Annie Cardinal

ENGINEERING AND DESIGN PORTFOLIO
FALL 2015

design@anniecardinal.com | anniecardinal.com | (650) 762-6817

Table of Contents

About Me

I graduated from Princeton University in 2015 with a degree in Mechanical Engineering and a certificate in Robotics and Intelligent Systems. I have a passion for product design and want to design products for consumers and lead projects using my technical background. I'm a big picture person with experience leading teams toward designing integrated systems.

I have experience in project management, product design, modeling and prototyping, and communication, along with technical skills like machine shop expertise, mechanical engineering coursework, CAD knowledge, and coding robots and user experiences. While I lean toward a career in Mechanical Design, my skill set prepares me for many different types of careers.

I love fixing things, and I realized that I enjoy looking for inefficiencies in everyday life and finding ways to make things better. By combining my experience in mechanical engineering and coding with my leadership skills and understanding of people, I strive to create compelling products and user experiences that change the way people look at the world. I am always looking for opportunities in product design and mechanical engineering.

You can learn more at anniecardinal.com or contact me at design@anniecardinal.com.

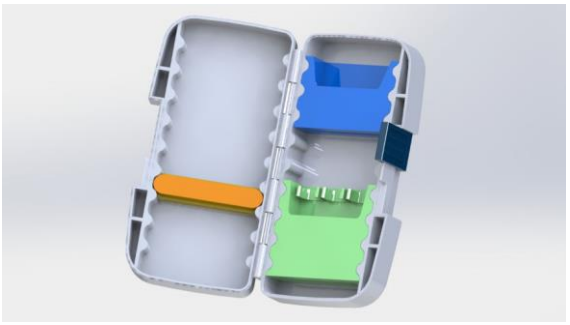
Professional Design Experience

CUSTOM CARRY CASE FOR GLASS PRODUCTS

September 2015 | Creative Edge Products, LLC | Lead Product Design Engineer

Profound Glass Works needed a customizable carrying case that would protect their artisanal glass products in shipment but would also be a useful way for their clients to store and show off their products. The case has a sliding latch to keep it closed, and the inside holds three arrange-able inserts for storing vials, coin holders, and plastic bags. I made a 3D model in SolidWorks, sent design approvals to the client, incorporated feedback, and 3D printed inserts in-house for the final prototype, ensuring that the tolerances were perfect.

The final prototype of the Opal Case



A SolidWorks model of the Opal Case

The exterior of the case prototype, featuring the company's embossed logo

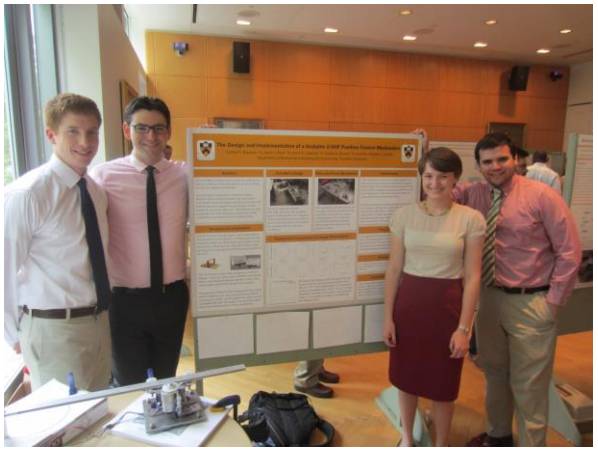
A SolidWorks model of the exterior of the case

Undergraduate Design Experience

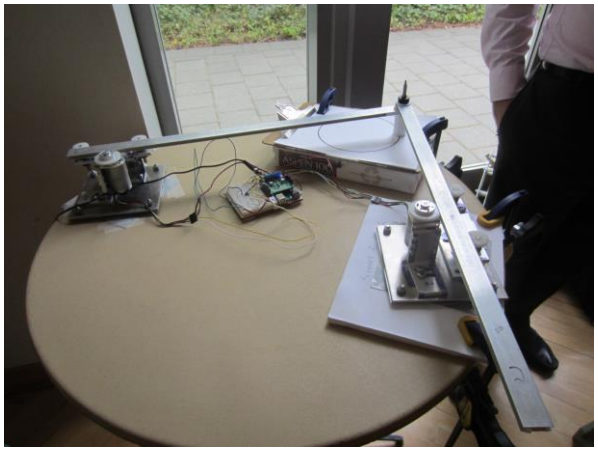
SENIOR PROJECT: DESIGNING A NEW 2DOF MECHANISM

September 2014 – May 2015 | Princeton University | Project Lead

Designed and manufactured a new scalable two degree of freedom mechanism that accurately controls the position of an end effector using an Arduino. Managed the project and co-designed and manufactured the mechanism.

