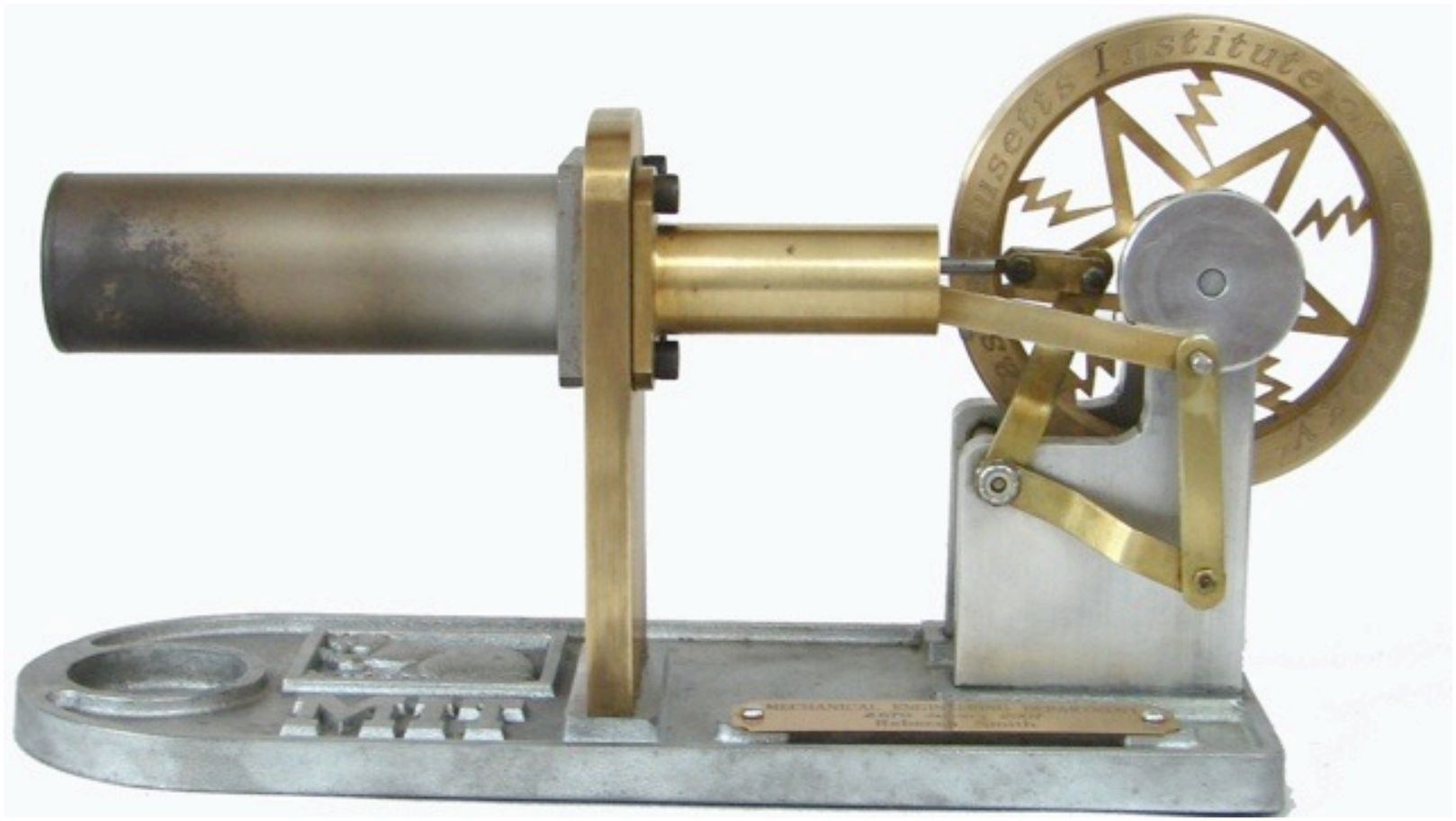
Things to collect:

sketches
goals
storyboards
diagrams
CAD
analysis
product specs
testing
prototypes

} design notebook!

Rebecca Smith

is a Mechanical Engineer from MIT
currently working at D-Lab.



Design Portfolios for Engineers!

Rebecca Smith

What does it mean to make a design portfolio as an engineer?

- You have an advantage!
- It may take a long time.
- It's okay if you don't have a lot of sketches.
- Presentation is important.

Rebecca A. Smith

Fall 2008

thermoSmart

ThermoSmart was created in Product Engineering Process, the senior Mechanical Engineering design class. During the class we went through the design process from brainstorming to producing a functioning alpha prototype on a $6500 budget.

This year's product theme was 'the home,' and my team of 17 students was assigned the area of Heating, Ventilation and Air Conditioning as our focus. We created thermoSmart, a wireless home heating product for forced hot air systems that turns a single-zone home into a multi-zone home, resulting in added comfort and energy savings. This was an extremely complex project for a group of mechanical engineers as it was very electrical engineering-and programming-heavy. We split into sub-groups to work on specfic tasks and I was the system lead for the User Interface/Experience (UI) group.

