

R·I·T COLLABORATIONS  
technology + creativity + community

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Rochester Institute of Technology has been a pioneer in inclusive education in the United States and Worldwide. The National Technical Institute for the Deaf (NTID), recognized by U.S. News & World Report as one of America's "Best College Values," and by The Princeton Review as one of the top 20 colleges nationwide for "Best Career Services", is only part of the efforts endured by faculty and students to cooperate with people with special needs.

For the past 3 years, RIT along with Regional Health and Non Profit Organizations have looked for new and relevant opportunities for students to gain experience while helping the community solve real issues. As part of these efforts, there are current projects that have been developed with NPOs, and represent great potential.

This year thanks to The Simone Center for Student Innovation and Entrepreneurship and the School of design (MFA Industrial Design Program), a multidisciplinary team of students working along with the National Multiple Sclerosis Society and the Association for the Blind and Visually Impaired, developing potential solutions to help patients with MS to transport between different seating surfaces and designing inclusive technology accessories to help visually impaired users to efficiently interact with touchscreen devices.

# RIT PARTICIPANTS

## **SCHOOL OF DESIGN**

(MFA INDUSTRIAL DESIGN PROGRAM)

**THE SIMONE CENTER** FOR STUDENT  
INNOVATION AND ENTREPRENEURSHIP  
(IDEALAB / SUMMER CO-OPS)

## **SCHOOL OF ENGINEERING**

(ELECTRICAL AND MECHANICAL)

# COMMUNITY PARTICIPANTS

NATIONAL MULTIPLE SCLEROSIS SOCIETY



ASSOCIATION FOR THE BLIND AND  
VISUALLY IMPAIRED (ABVI)



ROCHESTER GENERAL HOSPITAL





# PROJECT 1





## VISION:

A world free of MS.

## MISSION:

The mission of the National Multiple Sclerosis Society is to mobilize people and resources to drive research for a cure and to address the challenges of everyone affected by MS.



## CHALLENGE

It is difficult for many disabled individuals to move from their vehicle to a scooter or wheelchair independently. The use of a transfer board helps but there are many problems for the user. How might we design an object that would make it easier to transfer people from the driver's seat of a vehicle to their wheelchair or scooter?

PERSONA 1.  
**Kerrie**

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- 35 year old mother of 2.
- Active lifestyle.
- Challenges that impede transfer: spasticity, weakness, balance, fatigue, weather conditions, difficulty lifting legs into vehicle.
- Uses walker or manual wheelchair.



## TRANSPORTING TOOLS

### Kerrie



**Electronic Muscle Control Device**

She uses a device named Ness L300 Foot Drop System which is designed to help people with certain neurological conditions walk more naturally, with increased speed and improved balance. This device is about 80000 dollars.



**Cane**

A cane is very helpful when she needs to do short distance movement. Everyday she walks from the driver seat to the backside of the car with her cane.



**Walker**

The walker is her main assistant tool in her daily life. After driving to the destination, She gets the walker off her car from the backside, and goes to different places with it.

## ANALYSING SITUATIONS

### Kerrie



1. Fold and put the walker  
in the backside of the car



2. Walk to the driver seat  
with the supporting of the car



3. Sit Down  
Very carefully



## ANALYSING SITUATIONS

### Kerrie

#### 4. Bend the leg

Her feet and legs sometimes get very stiff especially in winter. She uses a leg lifter to lift the foot into the car, which is a very difficult process for her.



#### 5. Lift the leg

She use one hand or both hands to lift her leg, but the leg is so stiff and heavy that she really needs an additional tool to enhance this process.



## KERRY Needs

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### Easier for lifting

For women like this user, they need additional tools to help with lifting their legs.

### Break the stiffness

### Walking support

The user mentioned if there is something outside the car for her to grab, it would be much easier to walk by herself.







## PERSONA 2. Dan

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- 60 years old
- Lives alone, very little support
- Very independent
- Challenges that impede transfer: fatigue, weakness, cannot bear weight, difficulty sliding on transfer board
- Uses scooter.

Currently, Don uses a transfer board which expends significant energy, adding to his fatigue. Don is unable to maneuver effectively on the board unless he is wearing clothes that slide easily.



## TRANSPORTING TOOLS

# Don

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### Electronic Wheelchair

She uses a device named Ness L300 Foot Drop System which is designed to help people with certain neurological conditions walk more naturally, with increased speed and improved balance. This device is about 80000 dollars.





## ANALYSING SITUATIONS

### Don

Get into the vehicle from backside

Dan has a very large vehicle of which the driving seat is rotatable. He usually rides his wheelchair into the car through a extendable slope from the backside.



Use a handle and board



Only his arms are stressful



User remote control to turn the driver seat to the frontside

## DON Needs

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### Handles

Dan has no control for muscles from the waist to feet. Instead of using hands to support against the seat, using two hands to swing the body at the same time is much easier for him.

### Material

Because he is not able to move the waist and hips at all, the pants always get stuck after moving. The materials of pants and transferring board are very important element.







## PERSONA 3. **Allison**

- 30 years old.
- Does not drive, transfers into passenger side.
- Challenges that impede transfer: unable to use transfer board, weakness, balance/coordination issues, must rely on another individual to lift legs.
- Uses manual wheelchair.





