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Impacting Lives through Design

Joy of living & Advance Personalized Learning

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Abstract:

My four years at Olin College have taught me the importance of engineering to help others. This portfolio highlights the work I've done designing for people in an engineering context. I've met new people, learned about their values, identified problems, and thought in depth about potential solutions to make a large impact on people's lives. In particular, this portfolio details my work in the K-12 space, both in creating products and in building curriculum and teaching students.

Introduction

"When I grow up, I want to be a computer engineer."

That is the bold statement you will find next to my picture in my fifth grade yearbook. As an elementary school student, I had no idea what being an engineer entailed. I just knew that I liked math and science, and I figured being an engineer was a tangible goal I could set for myself.

If there is one thing I've learned during my four years at Olin College, it is that I am not a pure engineer, at least not by traditional standards. During my first few semesters, I struggled to find a place for the part of myself that needed more than just lines of code and mathematical proofs. Thankfully, I was able to find my passion in human-centered design. I found that engineering is made so much more meaningful when there is a person that needs to be helped, and when a direct impact is being made to improve others' lives. In particular, I have delved into the space of K-12 education, whether it is through directly teaching them and inspiring students by showing them what they are capable of, or thinking about technologies that can help pain points in the educational system such as note-taking for teachers, making math more fun, or helping special education teachers connect with their students.

This portfolio highlights some of my work: I've met people, identified problems, and thought in depth about potential solutions to make a large impact on people's lives. My goal is to continue doing the best I can to help as many people as possible as I continue my efforts to mold the definition of engineering to fit my passion to assist others.

Integrated Product Design – *Interdisciplinary Curriculum | Service Learning | Hands-on Project*

During the fall of 2014, I took ENGR3250: Integrated Product Design. Each team was comprised of students from Olin College, Babson College, and the Massachusetts College of Art and Design, and we spent time on each of the three campuses learning about the fields of engineering, business, and industrial design and how they go hand in hand to create a successful product.

For our project, my team met with special education teachers in elementary schools and high schools and learned about their classroom management styles, their curricula, their biggest challenges and their most rewarding moments. 8.5% of students in the US public school system have a learning disability, making the roles of these special education teachers extremely important. When one teacher told us that their goal is to "devote the same high-quality attention to each student," we decided to create a classroom tool that helps teachers connect with their students.

Together we designed the SparkEd, a device that increases personalized communication between the teacher and student in the classroom. There are three working parts to this product. First, there is the teacher's device, which can be worn as a watch. If the teacher is busy working with a small group or giving attention to a child having a particularly bad day, they may not have time to walk over to another student to compliment them on the good work they are doing. With the SparkEd, they could simply use a few seconds to find the student's name and send them a preset message of encouragement. This message would then show up on a device that sits on each student's desk. The student devices come in fun custom cases personalized to each student.

While the device sits on the student's desk, it captures pictures of them every thirty seconds and tracks their emotions. The teacher can later log on to their SparkEd dashboard to review their students' emotions over time. This will allow them to know when students are fulfilled and happy, and when they are struggling and need additional support. Teachers can continue to improve by using the data to better inform themselves of their students' needs.

Working together with students from other campuses was extremely valuable because it gave me a better sense of what it is like to work in a real production setting. There were many tensions due to the fact that different disciplines tend to prioritize different features; while the engineering students were more user-focused and experience-focused due to the nature of an Olin education, the industrial design students favored aesthetics and materials over function and the business students considered marketability and approached user-centered design from a different angle. Balancing these different viewpoints was difficult, but led to a well-rounded, thought-out product in the end, showing the value of learning to work with people from all fields of study.

SCOPE – *Interdisciplinary Curriculum | Entrepreneurship | Hands-on Project*

For my senior capstone project, I worked on a team of five on a project sponsored by Dassault Systemes SolidWorks. We were tasked with creating a mobile extension to the SolidWorks application, and given a full year to do so. We used a human-centered design approach to first learn about industrial designers and their needs and values, and then spent a semester developing a solution.

Industrial designers value collaboration and prefer to work together when designing a new product, producing many rapid sketches as they build off of each other's ideas. However, they often have a hard time keeping track of and organizing all the sketches they create. In addition, this collaboration decreases significantly once they begin creating digital 3D models because they are each hidden behind their own laptops and monitors. Even when they do share their models with each other or with other stakeholders in the project, they use static print outs because it is difficult to display and maneuver several models with a group of people. This shift further moves the focus from the design process to final results, contributing to the decline of creativity and collaboration.

In order to resolve these difficulties and make their workflow easier, we developed SketchID, a mobile application designed to further encourage creativity and collaboration within the industrial designer network. SketchID enhances collaboration among industrial designers and the people they work with by streamlining their creative process. Users are able to use their smartphones or tablets to sketch, capture, share and collaborate on their ideas with fellow designers, supervisors, and clients. SketchID increases digital collaboration on sketches and 3D models, facilitates documentation and organization of projects, encourages teamwork by allowing multi-user access to projects, and makes participation in design reviews and feedback sessions more comfortable for all stakeholders involved.

We were an Agile team, and I served as the Product Owner as well as the de facto Project Manager when necessary. Over the course of the semester, I learned to manage tasks for the team, made product decisions based on user research, and prioritized features and bugs as necessary. I found that it came naturally to me to fill the spaces where my team was lacking, making it easier for everyone to perform their assignments and move the project forward. While it was stressful at times, especially towards the end when we were running into development issues and needing to triage our features, it helped me learn what it is like to have to deliver a finished product within a tight timeline. Often at Olin, even if we don't complete a project, as long as our efforts are visible we are rewarded for our learning experience. However, when expected to complete a project for a company, the stakes are higher. As a capstone experience, I was able to both practice what I learned over the course of my years at Olin and also acquire new, practical skills that will help me in a corporate setting.