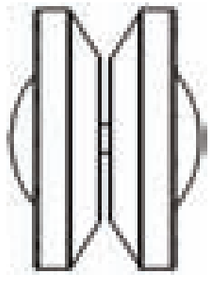
The UI team designed and 3D printed several iterations of three different enclosures for the electronics, created packaging boxes, wrote a full instruction manual for installation, use and troubleshooting, designed the graphical user interface for the central control unit, and designed posters and brochures for the final presentation.

User Interface team members: Rahel Eisenberg, Aiko Nakano, Sara Segal, Tiffany Tseng.

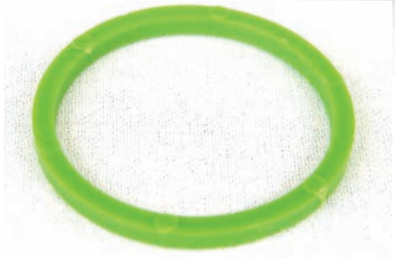
Monkey Yo-yo

Rebecca A. Smith

Detailed etchings on the monkey.

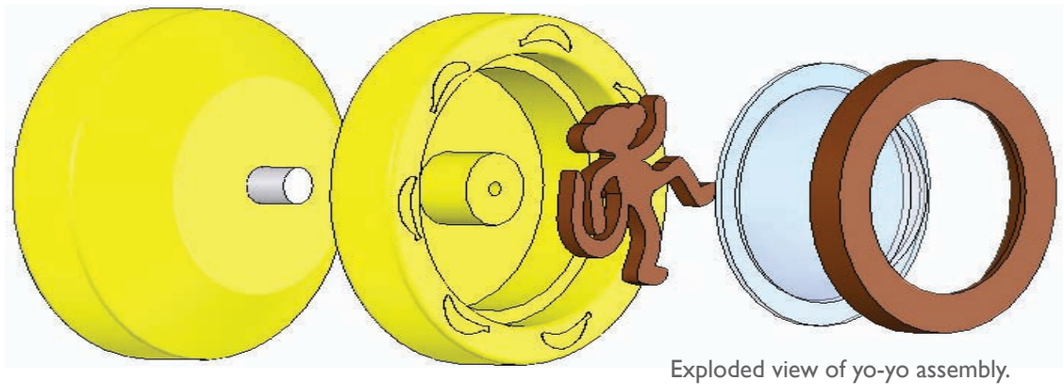


Butterfly shape of body. Best shape for tricks!



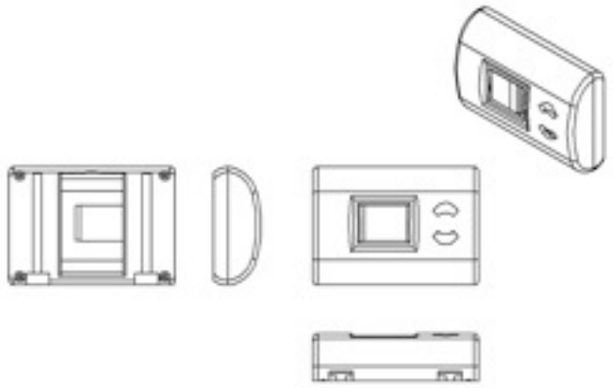
Injection-molded ring with snap-fit tolerances.

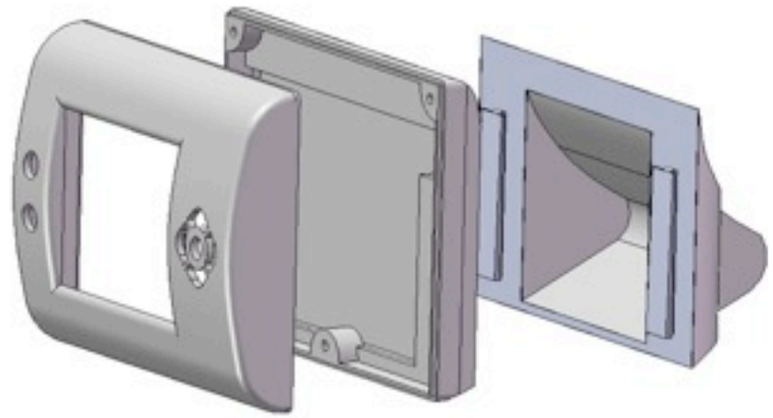
Thermoformed bubble.



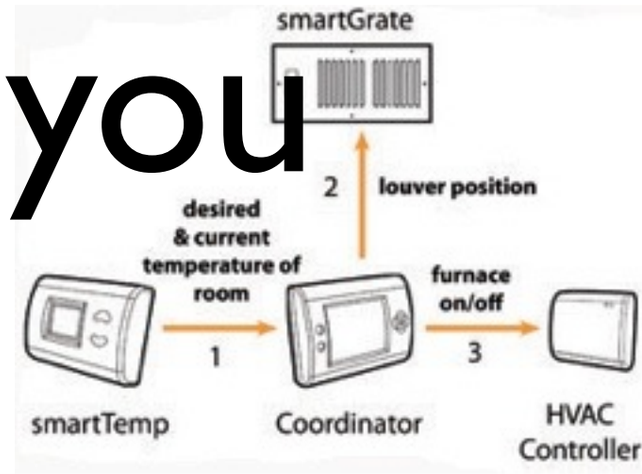
Exploded view of yo-yo assembly.

