Better Together

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I'm an Occupational Therapist
You lost me at Occupation
@WTF_is_OT

What's Occupational Therapy?

"Occupational Therapy? Never heard of it."

"OT seems just like PT"

"Anyway, I don't really need help getting a job"

Interdisciplinary from the Start

The founders of occupational therapy at Clifton Springs Sanitorium in 1917.

Photo courtesy of the archive of the American Occupational Therapy Association, Inc.

Back row (from left):

- William Rush Dunton - psychiatrist
- Isabel Newton - *secretary*
- Thomas Bessell Kidner - *architect*

Front row (from left):

- Susan Cox Johnson - *teacher*
- George Edward Barton – *architect and patient (tuberculosis)*
- Eleanor Clarke Slagle - *social welfare reformer*

Not shown:

- Susan Tracy - *nurse*

Interdisciplinary Team

Summer 2021 Team

Pacific University Oregon

Vy Nguyen

Maya Cakmak

Kavi Dey

Tapo Bhattacharjee

R4H

Henry & Jane Evans

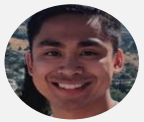
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Wendy Rogers

Harshal Mahajan

Travis Kadylak

Megan Bayles



Leo Galoso

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Aaron Edsinger

Charlie Kemp

Elliston Franks

Blaine Matulevich

Binit Shah

Aaron Edsinger
CEO

Charlie Kemp
CTO

Binit Shah
Software Lead

Blaine Matulevich
Engineering

Mohamed Fazil
Robotics Software Engineer

V Nguyen
OT Clinical Research Lead

Anna Garverick
Robotic Applications Engineering Intern

Alan G. Sanchez
Robotics Engineer Intern

Chintan Desai
Software Development Intern

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Summer 2022 Team

Wendy Rogers
Khan Professor of Applied Health Sciences

Harshal Mahajan
Assistant Director of Research at LIFE Home

Samuel Olatunji
Postdoctoral Research Associate

Megan Bayles
Graduate Research Assistant

Megan Bily
Undergraduate Research Assistant

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

R4H

Henry and Jane Evans
Robots for Humanity

Maya Cakmak
Associate Professor of Computer Science

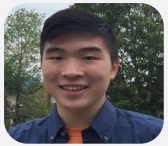
Graduate Research Assistants

Nick Walker

Vinitha Ranganeni

Research Interns

Kavi Dey



Brian Yao

Joe Sluis

UNIVERSITY OF WASHINGTON 1861

Participatory Design

Dynamic Duo

Courtesy of the Evans Family

Henry Evans

Courtesy of the Evans Family

Age: 60
Height: 6”4
Race: White
Sex: Male
Language(s): English
Glasses: Yes
Medical Condition: Basilar Artery Dissection; brainstem stroke; quadriplegia; non-speaking
Abilities: Cognition & sensation intact, slight left thumb flexion; functional neck mobility; expert robotics' user
Level of Assistance: Dependent in all activities of daily living (ADL) and majority of his instrumental ADL (IADL)
Technology Use: Computer, head tracker, mouse, telepresence robots, AutoBed
Roles: Family man, loving husband, advocate, car enthusiast, international speaker
Occupations: Playing cards, writing songs, socialization, watching YouTube, working, going outside