## ANALYSING SITUATIONS

# Allison

*A transfer board is not an option for Allison. Currently, she will stand using the vehicle door and handles, which is unsafe.*

*She will then lower her body onto the seat and must rely on someone to lift her legs into the vehicle. This process is often embarrassing for Allison and compromises her independence and feelings of dignity.*

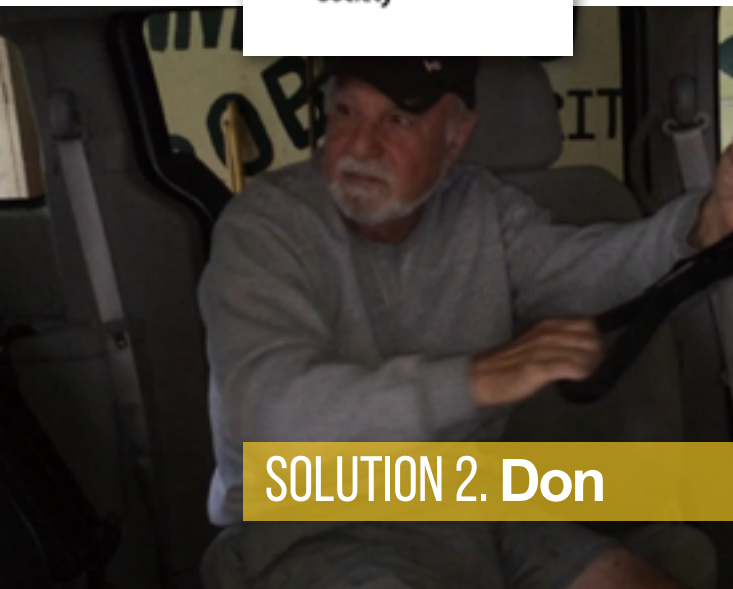




A black silhouette of a person in a wheelchair is shown reaching up to a car's roof rack. The person is positioned in front of a light gray silhouette of a car. The person's right arm is extended upwards, touching the roof rack. The wheelchair is a standard three-wheeled model. The car is a sedan-like vehicle with a visible roof rack. The background is white.

**Interaction from cane.**



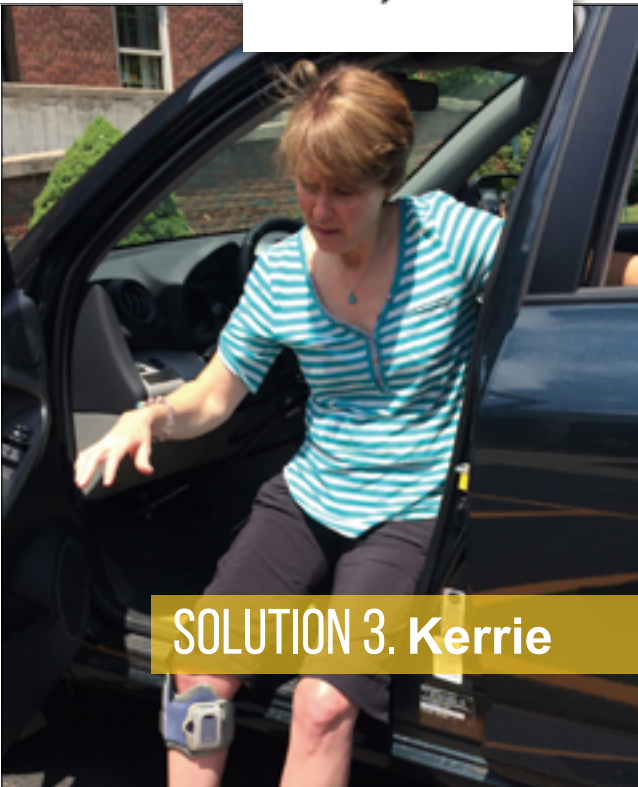


## SOLUTION 2. Don

1. The **Concept** is made of two moving handles with a rail positioned on the roof of the car, and a band connected two of them which help user push the handles if it out of reach. Users can put them aside when they are done. These handles can help users position themselves from wheelchair to car seat.







SOLUTION 3. Kerrie



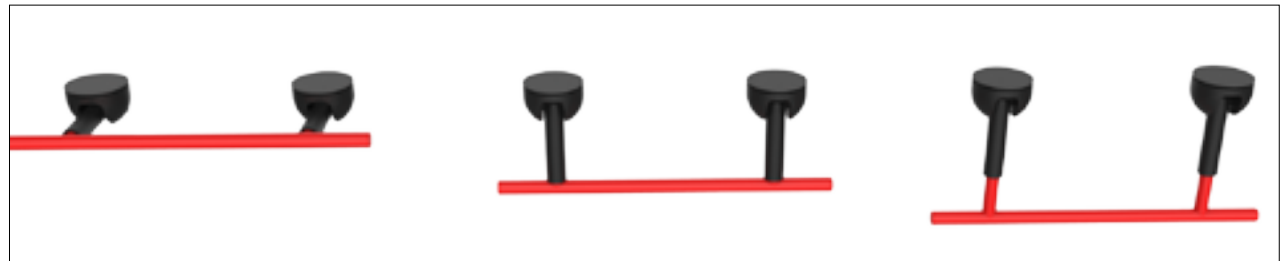
3. This concept is a foldable crutch that can be folded into a very small size and user can install it on the side of the car. When user need it, they can open the car door and unfold it, there will be a bar that user can use it to hold themselves.



SOLUTION 4.  
**Kerrie / Allison**



2. This concept is a foldable bar positioned on the roof of the car, users can easily unfold it when they are trying to transfer themselves from the wheelchair to the car, while they can hold the bar when they move their bodies.