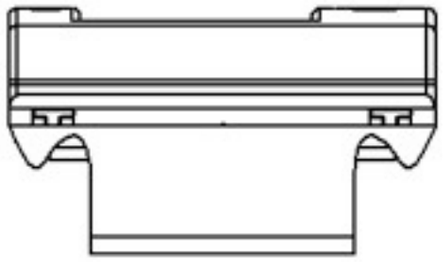
Banana etchings on body.

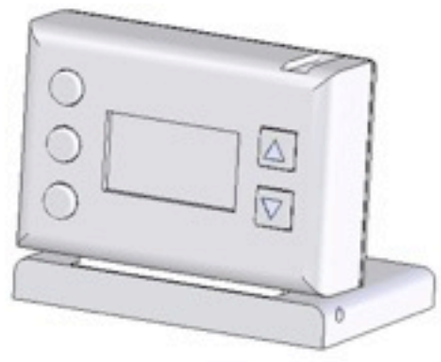


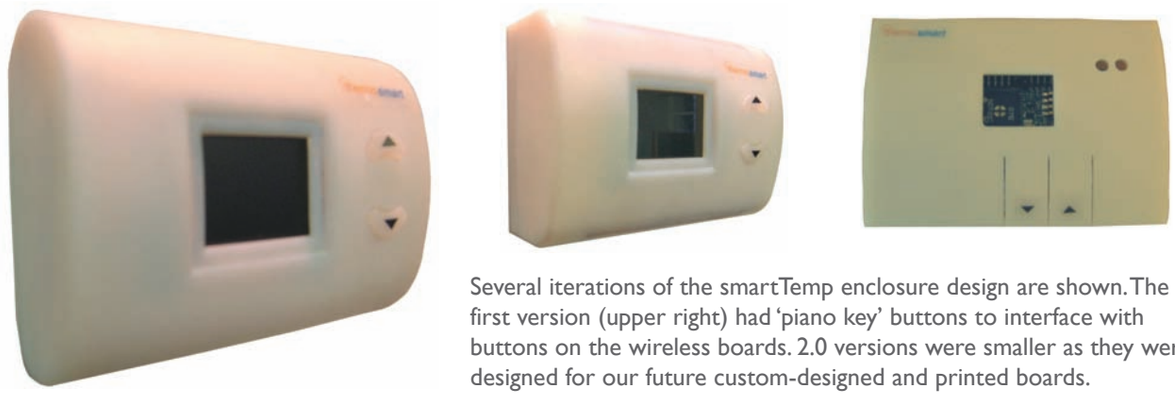


Gather everything you can!

