

# Emmanuel Klein

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# Family Connect





## User Testing

Luce is 96 years old.

She has never used a computer.

Her children, grandchildren, and great-grandchildren live across the country and around the world.

The TV and her automatic reclining chair are the centers of her physical space.

She spends her time reading books, watching TV, eating, napping, and in physical therapy.

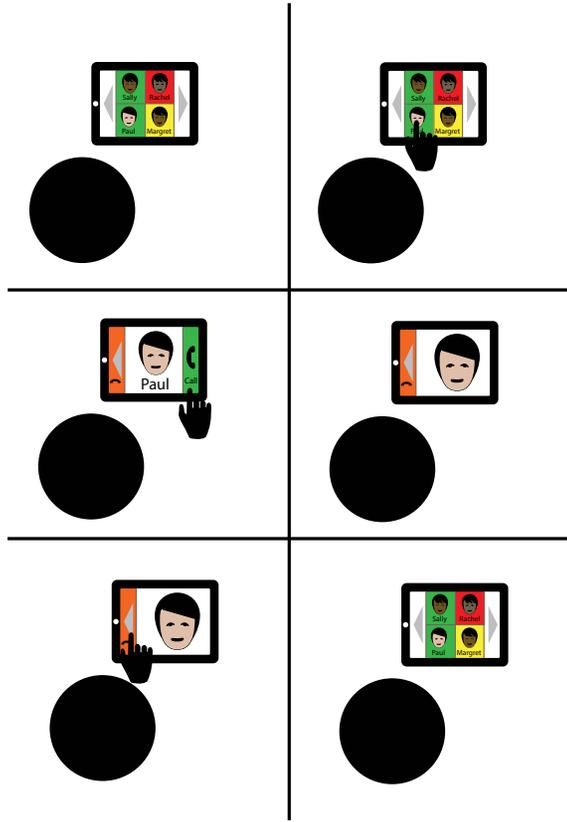
She has helpers who assist 24/7 with meals and are on call at night.

The electronic devices she does use are a wireless telephone, TV/remote (that she thinks has too many buttons), and radio.

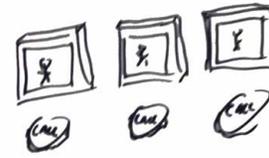
## Design Challenge

How can we connect people who feel isolated or intimidated by technology with their family who may live far away?

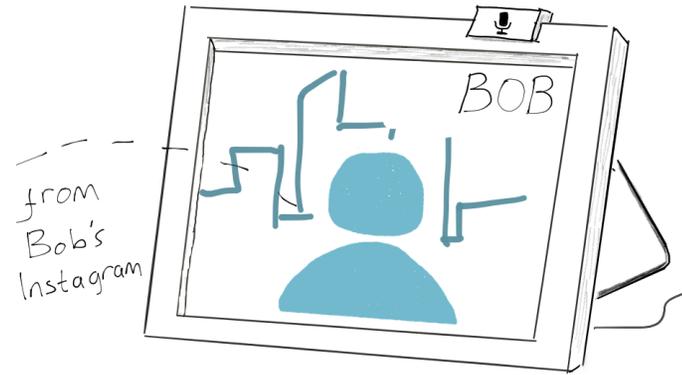
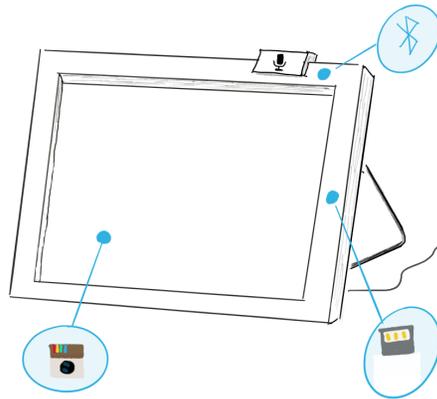
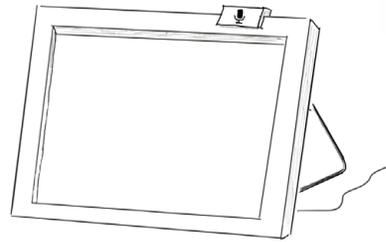
# Exploration