## IdeaLab SOLUTIONS



## Summer SOLUTIONS



## In progress.SOLUTIONS



## PROJECT 2





ABVI  
Goodwill





## PROJECT GOAL

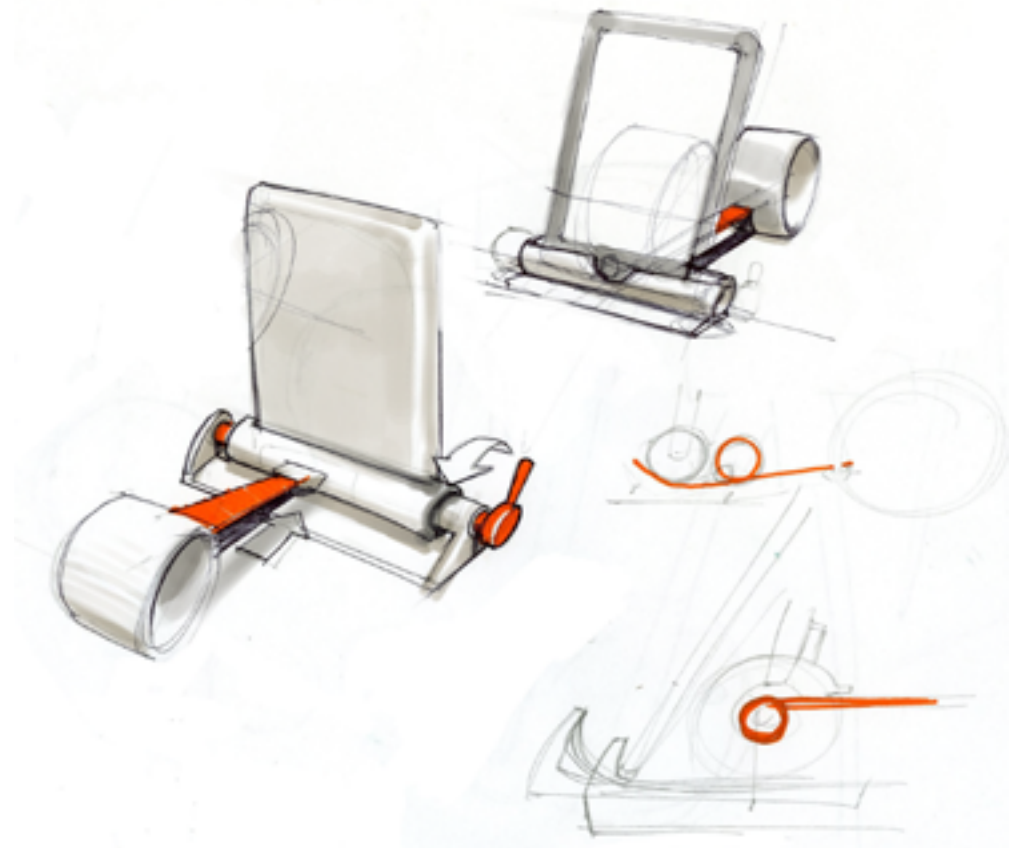
The main goal of this project is to develop a portable and affordable solution for people with visual impairment that will help them in reading printed documents: letter, newspapers, books, magazines and others.

## CURRENT SITUTATION

A CCTV (closed-circuit television) uses a video camera to project a magnified image onto a TV screen. The main issue with these devices is that they are expensive, heavy and difficult to carry.

## PROJECT GOAL

Taking as an advantage the popularity of tablets ( as Ipad, Google Nexus, Samsung Galaxy), their lower prices when compared with CCTV's (\$300 against \$1200) and the existence of apps that can zoom in and recognize text (OCR) the project took the direction of creating a tablet stand focused specifically in helping visually impaired users to read during an every day routine.