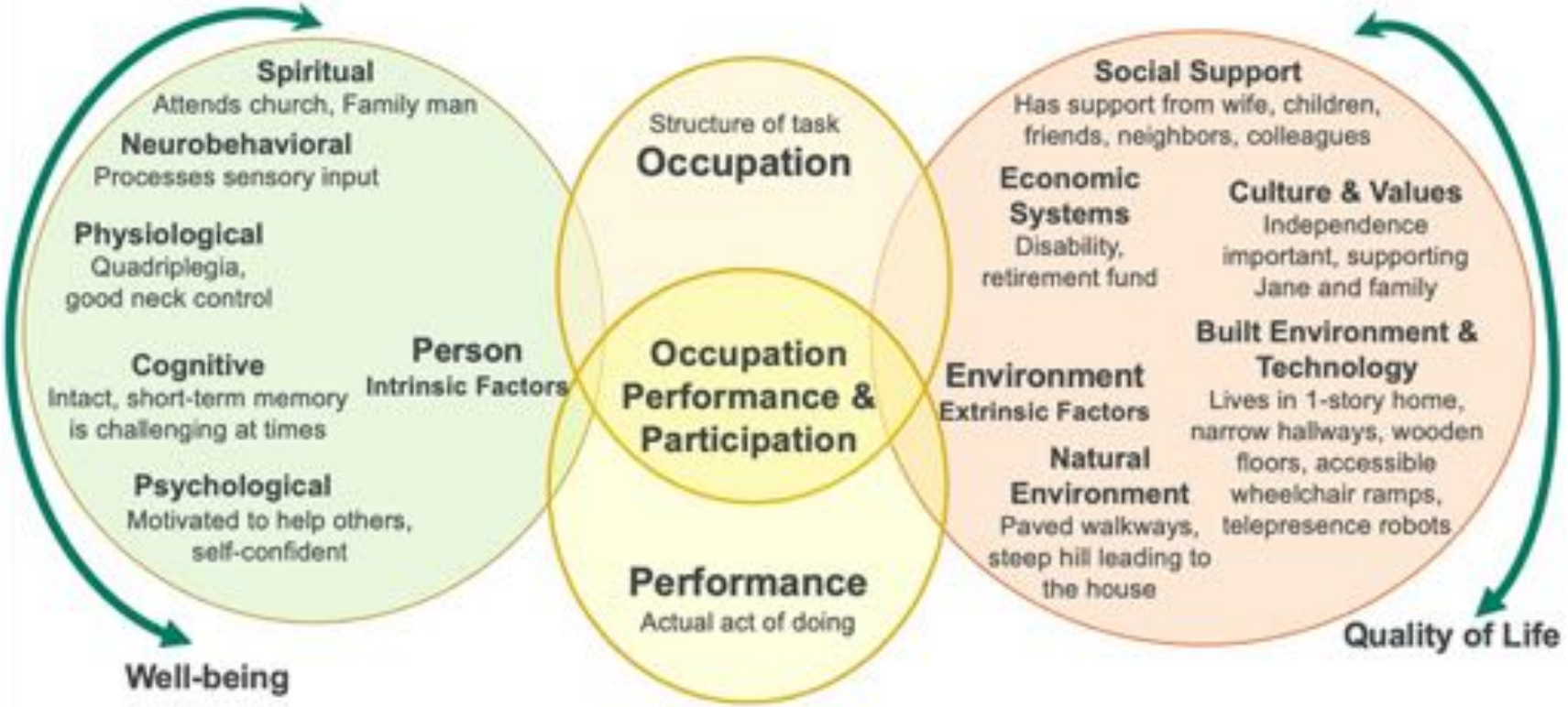
Jane Evans

Courtesy of the Evans Family

Age: 59
Height: 5”3
Race: Peruvian, German, Chinese
Sex: Female
Language(s): English, French
Glasses: Yes
Abilities: Letter board master, super-human
Level of Assistance: Independent
Roles: Extraordinary mother, wife, and care partner; advocate; speaker
Technology use: Smart Phone, Alexa, computers, some robotics
Occupations: Cooking, hiking, reading, writing, fishing

Needs Assessment

Person-Environment-Occupation-Performance (PEOP) Model



User-Centered Assessments

Canadian Occupational Therapy Measure (COPM)

Trust Questionnaire

GAS 5-Point Rating Scale	
Score	Predicted Attainment
-2	Much less than expected outcome
-1	Less than expected outcome
0	Expected outcome after intervention
+1	Greater than expected outcome
+2	Much greater than expected outcome

Fig. 1. Scaled Levels of GAS (McDougall & King, 2007, p. 4)