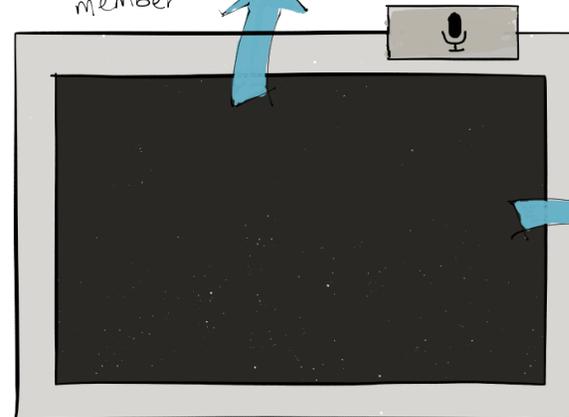
TU type



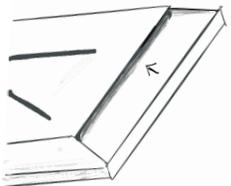
Photographs + Phone



Switch to other family member



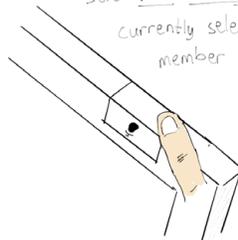
See other pictures of a family member



Insert iPad from the back of photo frame

It also acts as charging dock

Tap & hold button to send voice message to currently selected family member



# Concept

Give the functionality of Skype.

Use simple interface of something familiar like a picture frame.

Allow connection to a small group of friends/family.

Keep it simple!



# Prototype 0

Our zeroth prototype was comprised of static images on an iPad.

What we learned:

Physical buttons are good.



# Prototype 1

Our first prototype was a simple visual interface which was controlled with keys on a nearby computer.

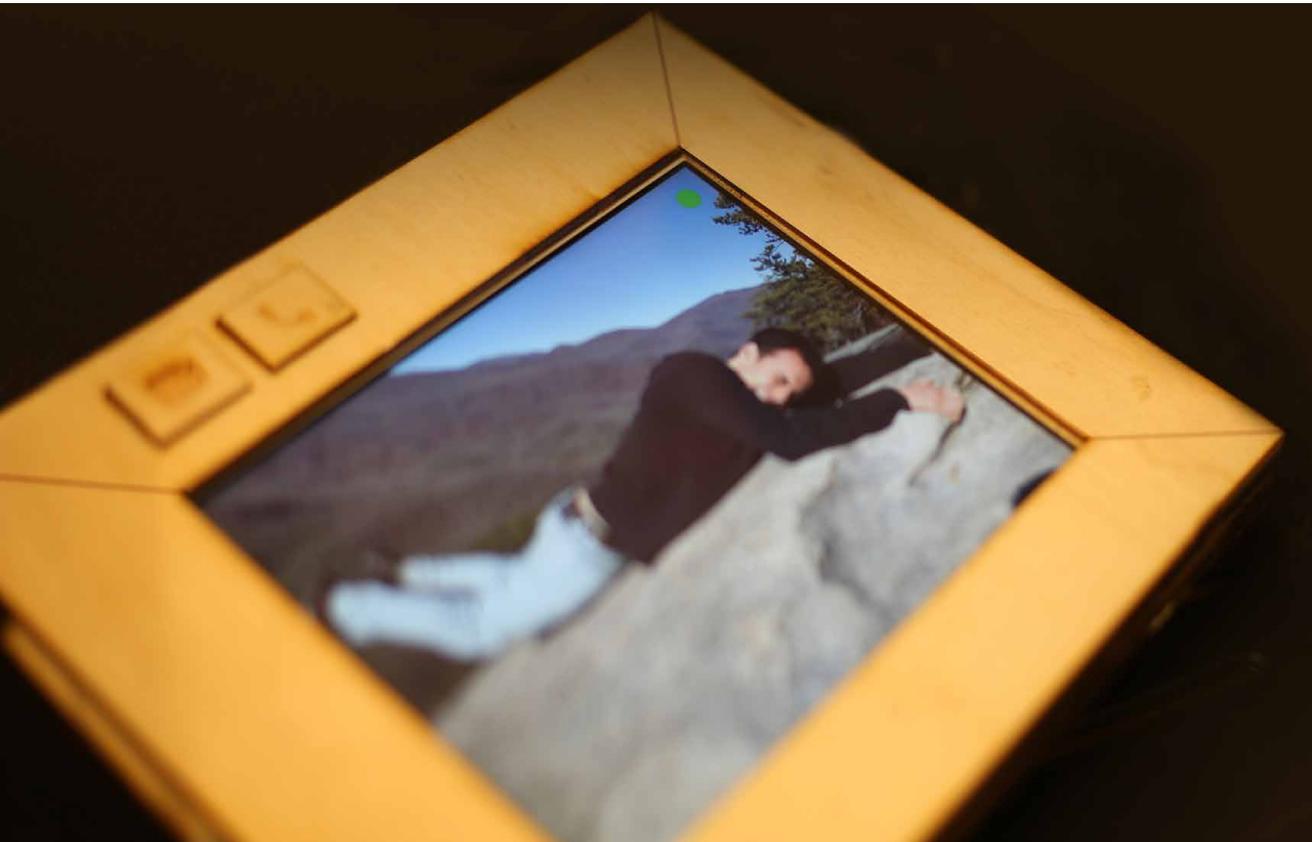
What we learned:

Screen based touch sensing can cause confusion; this is particularly the case when the response to touch sensing takes place only after the finger is released.

Physical buttons are good.

One button one function.

Physical scrolling is important.





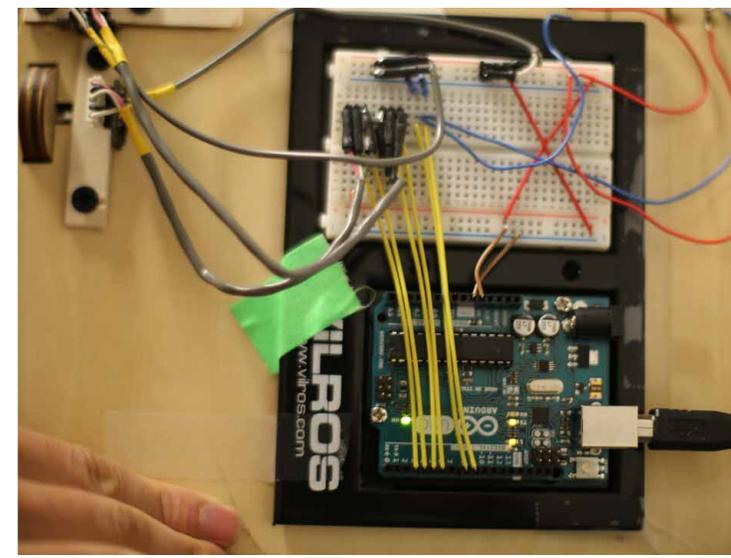
## Prototype 2

Our second prototype implemented functionality using an Arduino and added scrollers that allow for a more familiar navigation experience.

What to look into:

Dual-function volume control needs more testing to determine if it is confusing to users.

A less sensitive scroller wheel will improve the interaction for less dexterous fingers.



# User Testing



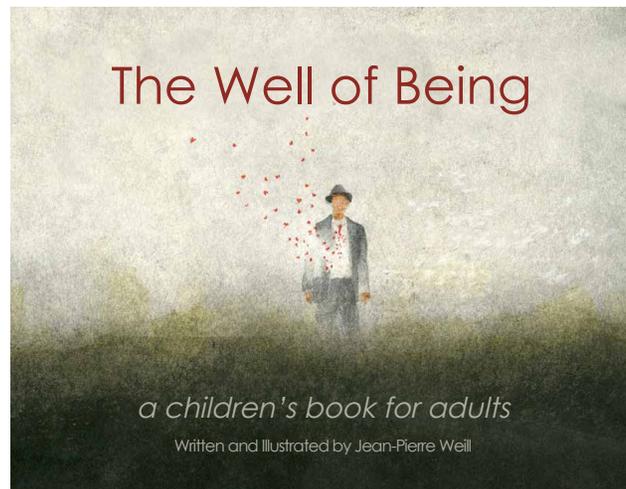
# Special Thanks to:

My partner Lutfi Rahmanto.

Russell Blanchard for his guidance and for teaching me how to tell a compelling story.