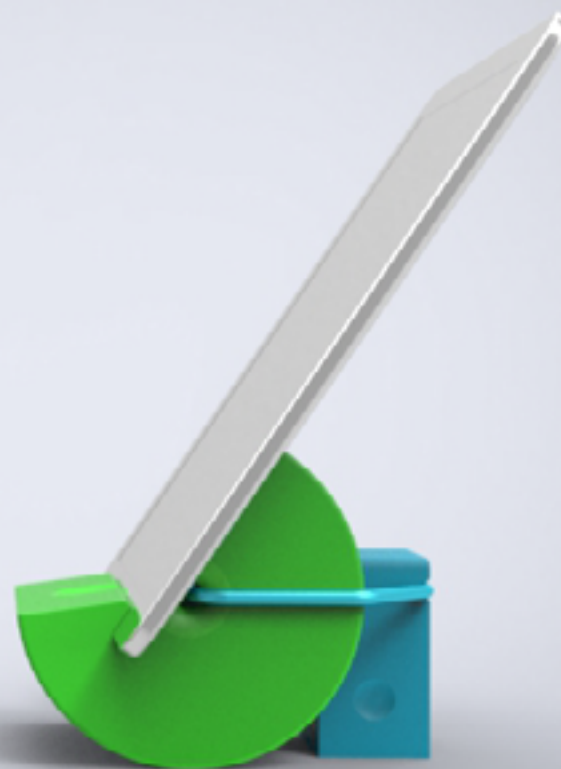




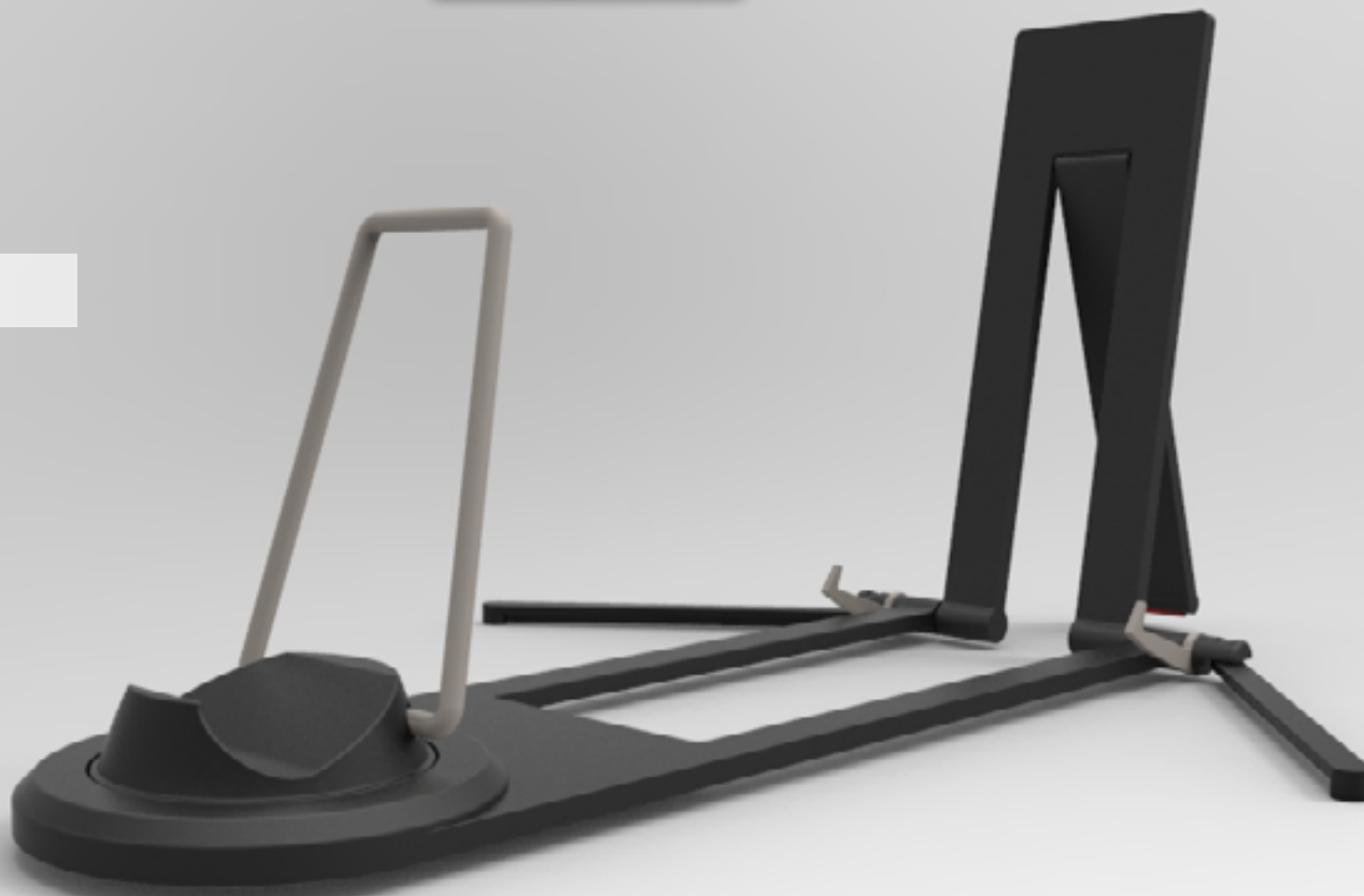
## BASIC REFERENCE DATA

The Ipad and the mini Ipad tablets were chosen as the main measurements' references due to their access technology apps that comes in every one of them.