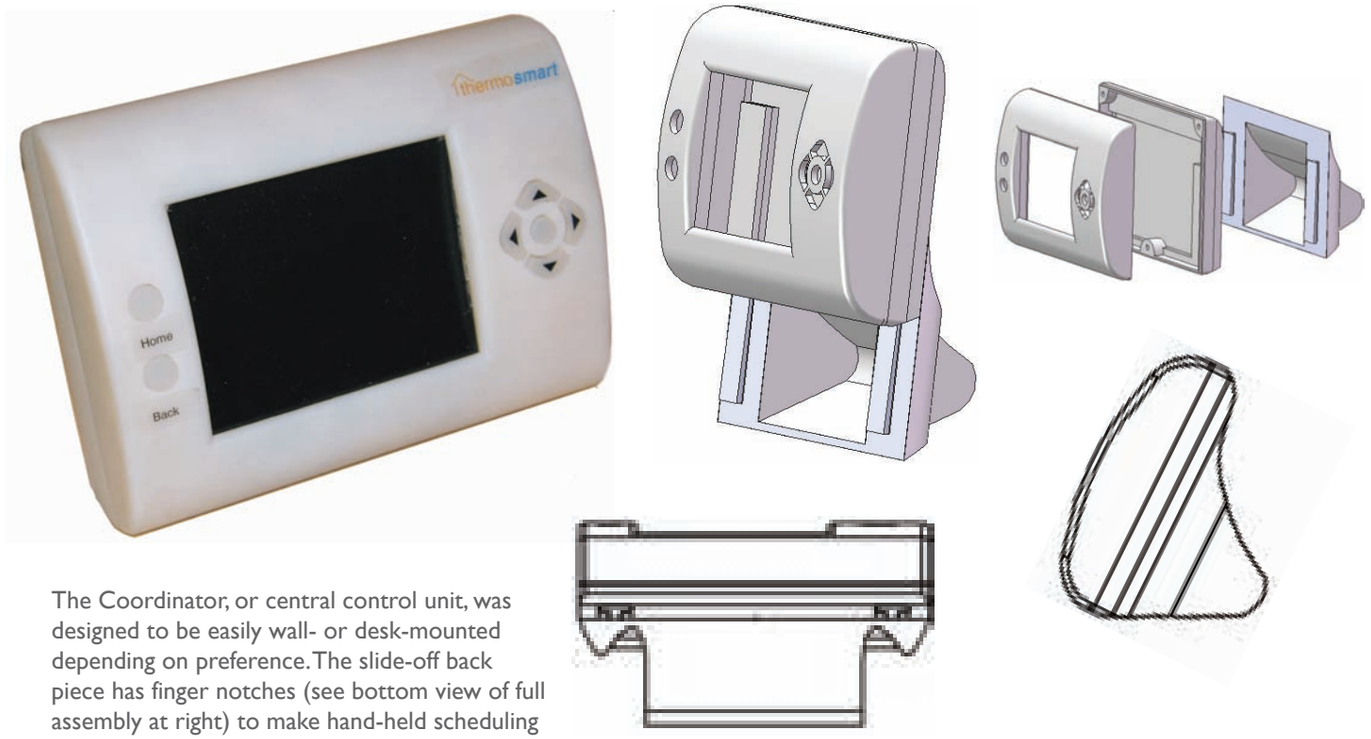








Several iterations of the smartTemp enclosure design are shown. The first version (upper right) had 'piano key' buttons to interface with buttons on the wireless boards. 2.0 versions were smaller as they were designed for our future custom-designed and printed boards.



The Coordinator, or central control unit, was designed to be easily wall- or desk-mounted depending on preference. The slide-off back piece has finger notches (see bottom view of full assembly at right) to make hand-held scheduling as ergonomic as possible.

thermoSmart packaging for basic pack.

Use a unifying theme or design.

Rebecca A. Smith

Design Portfolio

smithra@mit.edu
+1 518 542 3627

Rebecca A. Smith

Fall 2008

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thermoSmart

Rebecca A. Smith

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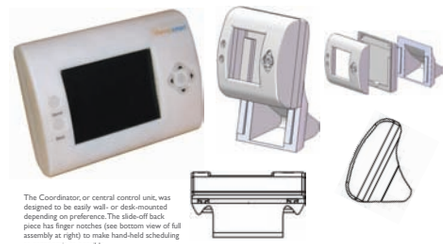

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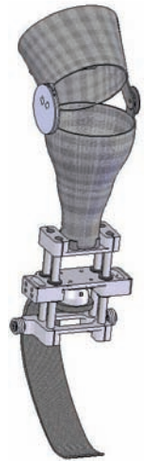
Rebecca A. Smith

Summer 2008

Prosthetic Devices



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The artificial gastrocnemius (pictured left) is a passive device designed for use by below-the-knee leg amputees when running. Through a pulley mechanism, when the knee bends the artificial leg will 'lengthen' at toe-off during running, modeling the motion of a normal runner when the foot flexes as it pushes off the ground.

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The parts were designed using SolidWorks and machining was primarily done using a CNC mill (after creating toolpaths in Mastercam), waterjet, and laser cutter.

Team member: Andrew Marecki.

Prosthetic Devices

Rebecca A. Smith

Aluminum pieces of the spring-clutch (approximately 2" wide and 4"long). Pieces were designed in SolidWorks and cut on waterjet.

So far I have CNC milled two of the three artificial gastrocnemius pieces, from aluminum blocks.

Rebecca A. Smith

Fall 2007

Monkey Yo-Yo

The class Design and Manufacturing II focused on learning about different types of manufacturing. In the lab portion of the class we spent the semester designing and manufacturing yo-yos. In groups of six students, we were to produce at least 50 yoyos made from injection-molded and thermoformed pieces.

My group decided to make a monkey yo-yo. The unique features of our yoyo were the butterfly shape, for better performance, and design features including banana etchings on the main body and a tiny monkey with an intricate face, hands and feet to be snapped in, visible through a clear plastic bubble. After creating solid models of the pieces, taking into account snap-fit tolerances and estimated material shrinkage, we machined the molds out of aluminum blocks on CNC mills and lathes.

My specfic task was to design and machine the mold for the thermoform bubble piece, and produce over 100 of these parts, after fine-tuning the parameters on the thermoform machine until no mold lines were visible on the bubble. I also helped to injection-mold hundreds of the other parts. I especially enjoyed choosing fun and unusual colors for the plastic!

Team members: Nikolai Begg, Adelaide Calbry-Muzyka, Dan Klenk, Ming Leong, Cathy Mancuso.

Monkey Yo-yo

Rebecca A. Smith

Detailed etchings on the monkey.

Butterfly shape of body. Best shape for tricks!

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Thermoformed bubble.

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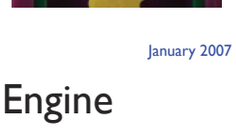


Rebecca A. Smith

Spring 2007

EGG & MAN Friends!

Eggman & Friends is a set of spinning, top-like toys designed for children. Eggman was created from idea to prototype in Spring 2007 for the class Toy Product Development, with the theme of toys designed for use in community centers in Brazil. The toys had to be inexpensive, easily manufactured, and designed for indoor play in small spaces.

The complete Eggman & Friends set features six unique eggs, each with their own personality and 'power.' Half of the eggs contain a centrifugal force switch that turns on lights or music when the egg is spinning about its y-axis, while the other eggs feature optical illusions that appear when the egg spins.

Presented in front of a large audience at the end of the course, Eggman received extremely positive feedback as well as interest from Hasbro Inc for potential future extensions and production. Potential changes are still being explored.