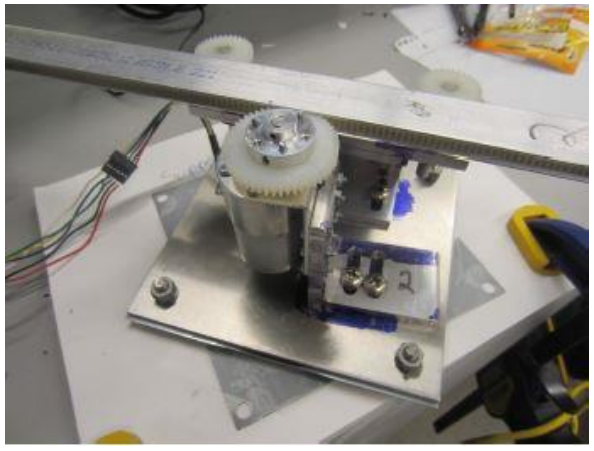


The team presenting at a poster session



The mechanism ready for demonstration

Joint of the rack and pinion mechanism



Pivoting gear rack motor mount

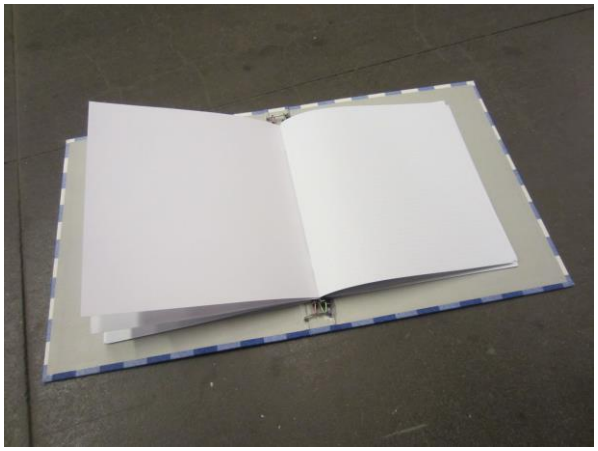
Undergraduate Design Experience

FLEXIBINDER PRODUCT DESIGN

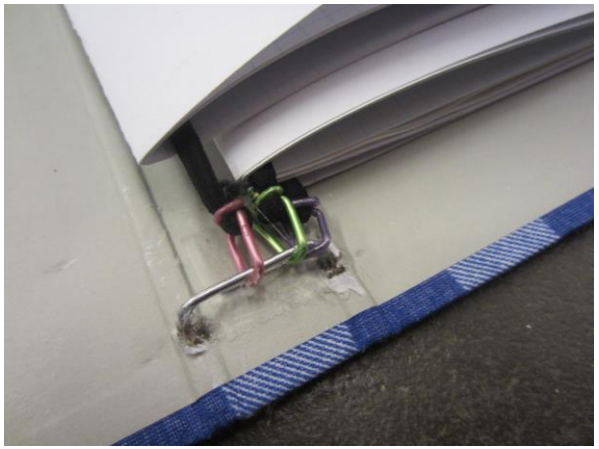
November 2014 – December 2014 | Princeton University | Product Design Lead

Led the physical design process of a new stationery product. Determined the materials and manufacturing techniques. Built and iterated upon a physical prototype. Compiled a product specification sheet and financial analysis as a deliverable on pitch day.