# Color Wall



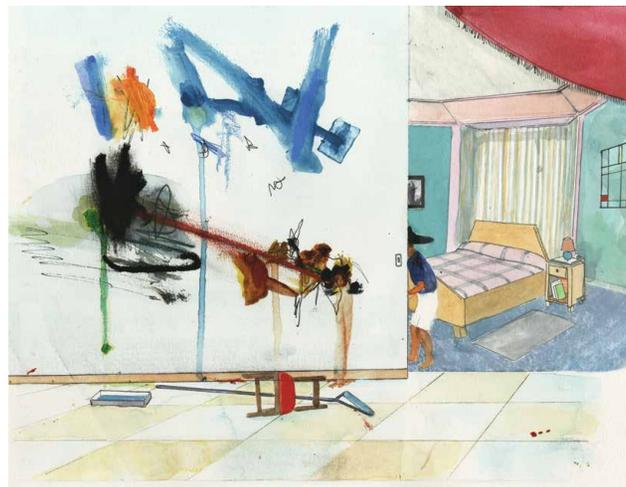


## Conception

The idea for this project was a book "The Well of Being".

In a section of the book, a child is reprimanded by his parents for painting on the wall. This event demonstrates the universal awakening that the individual experiences as he or she first encounters societal demands.

I thought the experience of painting on a wall (on a canvas that is ordinarily considered out of bounds) would be a liberating and fun way to revisit this universal encounter.



I edited, designed, and formatted the book as well as publicized it.

After an initial self-publication, we were picked up by Macmillan Publishing. The book is now printed or in the process of being printed, in the US and the UK. Translations of the book are being prepared in Chinese, Japanese, Korean, and Portuguese.