Goal Attainment Scaling

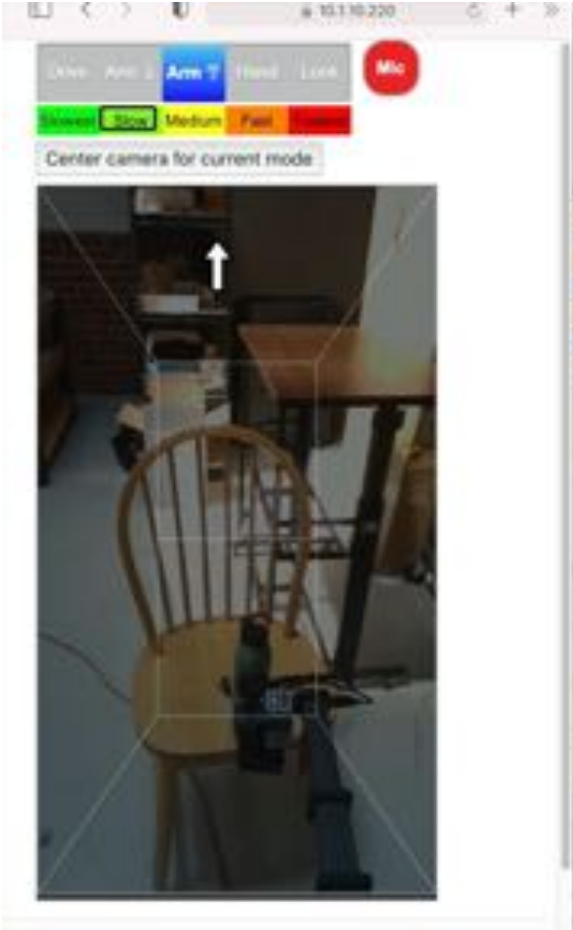
NASA Task Load Index

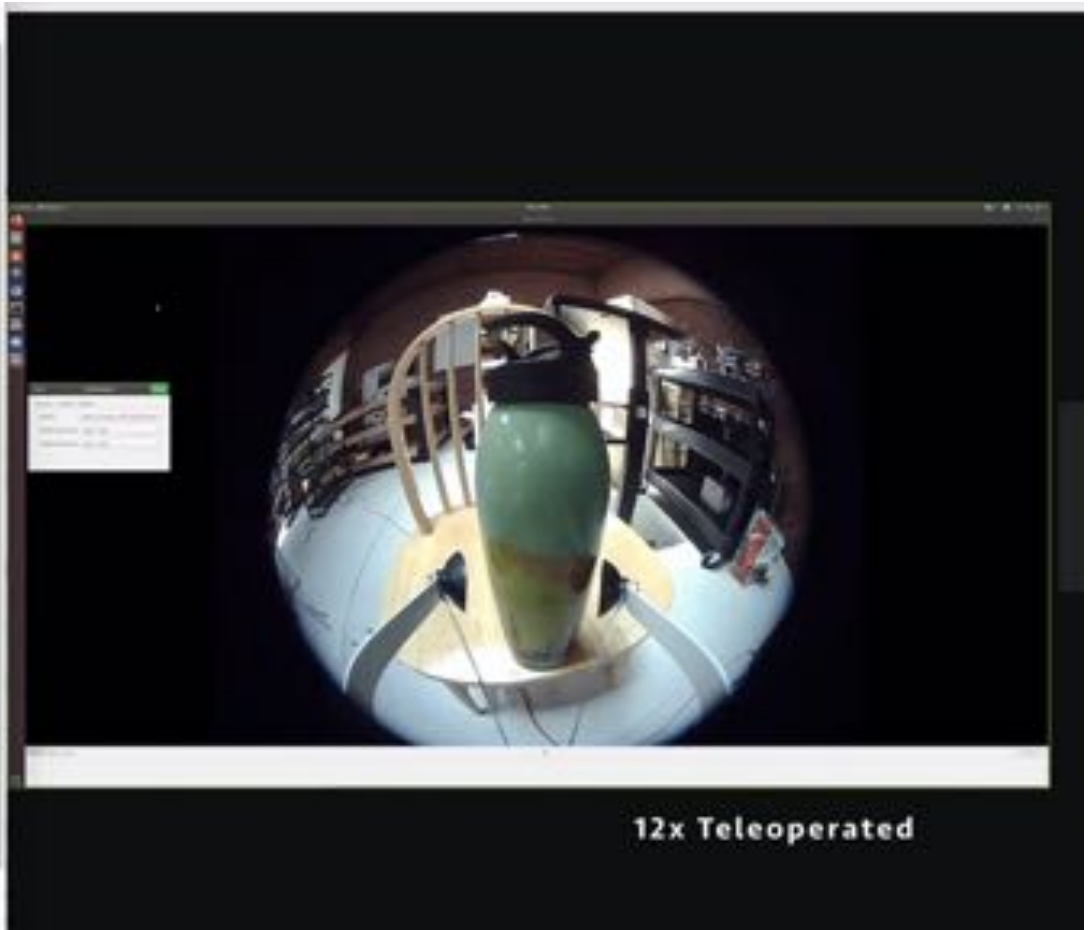
Perceived Ease of Use

Evaluating Stretch's Customized Settings

Iterative Process

Summer 2021


Arm ↑
Mic
Slow
Medium
Fast
Center camera for current mode