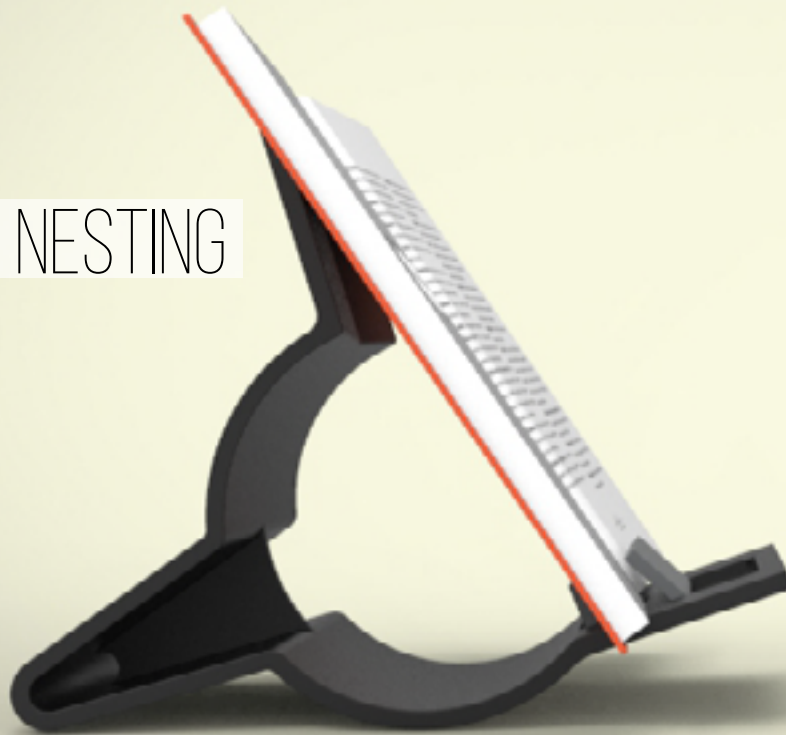
## PLAYFULNESS



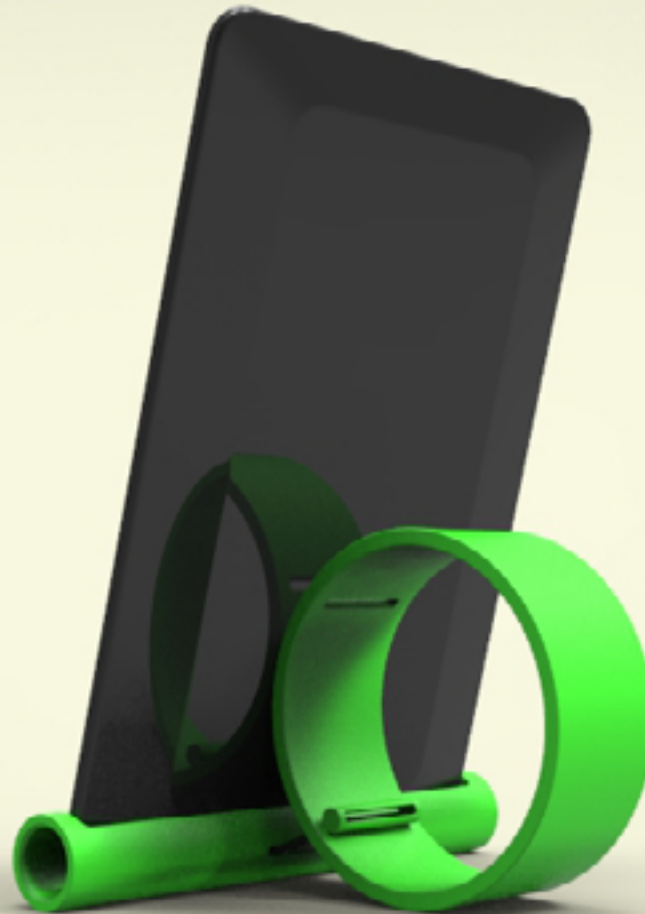
PORTABILITY



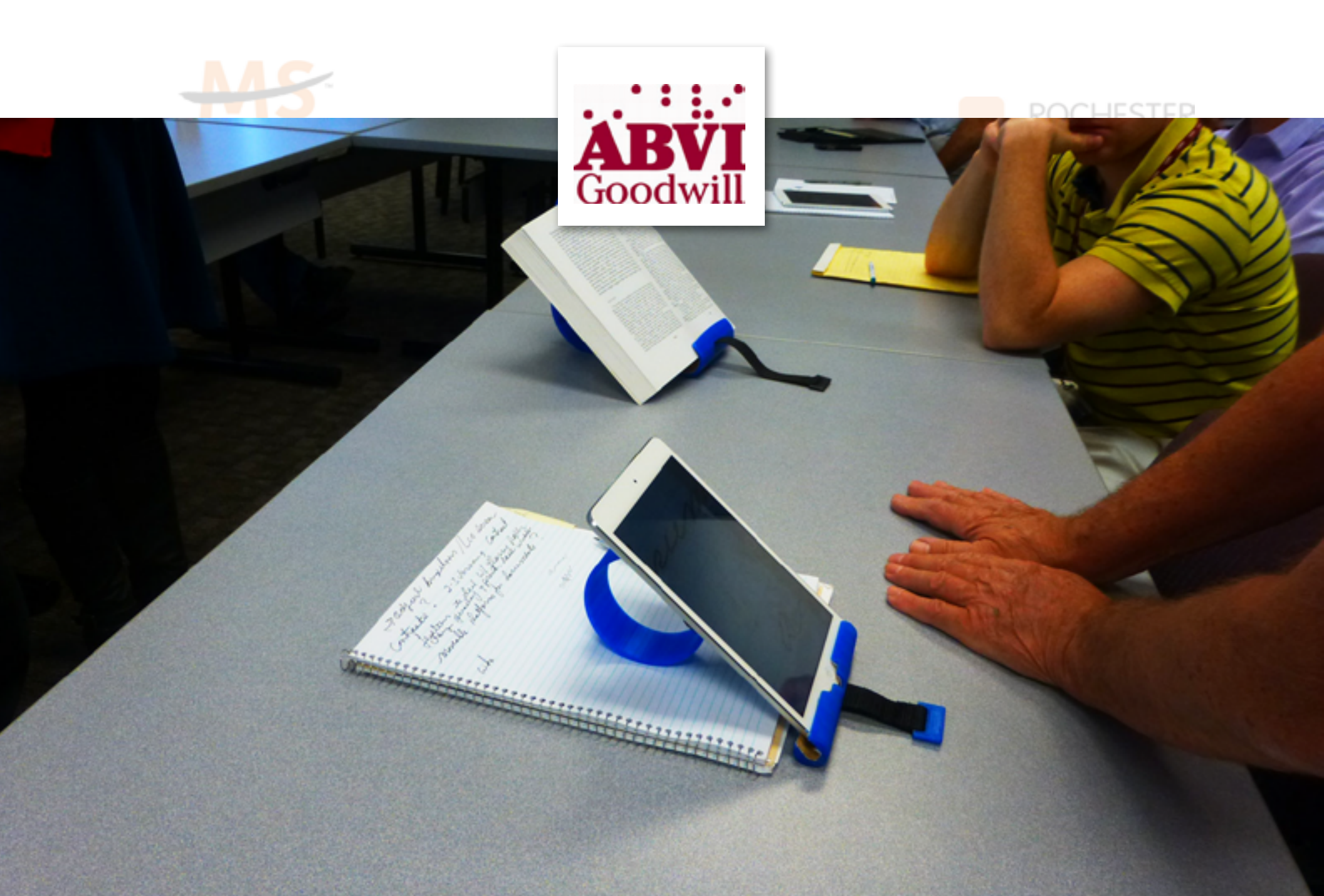
# NESTING



# FUNCTIONALITY







User reaction: first time that sees the prototype