Team members: Matthew Bieniosek, Mindy Eng, Chaitra Manjunatha, Sarah Shivers.

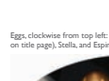
Eggman

Rebecca A. Smith

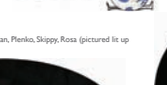
Testing an early sketch model.

Above: An early version of our centrifugal force switch. When the egg spins, the metal piece between the copper U at top will touch a side and complete the circuit, turning on the LEDs.

Below: Solid model for preliminary design of injection-molded piece for centrifugal force switch. Batteries would rest in the center and wire & LEDs would fill the channels. The piece would slide into the egg.



We designed a logo for the toy and for the six eggs, each with a unique look, personality and name. Right: Stella is pictured lit up.



The eggs were rapid prototyped from our SolidWorks design.

Eggs, clockwise from top left: Eggman, Pfenko, Skippy, Rosa (pictured lit up on title page), Stella, and Espiral.

For packaging, we designed and built an egg carton for each egg. The final versions had a lightning bolt clasp and information tags for each egg.

Rebecca A. Smith

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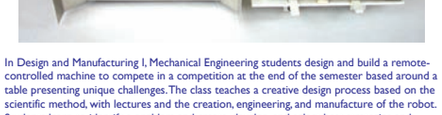
Spring 2007

Remote-Controlled Robot



In Design and Manufacturing I, Mechanical Engineering students design and build a remote-controlled machine to compete in a competition at the end of the semester based around a table presenting unique challenges. The class teaches a creative design process based on the scientific method, with lectures and the creation, engineering, and manufacture of the robot. Students learn to identify a problem and create, develop, and select best strategies and concepts using fundamental engineering principles, appropriate analysis, and experimentation.

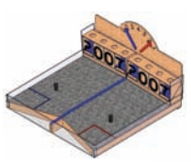
The constraints for the design of this machine were weight, size, and material - each student received the same bin of wood, metal, and other materials that they were to use for their robot. The playing table had hockey pucks, balls and an arrow at the top of a high shelf: a formula based on these items would determine a player's score. As the arrow provided the highest scoring potential, I designed a unique module, or the 'mini robot,' as I called it, drive along the shelf and lift the arrow.

Students were responsible for designing and machining all parts, and I used SolidWorks for solid modeling and the lathe, mill, bandsaw, drill press and more for machining.

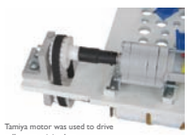
Rebecca A. Smith

Remote-Controlled Robot

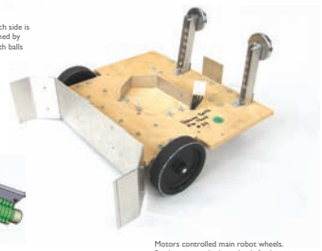
Rebecca A. Smith



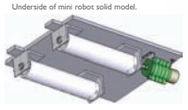
Playing table for final competition. On each side is a stack of hockey pucks, balls in bins latched by magnets and an arrow above the bins, with balls down the center.



Tamiya motor was used to drive rollers on mini robot.



Underside of mini robot solid model.



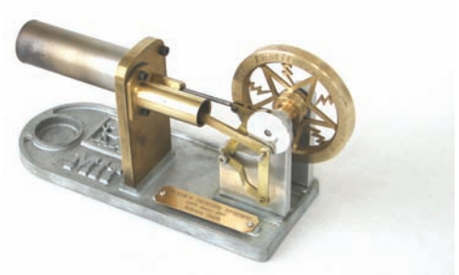
Arrow lifter on mini robot was controlled by rack and pinion system, driven by motor. Holes were drilled in ABS plastic to get rid of unnecessary weight.

Motors controlled main robot wheels. Sandpaper attached to wheels for better traction.

Rebecca A. Smith

January 2007

Stirling Engine



In the class Mechanical Engineering Tools, taken for two weeks in January 2007, I made my very own Stirling Engine. The class was meant to teach Mechanical Engineering sophomores how to use the shop machinery, including lathe, milling machine, bandsaw and waterjet, and provide a brief introduction to computer programs such as Matlab and SolidWorks.

Every student machined and built the same basic engine, but we were able to customize the flywheel. I went through several iterations of a star/lightning bolt design (two of my favorite shapes) based on the machining constraints of the waterjet, mainly minimum size of a cut.

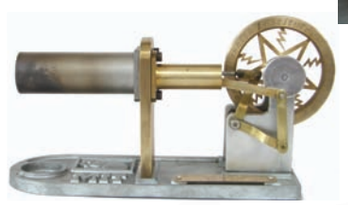
At the end of the class, all of the students set up their engines and lit them up to measure speeds and determine the fastest engines. My sterling engine ran at over 600 rpm, which was above average for the group.

Stirling Engine

Rebecca A. Smith

Left: Engine running during final 'race.' Speed was approximately 650 rpm.

Right: The engine ran based on a temperature differential created by this small flame.



Several versions of flywheel design. The points of the tiny stars could not be cut by the waterjet, so the final design was created.