Grenzebach Glier and Associates – *Entrepreneurship | Global Dimension*

During the summer of 2014, I had an internship at Grenzebach Glier and Associates, a philanthropic consulting firm in Chicago that serves non-profit organizations from all over the world. They provide a broad range of services, including strategic planning studies, campaign counsel, annual giving reviews, information technology implementation, and prospect analysis and research services. They have a strong, evidence-based analytics team that looks at metrics and data in order to help their clients meet their fundraising goals. Their leading product is DonorScape, an online tool for prospect research that helps users identify the giving capacity for each of their prospects and gain information on their wealth, personal and professional affiliations, and philanthropic giving history.

I worked on two projects during my summer internship at GG+A. The first project was for Donor Ask, a product targeted towards smaller non-profit organizations looking to do prospect research on individuals and receive information on a more limited range of data points than provided by DonorScape. I conducted market research, created mockups, and worked with an external developer to design and build a web and mobile application that gives ask guidance to fundraisers.

For my second project, I worked with a partner to design a prototype for the phase one launch of an analytics web application called Prospect 360 that aggregates key metrics from a client's CRM database and presents them in easy-to-read reports and graphs. We talked to many gift officers and gift officer managers to learn what data would be useful to have, and how the prototype should be organized. Our work was presented to a client in Europe, and we received feedback and iterate upon the design to improve our concepts.

Working at GG+A was a change of pace for me, and I learned about the world of philanthropic consulting and fundraising in the non-profit sector, which went beyond my personal experiences with non-profit organizations that largely consisted of donating and volunteering my time. I enjoyed working with members of the analytics team as it gave me the opportunity to think about designing around large amounts of data. One challenge was that we often did not have access to the firm's clients' data, so we had to fabricate our own. Because neither I nor my intern partner had experience in the field, it was difficult to come up with realistic data sets to design with. We learned to depend on the resources we were given and several subject matter experts who were willing to meet with us, and they guided the multiple iterations of our prototype.

Engineering Discovery / AHS Capstone – *Hands-on Project | Service Learning*

Engineering Discovery is a student organization on campus that focuses on K-12 outreach, running classes and workshops for younger students to learn about the STEM fields. I participated in many teaching activities, and even joined the leadership team for a year. However, I wanted to gain more experience working with one classroom over a longer period of time, because I wanted to be able to play a larger role in the development of individual students. As a result, for my Arts, Humanities and Social Sciences Capstone project I chose to develop a curriculum for a middle school classroom and teach it to a seventh grade science class in Framingham, MA.

I taught seven class sessions, dividing them into four parts to do a crash-course in various types of engineering. Two classes were spent teaching computer programming concepts using Scratch. Two classes used MaKey MaKeys to learn about circuits. One class was spent on a design exercise to encourage creativity and designing for real people. Two classes involved an active build, where each student built their own custom standing desk converter using cardboard. Through my seven sessions of teaching, I was able to make connections with the students and find the best ways to keep them engaged. Even when they were having bad days, or had gone through hours of standardized testing that morning, they were always excited to see me and to see what new, exciting lessons I was bringing to them. Being able to be that breath of fresh air in an otherwise stale curriculum was extremely rewarding for me.

As I reflected on each of the class sessions, I noticed a trend – for every activity, I always wished I could have done more. I wished I had taught them one more programming concept; provided them with one more type of material; shown them how to make one more connection. I think that's a really hard part about teaching – the class is only so long, and you have to prioritize what bits to talk about to ensure the students get the most out of the time they have. In many cases, I chose to explain how to use tools or create something and then let them experiment, to leave them ample time to get their hands dirty and try new things, which left little room for context and reflection. This balance is something I would love to improve at in future iterations of teaching.

CueThink – *Entrepreneurship | Hands-on Project*

CueThink is an ed-tech startup in Boston creating an innovative iPad application to improve critical thinking skills and math communication of students in grades 4-12. Students are encouraged to think through the steps of problem solving - to understand the problem, plan a solution, solve it, and review what they've done. When they solve the problem, they can record a video of themselves doing their work and talking out loud about what steps they are taking. These videos are then shared with their peers as well as their teacher, and students can then watch videos made by their classmates and leave annotations and likes. This application makes math a social activity for the students and encourages feedback and collaboration.

As a part-time intern at a rapid-paced startup, my work varies from week to week. The tasks I am involved with include:

> Product Design: Creating wireframes informed by the observations on the field. My main project has been to improve the Teacher Dashboard where teachers can set up their classes and assignments and review their students' work
>
> Social Media: Participating in edchats, editing blog posts and other content, and thinking about ways to engage other educators and students
>
> Quality Assurance: Testing and debugging the app and teacher dashboard with a focus on ease of use and stability

Working in a small startup environment has allowed me to do a variety of work that I enjoy. The team has a, "You suggest it, you do it" mentality where we are all thinking about ways to improve the product and taking ownership of the direction it takes.

It has also been interesting for me because I only work on the work flow and wireframes; another designer polishes the look. While I would like to be able to work on both, as a part-time intern I enjoy focusing more on the interaction than the visuals by taking the feedback we get from our users and thinking about ways to make the product more accessible to them.