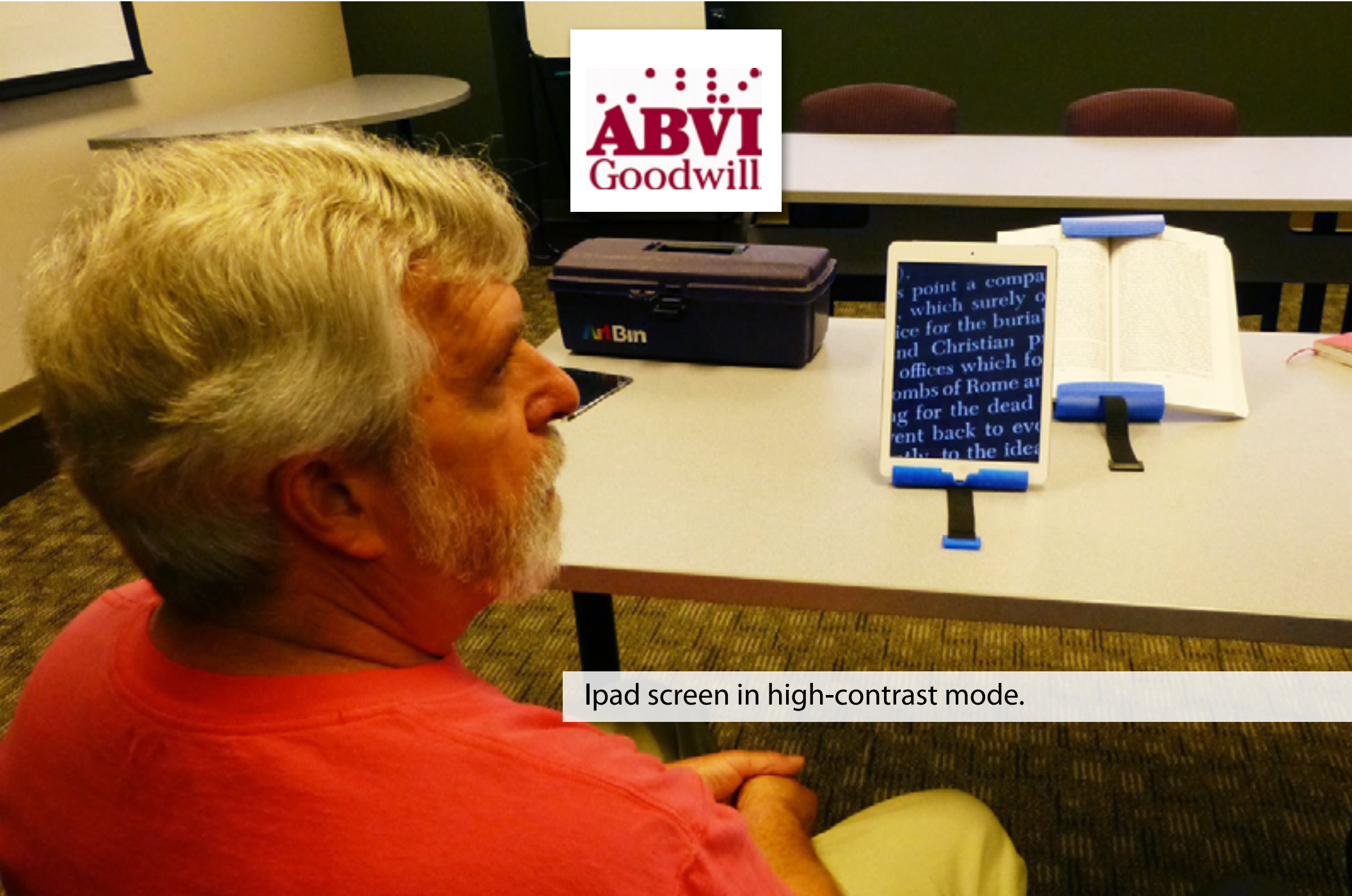
User adjusting stand's angle.





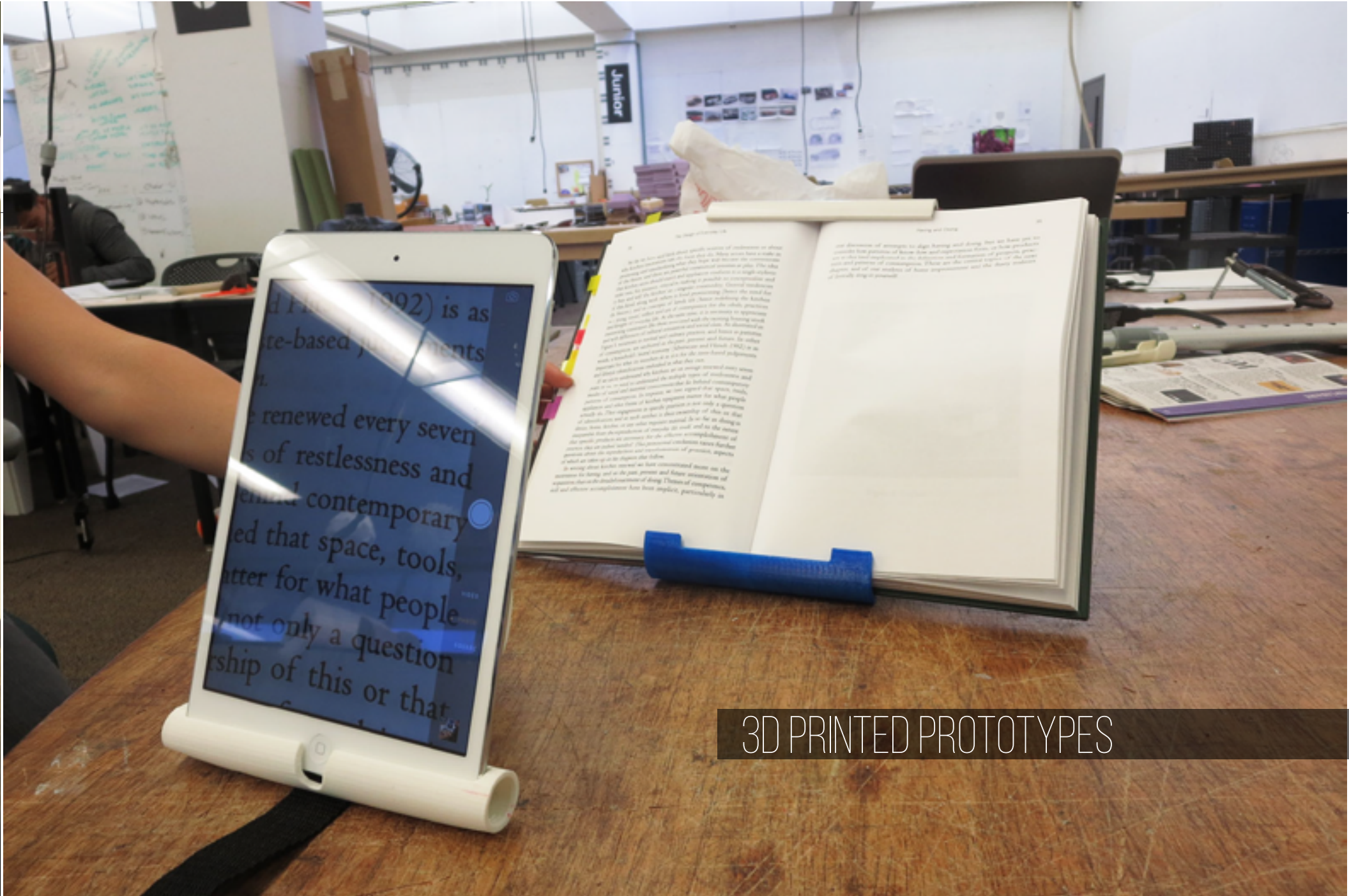
User putting Ipad stand over on-table text.





Ipad screen in high-contrast mode.