Spring 2006

Harry Potter Levitating Toothbrush Holder

The Harry Potter Levitating Toothbrush Holder is a toy created in the class Toy Product Development my freshman year. The goal of the class, which was also a public service design seminar, was to create toys that would encourage children to have better dental hygiene - to make brushing their teeth fun!

After brainstorming many ideas my team, made up of myself and three upperclassmen, built sketch models and mockups for several of the top ideas. We eventually decided to go ahead with my original idea for a 'floating' toothbrush holder as our final product and created a prototype.

The toy uses magnets to create the floating effect, with magnets in the base as well as in the bottom of our custom 'wand' toothbrush. There are also LEDs in the base, controlled by a reed switch in Harry Potter's wand, that are turned on when the toothbrush is removed for an added effect.

Interesting fact: due to a last-minute shipping disaster, our Harry Potter figurine was actually a disguised Bilbo Baggins!!

An earlier mockup (right) had a toothbrush floating in Dumbledore's 'hand.' Below: top view of lights.

Team members: Ellann Cohen, Ricky Diaz, Qinyuan Liu.

Miscellaneous!

In my spare time I love to go to concerts (I attend a few dozen a year); read; cook and/or bake; make jewelry; listen to music; run very slowly along the river; take pictures of funny random things; and sleep!

Earrings that I made at a SaveTFP Crafts Night, an event that I organized and ran.

Artist - Song Title

Ted Leo & The Pharmacists - Me And Mia
Ben Kweller - Commerce,TX
Andrew Bird - Heretics
Kevin Devine - Brooklyn Boy
The Flaming Lips - Yoshimi Battles The Pink Robots Pt. 1
Spoon - I Turn My Camera On
Neutral Milk Hotel - Holland, 1945
Elliott Smith - Whatever (Folk Song In C)
Albert Hammond, Jr - G.F.C.
Jack Conte - First Day of My Life (Aphex Twin/Bright Eyes Cover)
Wilco - Heavy Metal Drummer
Someone Still Loves You Boris Yeltsin - Glue Girls
Weezer - My Name Is Jonas
The Black Keys - The Lengths
Headlights - Get Your Head Around It

This is a playlist from my radio show, Hook Heavy. It was the show before my birthday this year, so these are a lot of my favorite songs! I have seen nine of the fifteen bands/artists live :-)

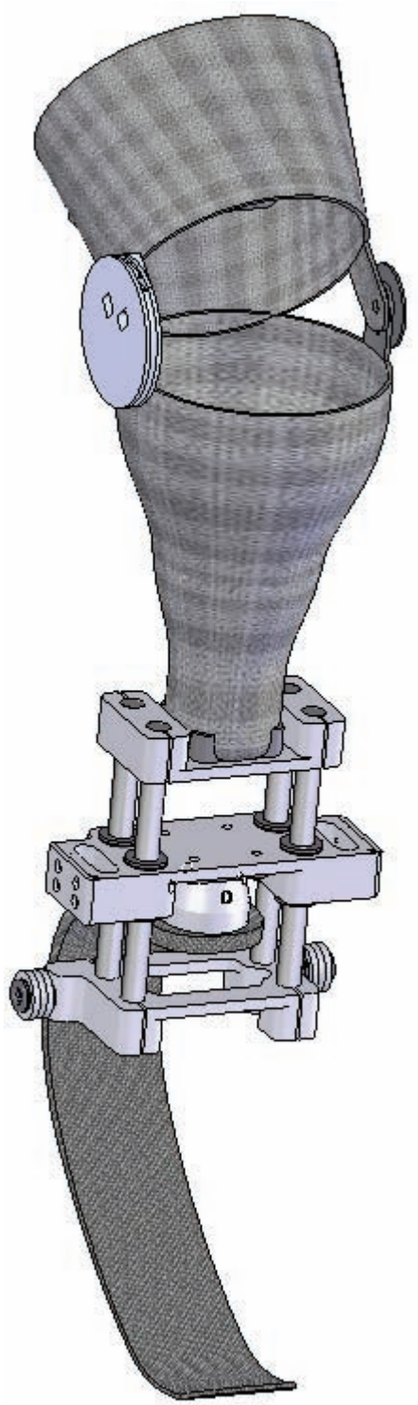
Rebecca A. Smith

Use text where you need it.

Rebecca A. Smith

Summer 2008

Prosthetic Devices



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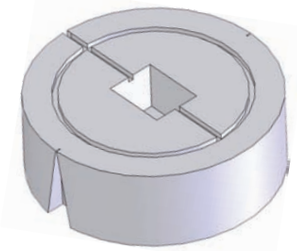

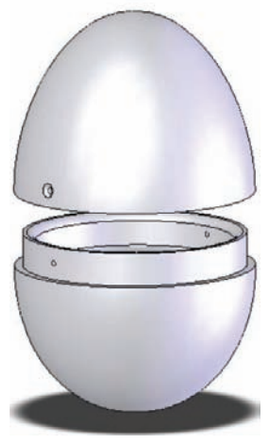

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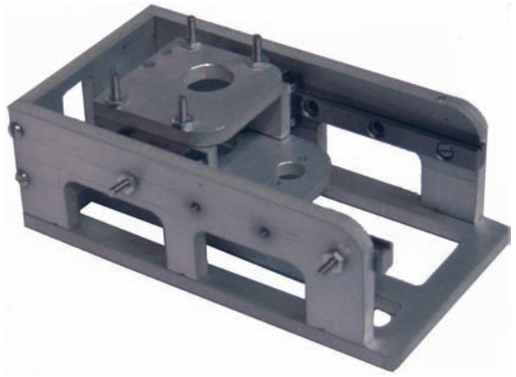
Don’t be scared of white space.