12x Teleoperated

STRETCH CONTROLS

Slowest | Slow | Medium | Fast | Fastest

Labels On/Off

Contrast

Light On/Off

Camera Controls

Labels On/Off

Contrast

Light On/Off

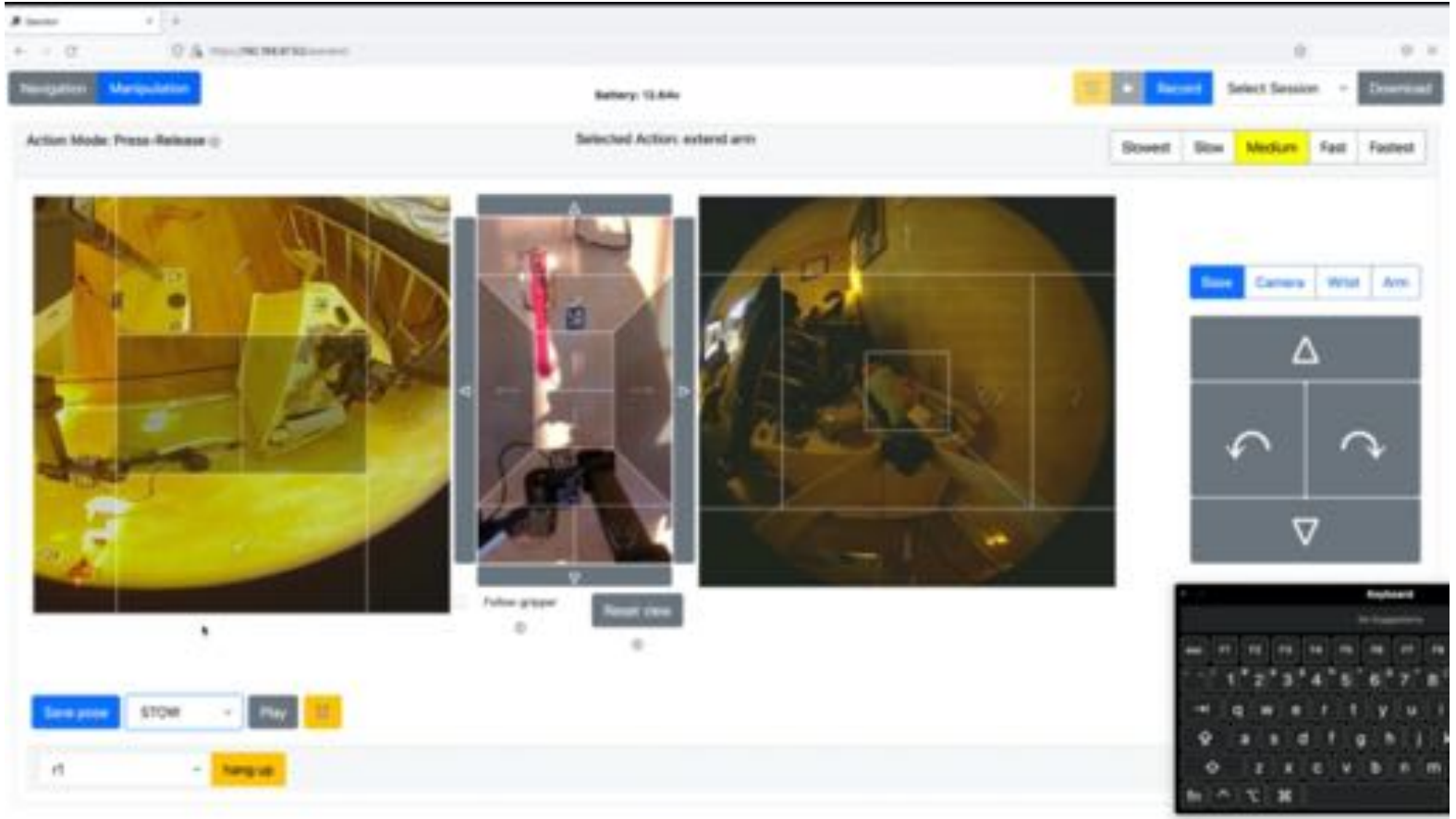
Navigate

Manipulate

Prepare Arm