3D PRINTED PROTOTYPES

- *Portable*
- *Affordable*
- *Lightweight*
- *Versatile*
- *Simple*



## PROJECT 2

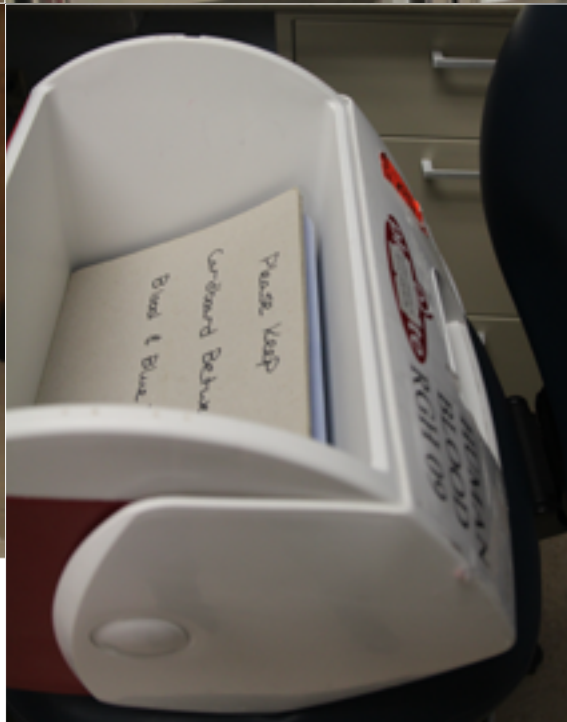


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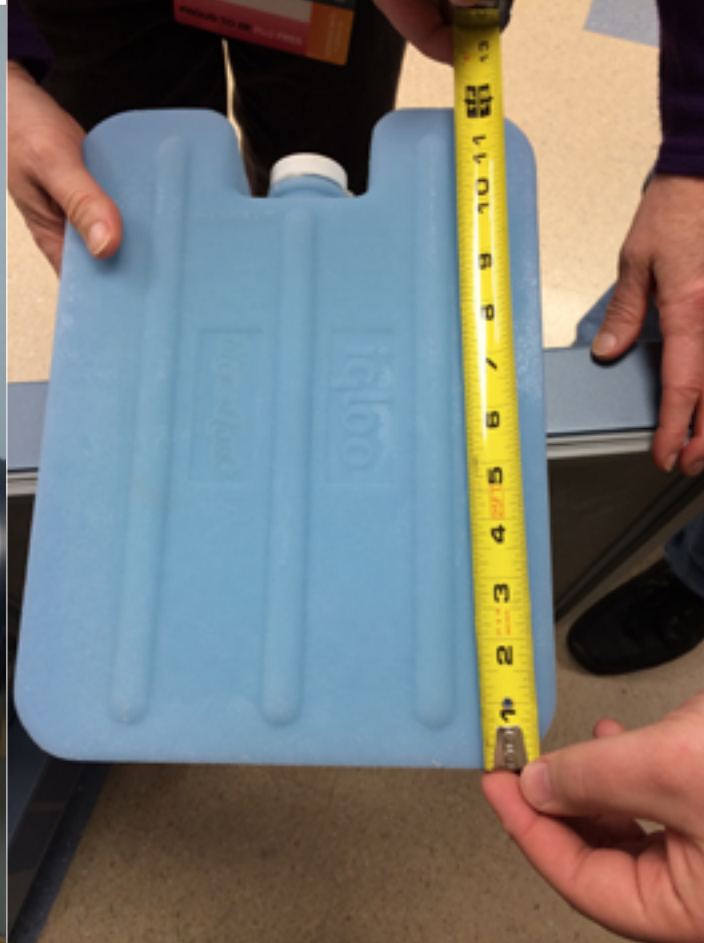


**Collaboration Project:** RIT + Blood Bank of the Rochester General Hospital + Innovation Center IdeaLab 2013-14  
Ice Pack redesign for the Cooler container to transport blood samples in the Blood Bank of RGH.