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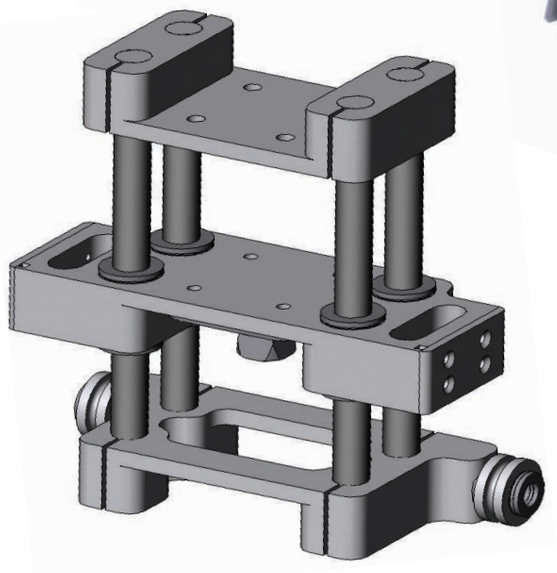
So far I have CNC milled two of the three artificial gastrocnemius pieces, from aluminum blocks.



Team members: Nikolai Begg, Adelaide Calbry-Muzyka, Dan Klenk, Ming Leong, Cathy Mancuso.

User Interface team members: Rahel Eisenberg, Aiko Nakano, Sara Segal, Tiffany Tseng.

Team member: Andrew Marecki.

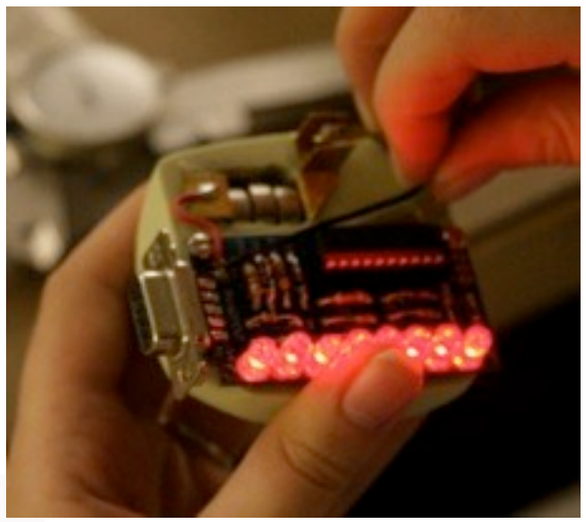
Team members: Matthew Bieniosek, Mindy Eng, Chaitra Manjunatha, Sarah Shivers.

Be clear about your role on each project (and make sure you're able to talk about it)

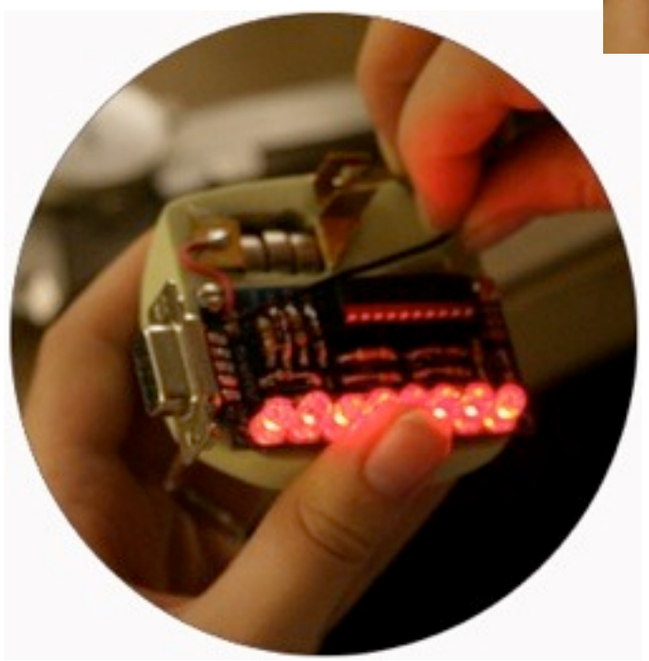
The UI team designed and 3D printed several iterations of three different enclosures for the electronics, created packaging boxes, wrote a full instruction manual for installation, use and troubleshooting, designed the graphical user interface for the central control unit, and designed posters and brochures for the final presentation.