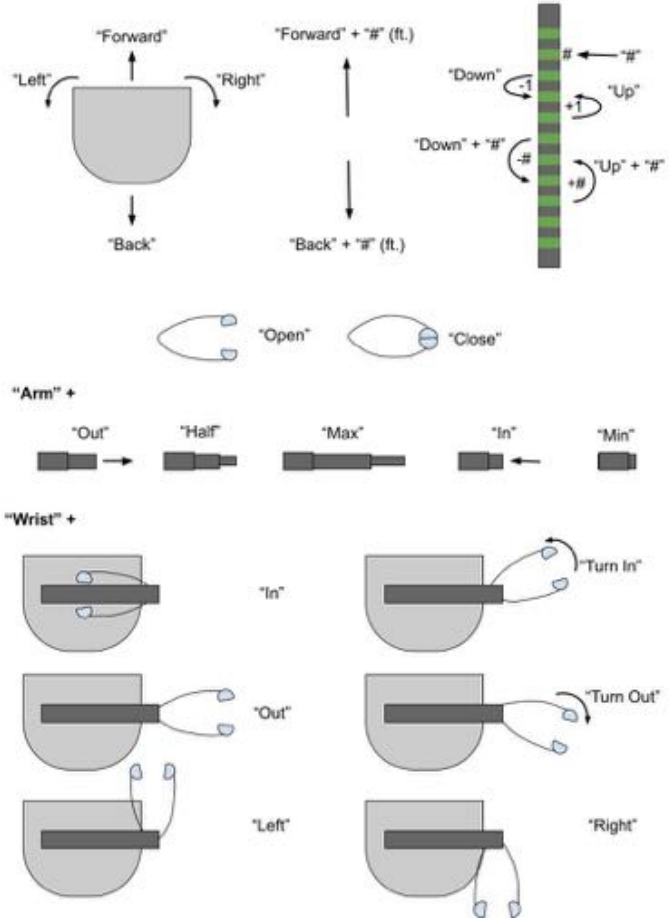
Stow Arm

Summer 2022


Navigation
Manipulation
Record
Select Session
Download
Action Mode: Press-Release
Selected Action: extend arm
Slowest
Slow
Medium
Fast
Fastest
Base
Camera
Wrist
Arm
Follow gripper
Reset view
Save pose
STOW
Play
hang up