The FlexiBinder's outer hard cover



Lightweight paper inserts in three varieties



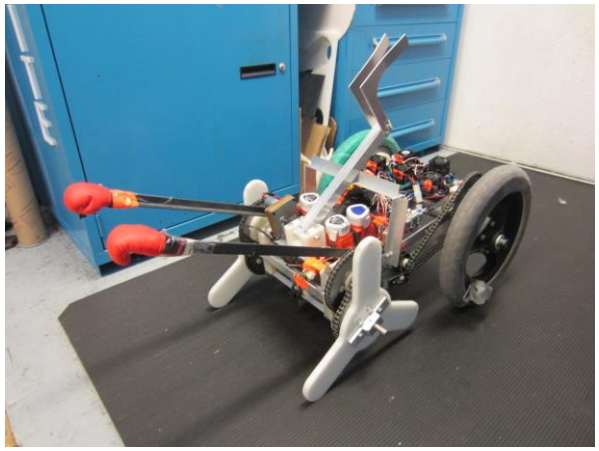
Elastic bands constrain the inserts and allow for easy removal

Undergraduate Design Experience

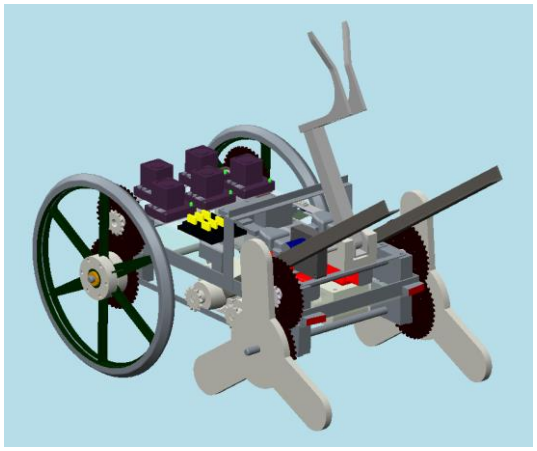
SEARCH AND RESCUE ROBOT

February 2014 – May 2014 | Princeton University | Project Co-Lead

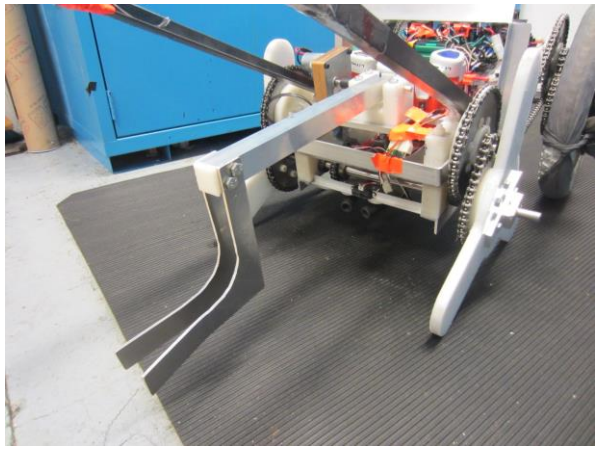
Developed a winning search and rescue robot capable of step-climbing and autonomous navigation. Managed the coding and electronics components and oversaw testing and reliability design.