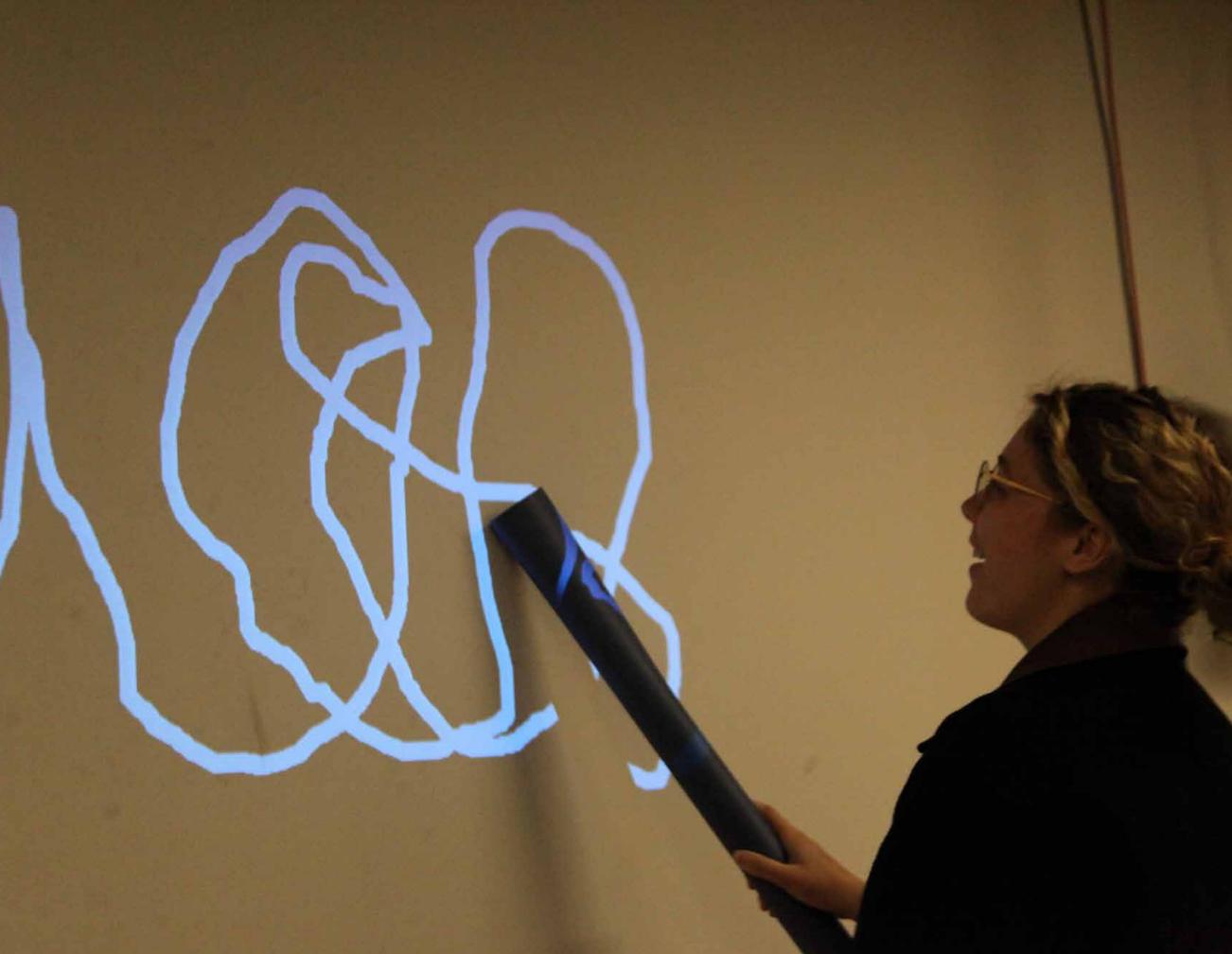
# Design Challenge

How can we foster the freedom and playfulness of a child drawing on the wall in a public space?

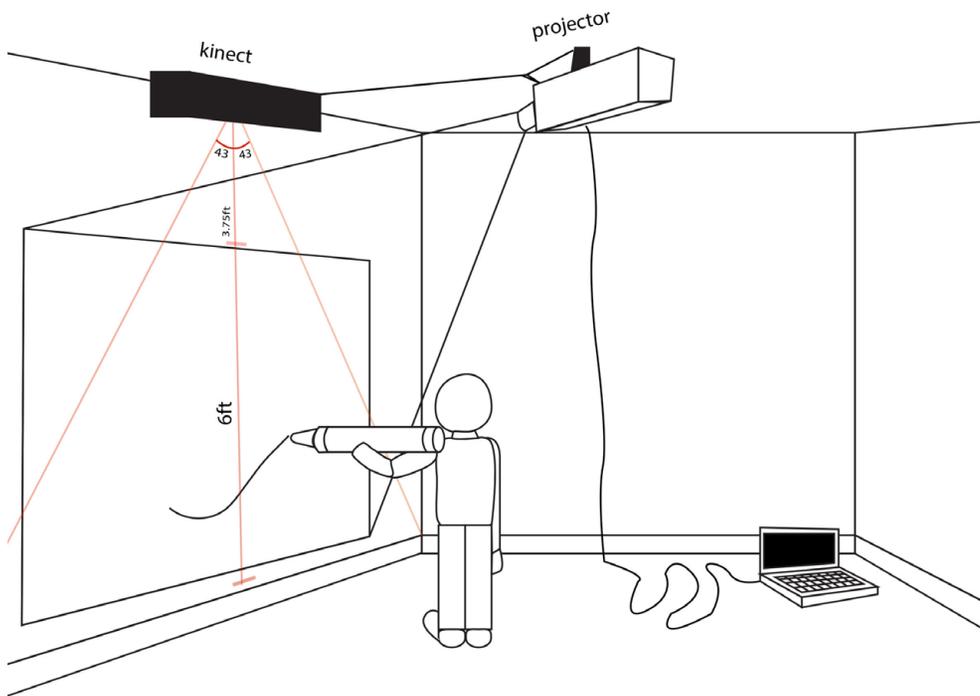
# Prototype 1

Our first prototype required my partner and I to manually map the physical interactions of our users with a custom paint visualization.

From our prototype, we were able to focus on the interaction we sought such as determining the size of the crayons. We were also able to see that drawing on the wall and throwing a ball against a wall where two very different interactions that didn't necessarily belong together.

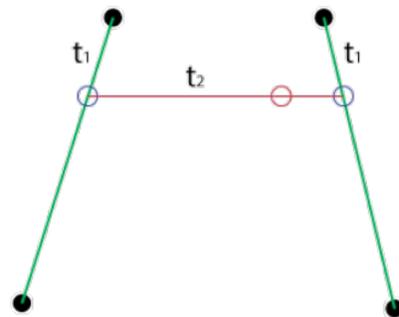
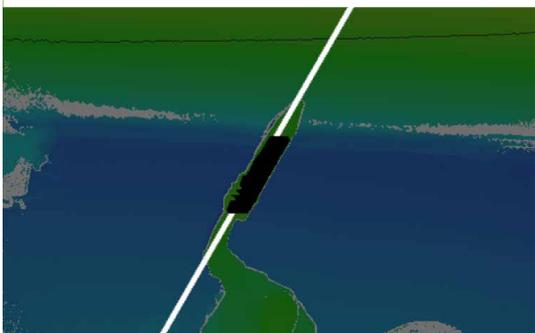
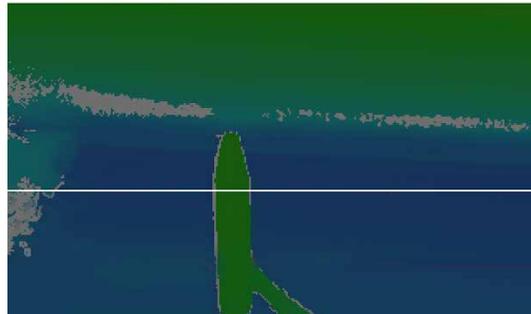