Voice Commands

This is an illustration of the Voice Commands for Stretch



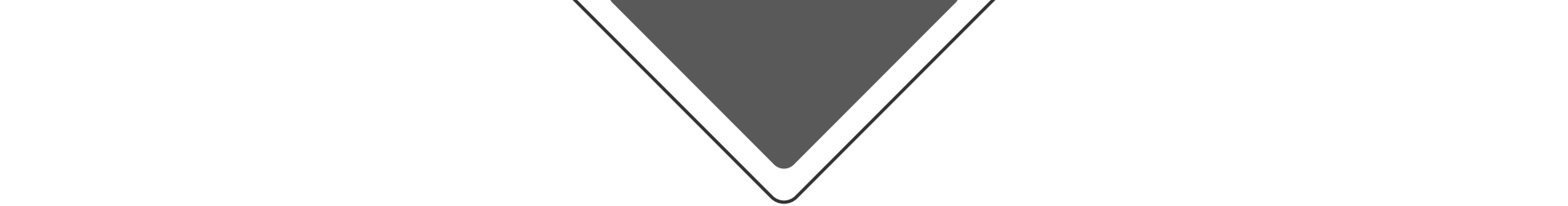
Making Suggestions

Adding Visual/Tactile Cues

What do the tape strips mean?

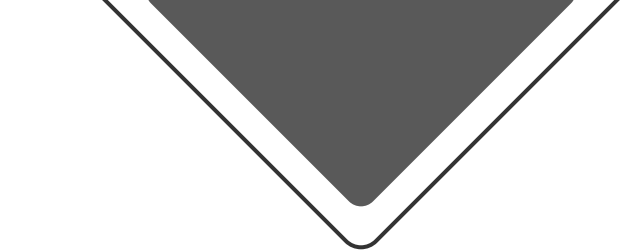
- Say ’#’ = Stretch’s arm will go to that number
- Examples:
  > Say ‘1’ = Stretch’s arm goes to it’s lowest
  > Say ’10’ = Stretch’s arm goes to it’s highest

Tasks Performed



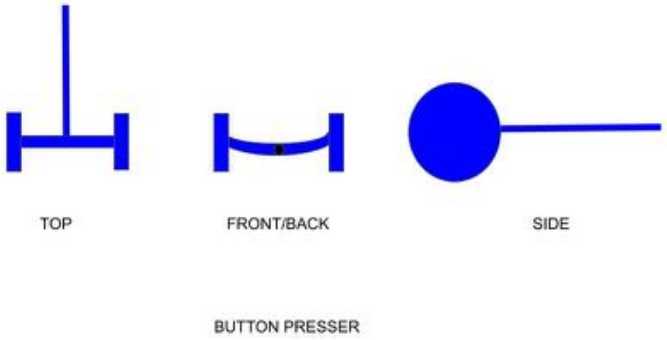
Self-feeding

Tools



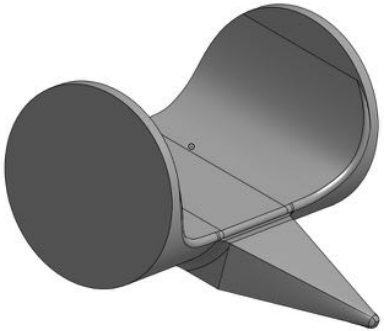
Percussion Vest Machine

Design Process of Button Pushing Tool



1. Henry's Design

Henry created the above design using Google Slides. The tool has a curve in the middle to ensure the gripper camera has a clear view of the button on the percussion machine.

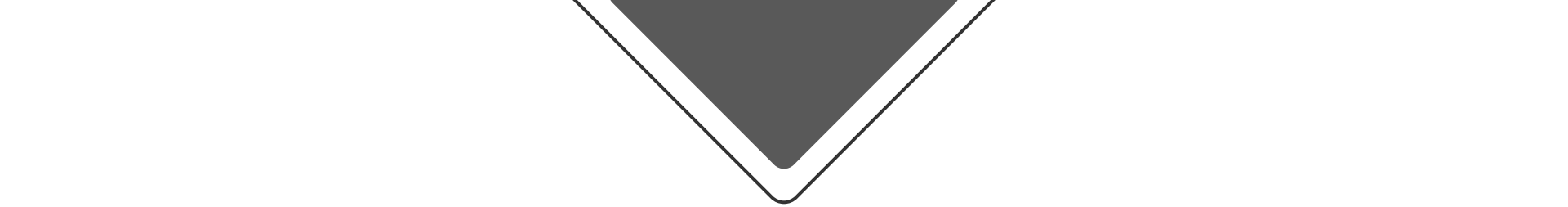


2. Anna brings The Design to Life

Anna used computer-aided design (CAD) to create a 3D printed version of the Henry's design.