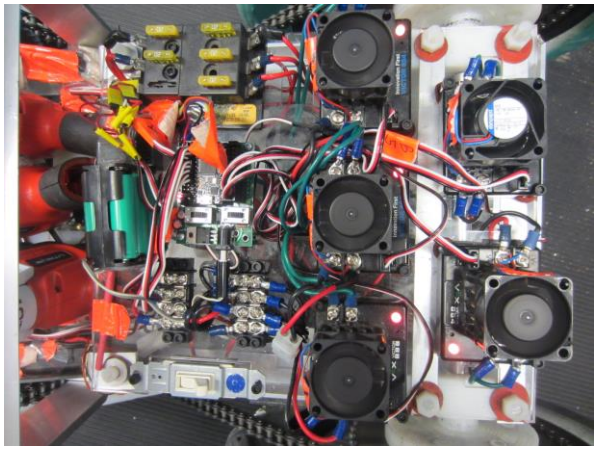
Rocky in his completed state



3D Model of Rocky using PTC Creo 2.0



Rocky's passive gripper



Circuit board laid out on an acrylic sheet

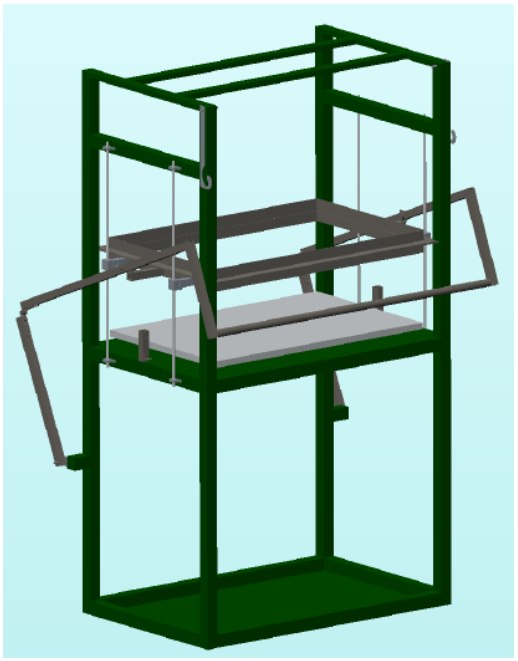
Undergraduate Design Experience

THERMOFORMING MACHINE MECHANISM

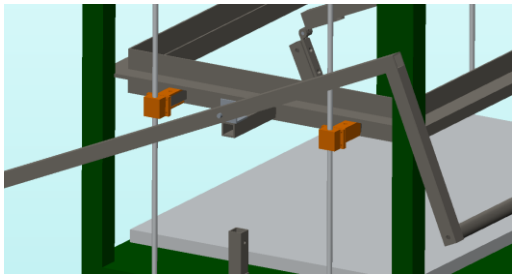
November 2013 – January 2014 | Princeton University | Project Lead

Managed a team of 9 students in designing and building the mechanism for a thermoforming machine. Coordinated with 5 other project managers to successfully build the machine under a time pressure. Delegated tasks, set schedules, incorporated the ideas of team members, budgeted, and ordered materials.

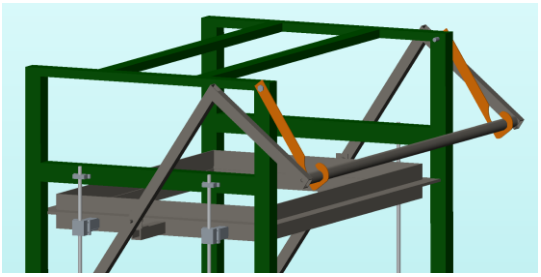
The final thermothorming machine with the mechanism raised



Final CAD model of the mechanism, all parts shown in grey



C-channel connectors allow for easy removal of the Plastic Holder



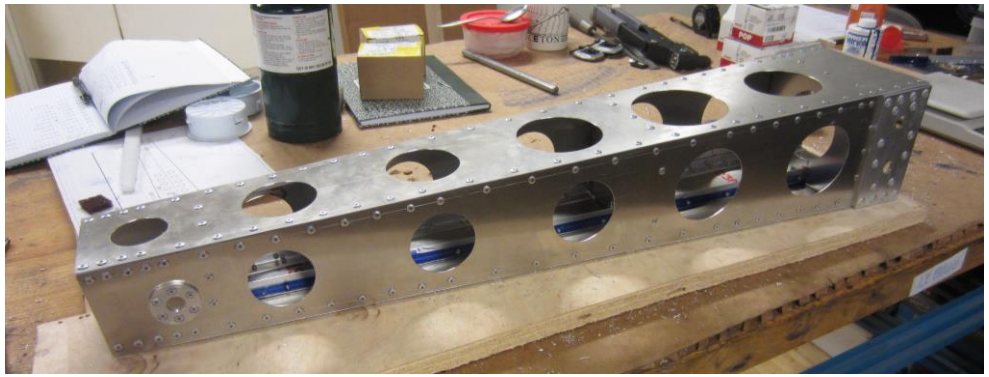
Hooks swing free when handle is lifted so user doesn't need to touch hot material