# Design



We used the Kinect to capture color and depth information. With Processing, we tracked the tips the crayons along with their corresponding colors.

After initial user testing, we wanted a physical manifestation of an eraser and not a digital refresh button. We used a painting roller for the eraser; this became a coveted item for children engaging with the Color Wall.



The position of the tip was mapped to the projection using a numeric model similar to a steady state thermodynamics problem. It was satisfying to engage in a whimsical project using my background in engineering.

## In use

The games that children created were varied.

People realized they could paint with their colored clothing on the wall, which was an interesting, unexpected interaction.

My partner and I are currently in dialogue with institutions which create children's learning installations. The Color Wall is intriguing to them because it engages many children simultaneously while employing indestructible active elements.



# Special Thanks to:

My partner Esther Hersh.

# Prosthetic



# Overview

While there have been significant strides in prosthetic technology, comparatively little progress has been made to the interface between the user and the device.

Sockets that form the interface between the patient and the device are static, whereas limbs are dynamic.

The limbs themselves experience shape change daily, seasonally, and progressively.

Many users put on and take off layers of socks throughout the day to keep their sockets attached.

A friend and I developed the idea for a new type of prosthetic socket in a medical robotics class which we both took in our senior year at the University of Maryland.

The two of us created a company based on our idea called Adaptive Motion Technologies LLC.

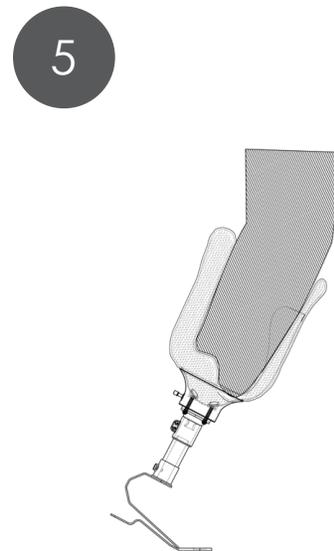
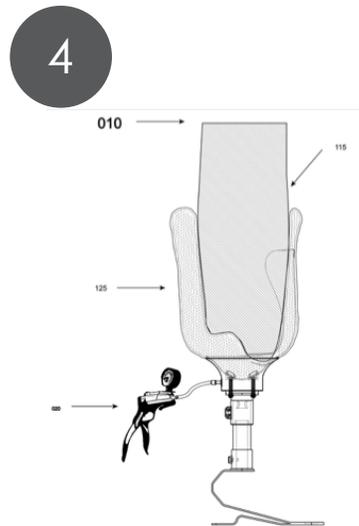
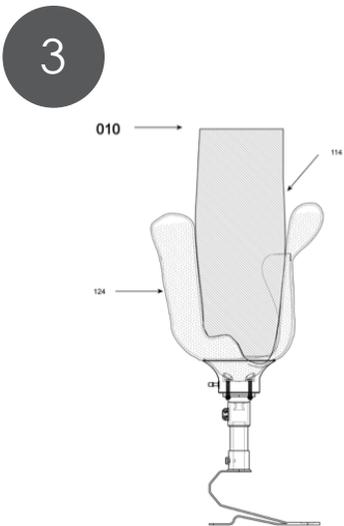
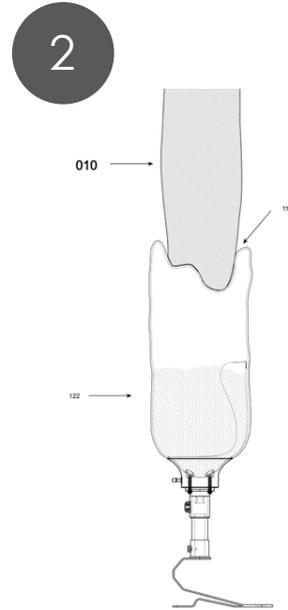
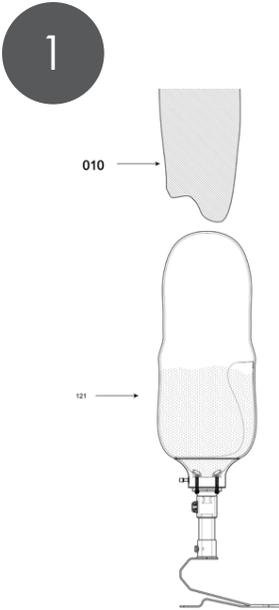
We did extensive research into the market, including meetings with doctors, prosthetists, and amputees.