3. 3D Printed Tool

Above is the final product! The tip is highlighted with green tape. The two supports on the side of the tool prevents it from sliding from the original angle optimal for pushing the button.



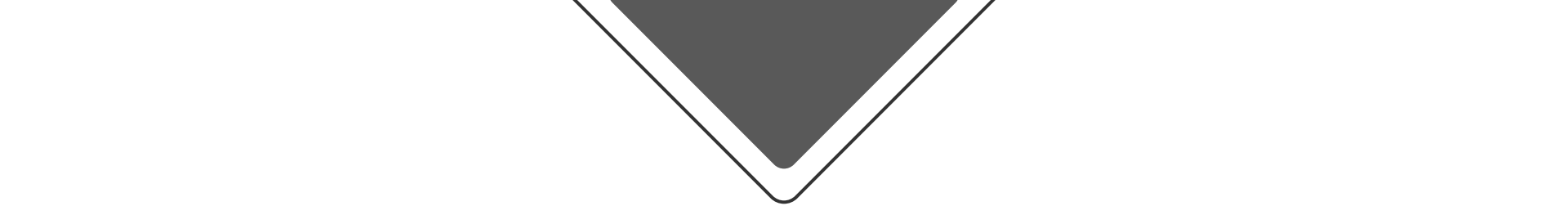
Stretchercise

Home Page

Jane selects her desired exercise from this ’Home Page.’
This ‘Home Page’ pops up whenever she is finished with an exercise.