Undergraduate Design Experience

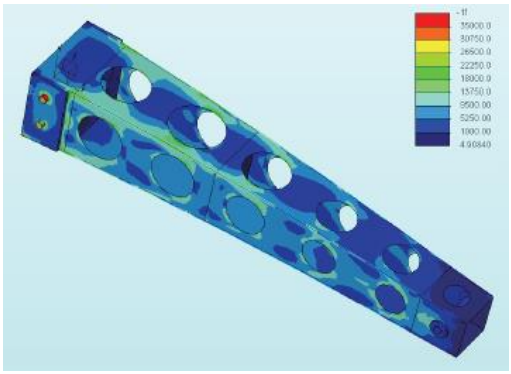
DESIGN OF A BOX-LIFT CRANE

October 2013 | Princeton University | Team Lead and Manufacturer

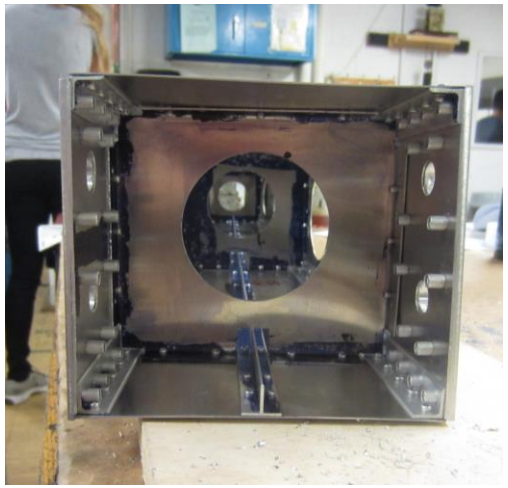
Simulated, designed, and manufactured a sub-three pound aluminum box-lift crane capable of lifting 850 pounds (500 pounds required). Won best design award out of 10 groups. Also managed the production schedule and finished with time to spare.



Finalized crane polished and assembled



Crane under static load in PTC Creo 2.0



Torsional rib cross-sections

Side support plates

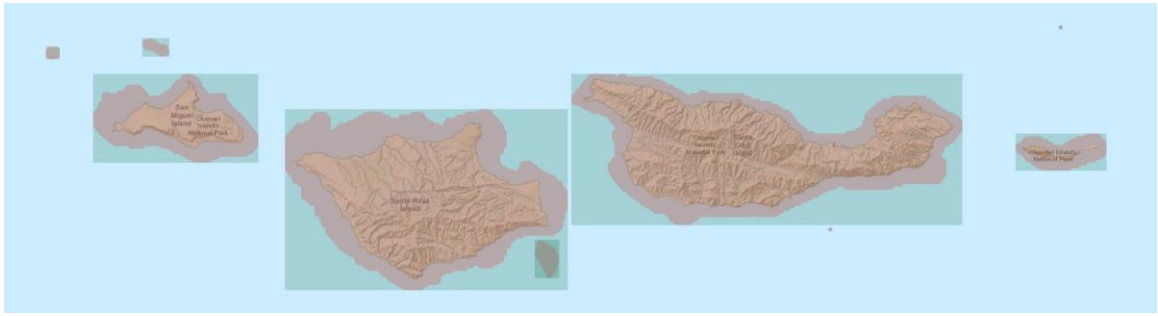
Sitting on the crane

Internship Design Experience

NAVIGATION CODE FOR UNMANNED WAVEGLIDER DRONES

Summer 2014 | Liquid Robotics, Inc. | Programming Intern

Liquid Robotics produces the Wave Glider, an unmanned ocean-going drone that collects data for purposes ranging from the military to oil and gas companies to biological research. The Wave Glider is currently unaware of islands, and I wrote scripts to process bathymetry data into obstacles that mark unsafe areas, and modified the robot's operating system in Java to process these obstacles and use them when generating the robot's path. I worked directly for Dr. James Gosling, the father of Java.



Unsafe areas, shown in red, surrounding the Channel Islands.
The blue rectangles are bounding boxes used in a search algorithm.

The path of a Wave Glider successfully avoiding Anacapa Island.