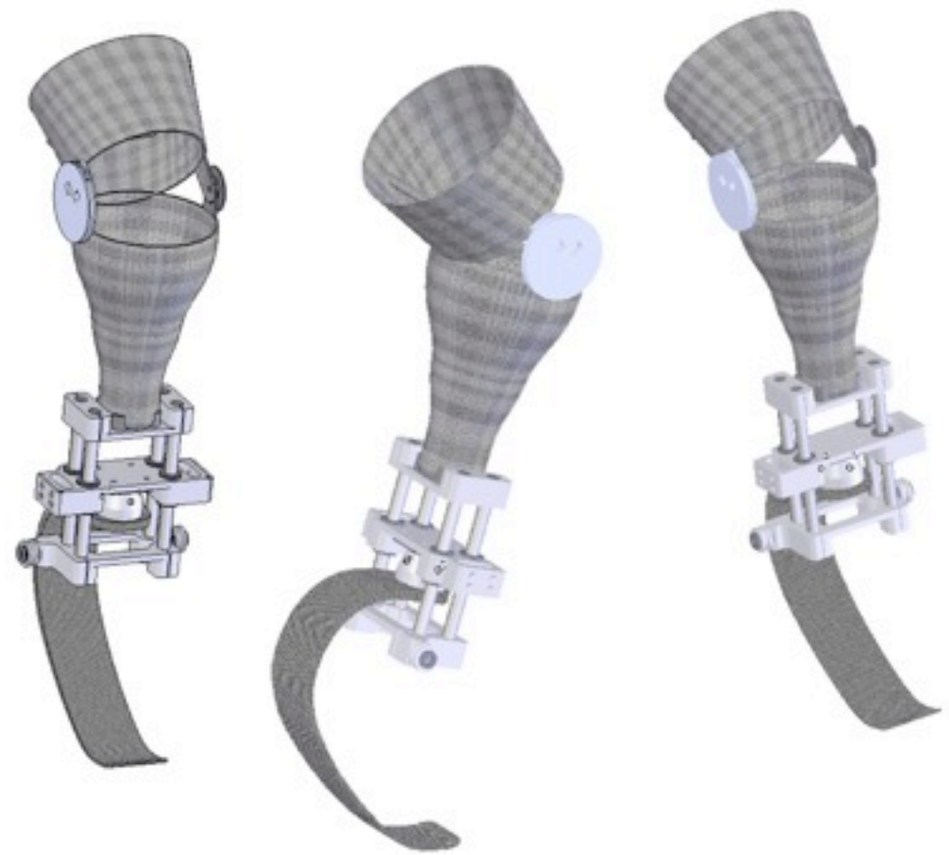
My specfic task was to design and machine the mold for the thermoform bubble piece, and produce over 100 of these parts, after fine-tuning the parameters on the thermoform machine until no mold lines were visible on the bubble. I also helped to injection-mold hundreds of the other parts. I especially enjoyed choosing fun and unusual colors for the plastic!

Set aside more time than you think you will need!




thermoSmart
basic pack
thermoSmart
HVAC Controller





Have fun with it!

Miscellaneous!

In my spare time I love to go to concerts (I attend a few dozen a year); read; cook and/or bake; make jewelry; listen to music; run very slowly along the river; take pictures of funny random things; and sleep!

Earrings that I made at a SaveTFP Crafts Night, an event that I organized and ran.

Artist - Song Title
Ted Leo & The Pharmacists - Me And Mia
Ben Kweller - Commerce, TX
Andrew Bird - Heretics
Kevin Devine - Brooklyn Boy
The Flaming Lips - Yoshimi Battles The Pink Robots Pt. 1
Spoon - I Turn My Camera On
Neutral Milk Hotel - Holland, 1945
Elliott Smith - Whatever (Folk Song In C)
Albert Hammond, Jr - G.F.C.
Jack Conte - First Day of My Life (Aphex Twin/Bright Eyes Cover)
Wilco - Heavy Metal Drummer
Someone Still Loves You Boris Yeltsin - Glue Gitrls
Weezer - My Name Is Jonas
The Black Keys - The Lengths
Headlights - Get Your Head Around It

This is a playlist from my radio show, Hook Heavy. It was the show before my birthday this year, so these are a lot of my favorite songs! I have seen nine of the fifteen bands/artists live :)

The H
create
man ye
service
encour
make t

After t
myself
mocku
decide
toothb
prototy

The to
magne
custom
base, c
that ar
an add

Interesting fact: due to a last-minute shipping disaster, our Harry Potter figurine was actually a disguised Bilbo Baggins!!

So, remember:

1. Document, document, document!
2. Express your work in a way that is comfortable to you
3. Be honest

Start now!

1. Document & gather everything
2. Benchmark other portfolios and come up with a design you like
3. Get a live document going

Doug Marsden

is an engineer at Eleven.

&

Ben Beck

is an industrial designer at Eleven.

Question and Answer

(hopefully)

Recap

What?

visual representation of your work

Why?

convey the detail of your work

How?

start documenting now!

Roadmap

Spring term

- interest survey
- software and layout workshops
- consultation sessions

Resources

- portfolio website
- find mentors
- find existing examples (benchmarking)

check out the new site!

Go Build a Portfolio!

http://web.mit.edu/ideation/portfolio/

MIT Ideation Lab / November 1, 2010

Justin Lai (justinlai) / Geoff Tsai (heff)

guests: Rebecca Smith (rebecca.anna.smith@gmail.com)/
Doug Marsden (doug@eleven.net) / Ben Beck (ben@eleven.net)