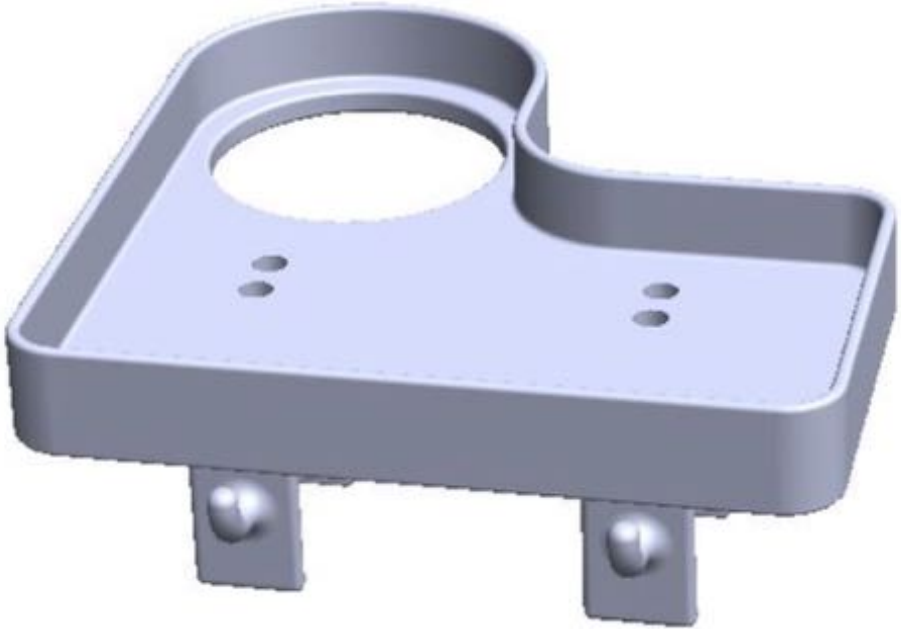

3

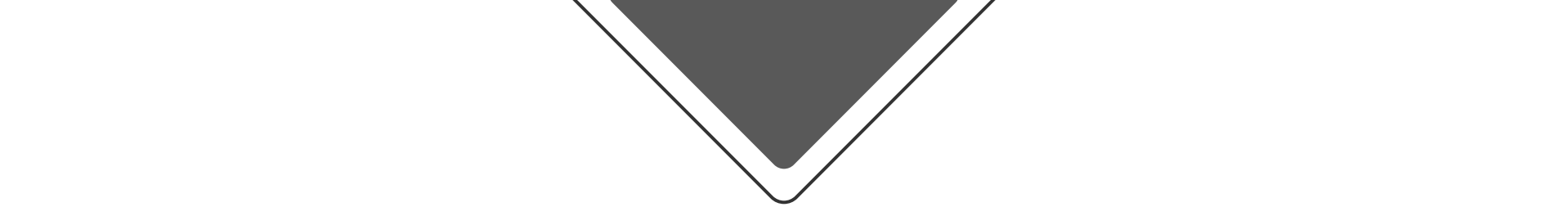

Nice work!



Meal Delivery
&
Clean Up

Arm-Mounted Tray

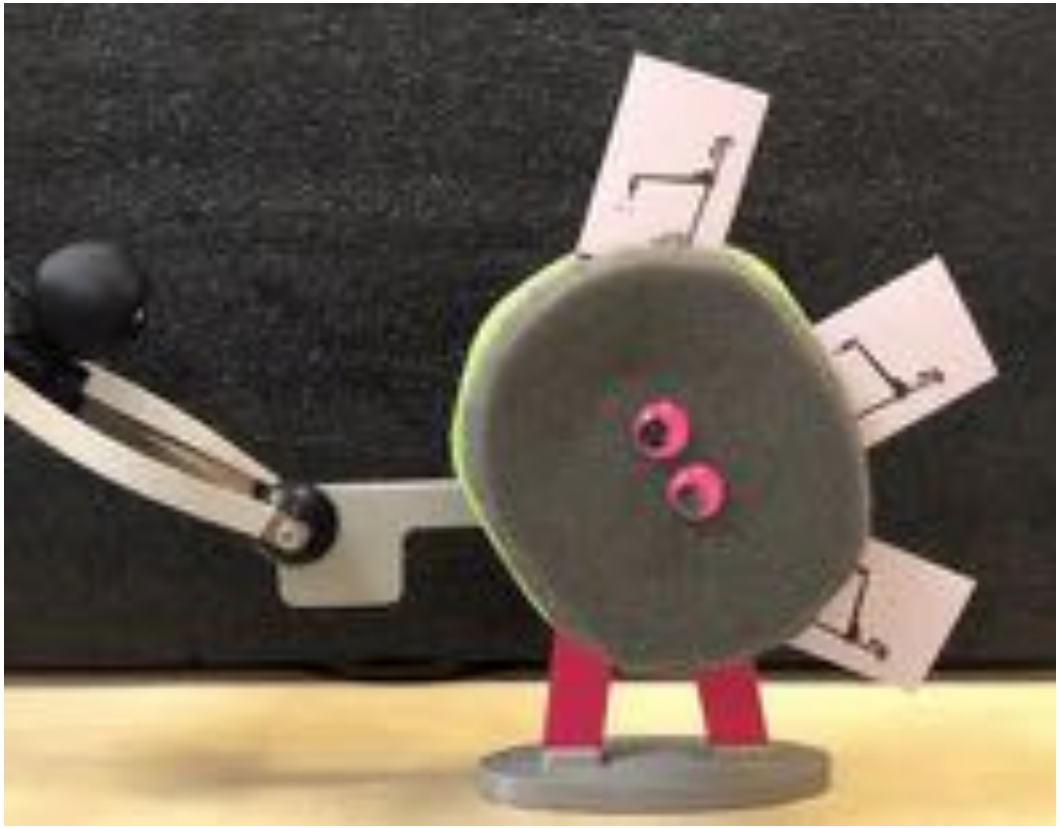




Playing Card Games

Summer 2021 Tool

Summer 2022 Tool



A Happy Straight in Poker

Access to Care

The collaboration between occupational therapy and engineering can bring complementary perspectives together to create technology that makes a pinnacle impact to a person, their communities, and in everyday society.

Thank you!