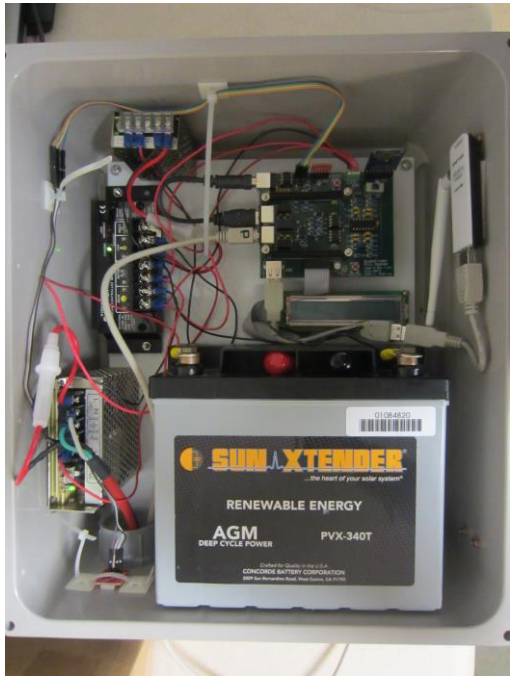
Internship Design Experience

QUAKEFINDER MINISTATION HARDWARE DESIGN

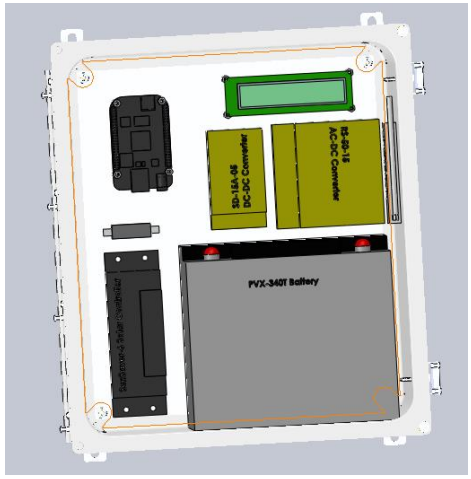
Summer 2013 | QuakeFinder | Project Hardware Lead and Intern

I developed a robust standalone seismic data recording station for implementation in classrooms. I designed the enclosure layout and power system and wrote the user manual with assembly instructions. The MiniStation is now in production.

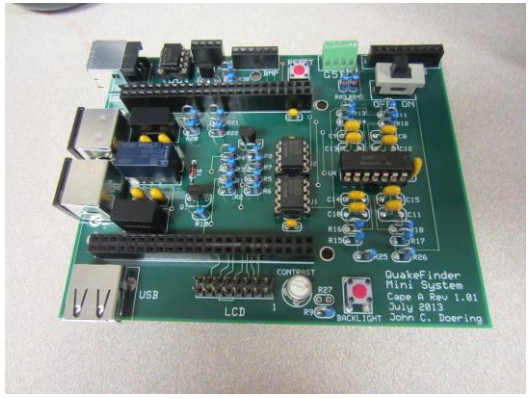
The completed MiniStation installed in my yard for testing.



Interior of the MiniStation



SolidWorks mockup of case interior



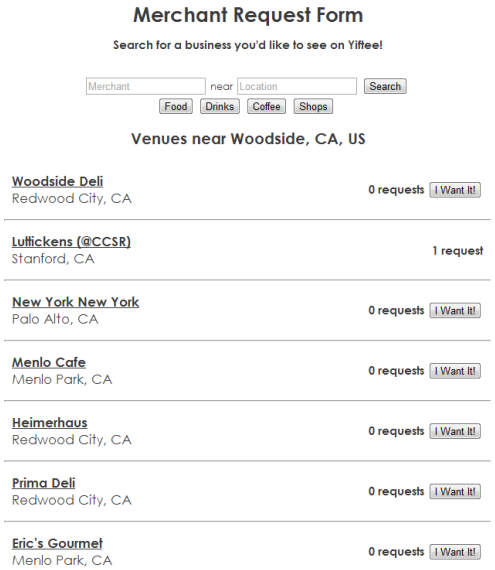
Finished PCB with all components soldered

Internship Design Experience

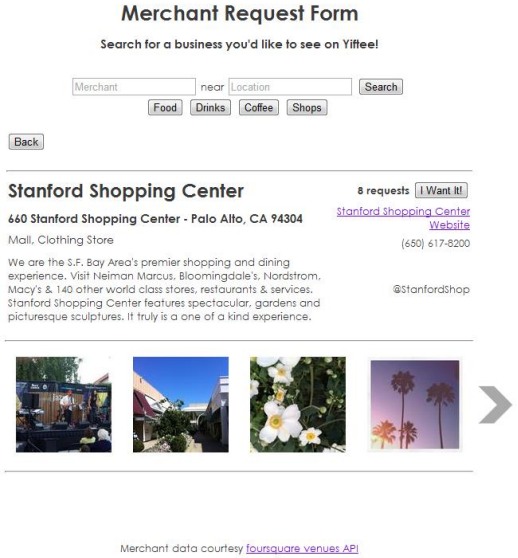
YIFTEE MERCHANT RECOMMENDATION ENGINE

Summer 2012 | Yiftee | User Experience and Web Design Programming (Intern)

Yiftee is a startup that allows users to send gifts to each other at local stores. The Merchant Recommendation Engine uses the Foursquare API to access data about various merchants and allowed a customer to recommend a new merchant to Yiftee. It also allows a merchant to claim their store on Yiftee using prepopulated data without a personal visit from a Yiftee employee, allowing for company expansion. I designed and programmed the applet using JavaScript, jQuery, JSON, Ajax, CSS, and HTML.