We developed IP and submitted provisional and full patents based on our idea.

## Design Challenge

How can we address the needs of lower limb amputees who often experience discomfort due to poorly fitting prosthetic devices?

# Concept



1. The socket has a bladder with a granular particulate matter inside; at atmospheric pressure, the granular material simulates a liquid allowing the material to take the shape of the patient's leg.

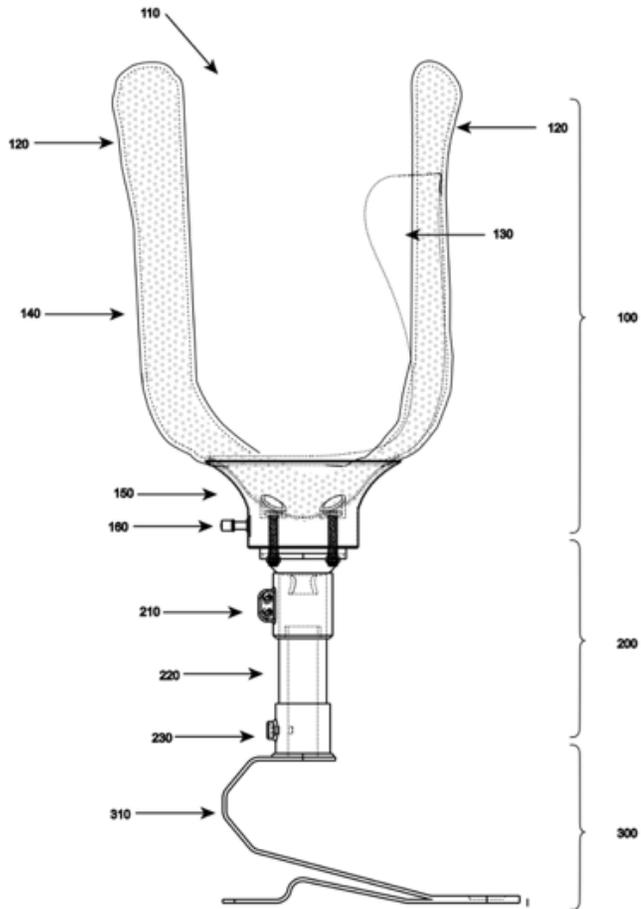
2-3. The limb can be "rolled" into this bladder displacing the granular material.

4. Once in position, a pump is used to apply a vacuum to the bladder, jamming the particles together, resulting in a rigid solid structure that is now formed correctly to the current conditions of the limb.

5. The pump can then be detached.

The mold can reform on the fly with a small portable pump to accommodate the changing conditions of the limb.

# Design



# Proof of Concept

Our proof of concept was constructed from a section of inner tube, coffee grounds, and a bike valve, all wrapped in a section of pantyhose.

Moving forward, we needed to:

- provide adequate support
- make the design lighter
- use skin-safe materials
- allow for standard prosthetic components



After numerous prototypes and significant research, we determined that the costs and barriers of bringing this idea to market were prohibitive, and we retired the company.

In particular, reimbursement policies and the FDA approval process created significant risk for our idea.

If developed further, this idea could be implemented as a postoperative device:

- the shape-changing abilities of the design would benefit the patient when the limb is changing most drastically immediately after limb loss
- this socket would give doctors easy access to the limb to check for proper healing or possible infection
- limited mobility of the patient would allow for a less mechanically rigid socket

## Prototypes 2-xx



# Special Thanks to:

My partner in crime and oldest friend, Jonathan Howarth.

William Herlands and Ayelet Lobel, two of the most impressive people to work with that I know.

Terry Elan, who patiently showed me how to make prosthetic sockets, lent me equipment and introduced me to numerous contacts.

Countless doctors and amputees that gave their time, knowledge, and advice.