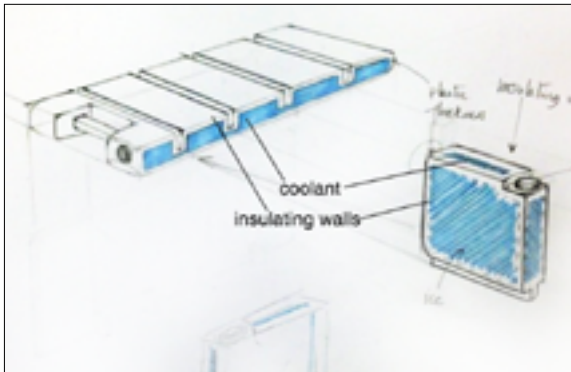






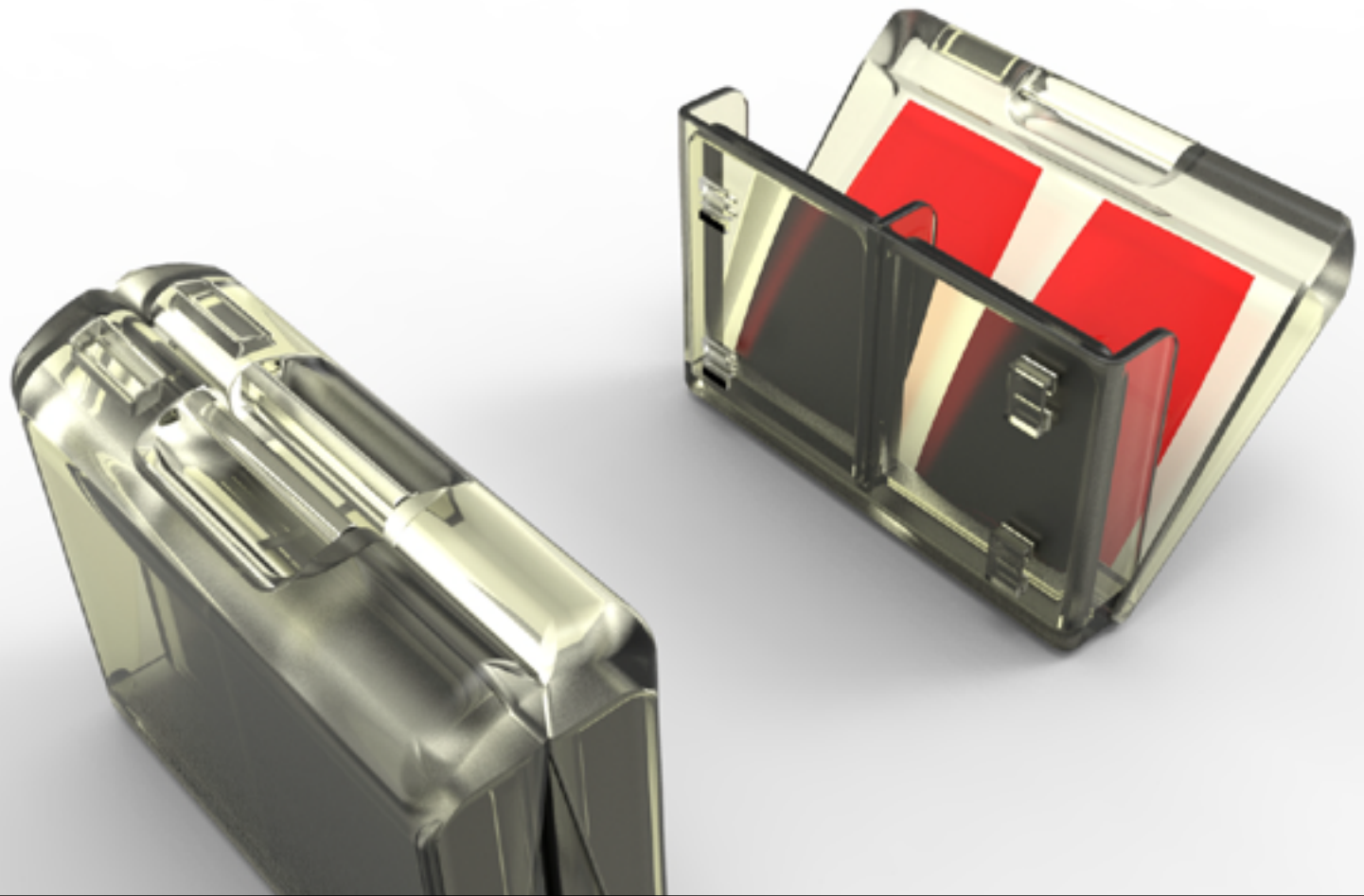


## DESIGN PROCESS



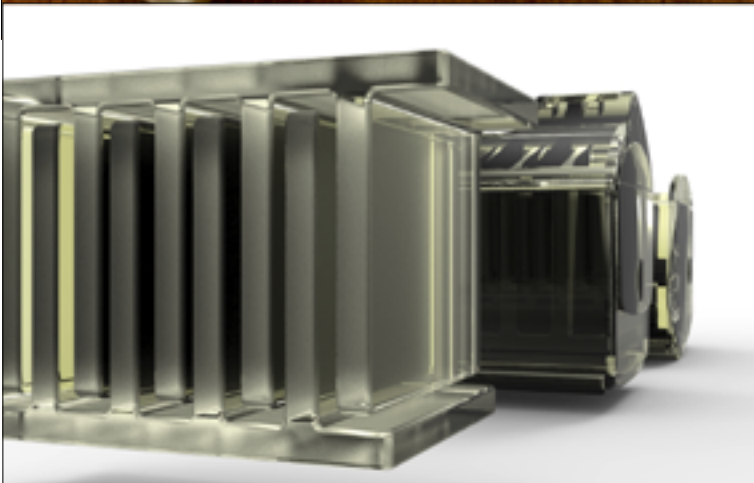
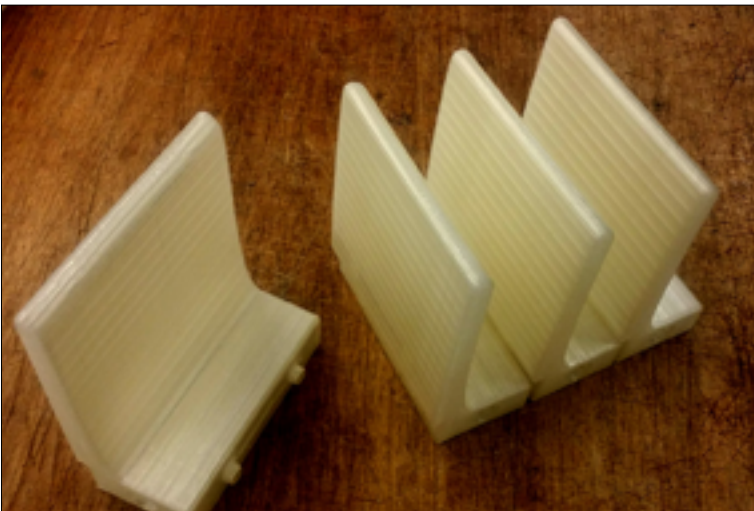


Collaboration Project: RIT + Blood Bank of the Rochester General Hospital + Innovation Center IdeaLab 2013-14





Collaboration Project: RIT + Blood Bank of the Rochester General Hospital + Innovation Center IdeaLab 2013-14



Prototyping: 3D printing models made with Fusion 360 STL files.

# CREDITS

## **ACADEMIC ADVISERS:**

Industrial Design: Stan Rickel / Business: Richard De Martino

## **SUMMER DESIGN TEAM:**

(ID) Yolegmma Marquez, (ID) Qunxi Huang, (ID) Patricio Corvalan,  
(ID) Zhuo Wang, (Eng.) Rohith Ganesan, and (Eng.) Matthew Bridges.

## **IDEALAB PROJECT:**

(ID) Yolegmma Marquez, (ID) Guillermo Fok, (ID) Aisha Iskandirani.