The user's search query for merchants in a specific area



A closer look at the customer's desired merchant

Internship Design Experience

YIFTEE MERCHANT DASHBOARD

Summer 2012 | Yiftee | User Experience and Web Design Programming (Intern)

The Merchant Dashboard allows merchants to view their product sales and trends through Yiftee. I designed and developed the page, which included JSON commands that called the merchant's data and populated dynamic fields and graphs on the page, and used CSS and HTML for formatting. I began design with PowerPoint mockups and moved to CSS and HTML prototyping.

Initial mockup in PowerPoint

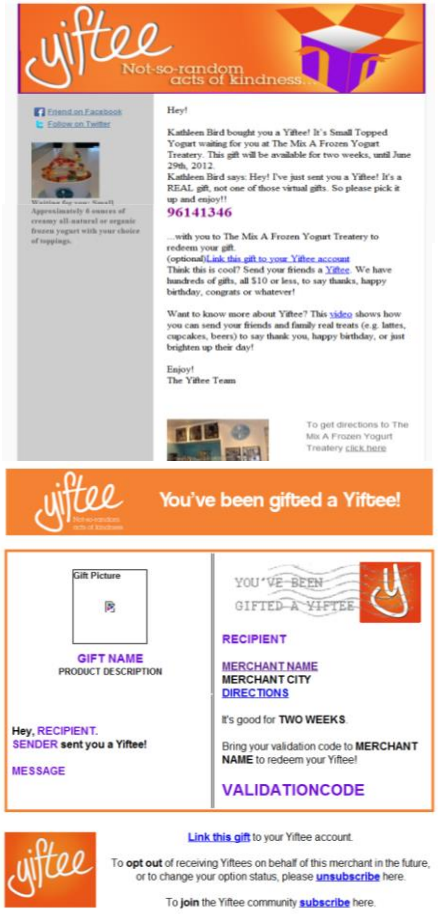
Final version in HTML and CSS

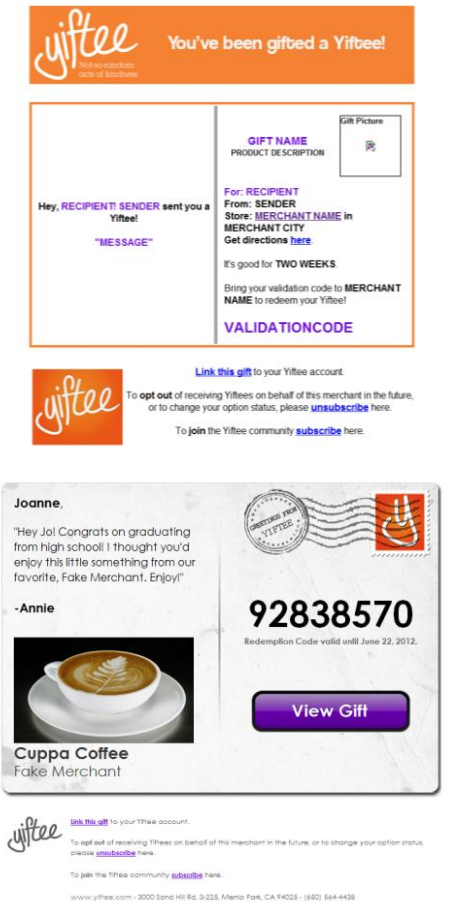
Internship Design Experience

YIFTEE GIFT EMAIL TEMPLATE

Summer 2012 | Yiftee | User Experience and Web Design Programming (Intern)

The Gift Email Template replaced Yiftee's old and outdated template. The new template is more user-friendly and looks less like spam. The template transitioned from a generic email template to a postcard through the many iterations (six are shown below).





Internship Design Experience

NANOCROWD "WILL I LIKE THIS MOVIE?" GAME

Summer 2009 | Nanocrowd | Programming Intern

Nanocrowd is a movie recommendation search engine that uses keywords from film reviews to classify movies into "nanogenres" that provide more description than a generic movie genre. The game is based on Nanocrowd's database and allows a user to input a movie title and determine their compatibility with the movie. It was live on Nanocrowd's website and Facebook.

The nanogenre page of the application