BME Design-Fall 2025 Complete Notebook

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Lucy McArdle

on

Dec 12, 2025 @04:47 PM CST

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David Diancin - Sep 11, 2025, 10:39 AM CDT

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Smith	Sydney	Communicator	slsmith42@wisc.edu				
Klenner	Gabe	BSAC	gklenner@wisc.edu				
McArdle	Lucy	BWIG	lmcardle@wisc.edu				
Hain	Lauren	BPAG	lhain@wisc.edu				



SYDNEY SMITH - Dec 10, 2025, 11:18 AM CST

Course Number: BME Design 200/300 Lab 303

Project Name: UW Adapted Fitness: Grip strength improvement mechanism

Short Name: Grip Strength Mechanism

Project description/problem statement: Individuals in the UW Adapted Fitness program may face challenges with grip strength that limit their ability to perform daily tasks and participate in exercise. A longtime client with reduced grip strength in one hand has worked consistently to improve function but still struggles with both everyday items and workout equipment. Current tools in the Conway Adapted Fitness space are not tailored to his needs, creating a gap in training effectiveness. This project aims to design a safe, affordable, and user-friendly mechanism to support targeted grip training, improve independence, and enhance the client's overall fitness experience.

About the client: Our client is a TBI survivor with hemiplegia on the right side of their body. They attend the Adapted Fitness program at the Bakke, where they complete physical therapeutic exercises to strengthen their right hand so they can eventually open it to a flat hand. His hand is currently stuck in a fist and has complete weakness of muscle on his right side. Our goal will be to create a device for physical therapeutic training, acting as stronger tendons to help create tension and pull his finger more open, eventually leading to a fully open hand over time.

Lucy McArdle - Oct 24, 2025, 12:51 PM CDT

Title: Client Questions

Date: 9/12/2025

Content by: Gabriel Klenner

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith

Goals: Come up with questions for clients

Content:

What didn't work with previous designs that needs to be added/improved upon?:

Could not open the hand at all, very tightly grasped

What is our budget for this project?

How long do you intend to use this product?

Would like to use it as home as well, timeline for as long as he can tolerate the glove

Are there any size and weight requirements?

What's the best way we can contact you?

What type of material would you recommend we use?

Are aesthetics a priority or only function?

Style of the glove, but priority is function

Where is this product going to be used (gym, home, physical therapy etc.)

Conclusions/action items: Once we meet with our client we will ask these questions and use their answers to complete our PDS draft.

David Diancin - Sep 22, 2025, 2:48 PM CDT

Title: Meeting with Dr. Doyle

Date: 9/19/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith, Dr. Doyle

Goals: Get a better understanding of the adapted fitness area and introductions with Dr. Doyle

Content:

Dr. Doyle is in charge of a program at the adapted fitness area of the Bakke where she has multiple clients from the greater Madison area that have a goal of improving themselves. They work with a small team of kinesiology students here at UW Madison to reach their goals with the equipment and teaches from the Adapted Fitness area with Dr. Doyle.

What's the best way we can contact you?

- The best way to contact Dr. Doyle is through emailing her and the adapted fitness email to include her assistant Deanna Hebbring.

Where is this product going to be used (gym, home, physical therapy etc.)

Conclusions/action items:

- Continue brainstorming ideas for a solution individually and prepare for zoom meeting with Client(John)

2025/10/10 Meeting with Dr. Doyle and John

Lucy McArdle - Oct 12, 2025, 8:22 PM CDT

Title: Meeting with Dr. Doyle and John

Date: 10/10/25

Content by: Lucy McArdle

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith, Dr. Doyle, John

Goals: Meet and introduce ourselves to John, obtain hand measurements

Content:

We met with John for the first time and after introductions we measured his hand and gained a better understanding of the resting state of his right hand.

Measurements:

Wrist to thumb: 13.5 cm Across knuckles: 13 cm Middle length: 10 cm Index length: 8.5 cm Ring length: 8 cm Thumb length: 5.5 cm Pinky length: 9 cm

Wrist to middle knuckle: 11 cm Wrist circumference: 16.5 cm Pointer circumference: 5.5 cm Middle circumference: 5.5 cm Pinky circumference: 5 cm Thumb circumference: 5.5 cm Ring circumference: 5.5 cm

2025/11/09 Meeting with John and Leslie

GABRIEL KLENNER - Nov 10, 2025, 6:08 PM CST

Title: Meeting with John and Leslie

Date: 11/09/2025

Content by: Gabriel Klenner

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith, Dr. Doyle, John, Leslie

Goals: Have john try on the left glove and get some hand measurements by marking a rubber band

Content:

Before presentation on December 5th:

- · Get handicapped parking for Leslie and John
- Email Leslie a map for parking and the exact details of the event

Rubber band markings:

- Blue Index
- Black Middle
- · Red Ring
- · Green Pinky
- Purple Thumb

Conclusions/action items:

Use these measurements as we continue to create or final product and stay in touch with Leslie and John as they want to come to the final presentations on December 5th.

David Diancin - Sep 22, 2025, 3:51 PM CDT

Title: Advisor Meeting

Date: 9/22/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith

Goals: Establish a weekly meeting time and fill in Professor Bartels on progress

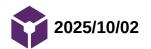
Content:

How will notebook checks be graded and how many research entries should we have?

Do we need to completely fill out the design matrix by Thursday with our current desgins?

Conclusions/action items:

- Begin compiling ideas and



GABRIEL KLENNER - Oct 02, 2025, 5:20 PM CDT

Title: Advisor Meeting

Date: 2025/10/02

Content by: Gabriel Klenner

Present: David Diancin, Lauren Hain, Gabriel Klenner, Lucy Mcardle, Sydney Smith, Randy Bartels

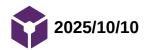
Goals: Get feedback on design matrix and preliminary presentation

Content:

- · Went over Design Matrix
- Focus on the issues with the design we chose (safety of rubber bands)
- Highlight difficulties and issues with other designs in presentation
- Quantify values on design matrix, make sure it is testable
 - o e.g. patient comfort: how long does it take to put on?
- Think about how our design could go wrong and what we can do to fix it now
 - How will we respond to questions?
- · Practiced presentation

Conclusions/action items:

Think about these topics when preparing for the preliminary presentation.



GABRIEL KLENNER - Oct 10, 2025, 12:17 PM CDT

Title: Advisor meeting

Date: 10/10/2025

Content by: Gabriel Klenner

Present: David Diancin, Lauren Hain, Gabriel Klenner, Lucy Mcardle, Sydney Smith, Randy Bartels

Goals: Get feedback and advice from Prof. Bartels

Content:

Recommendations:

- · Research elastic deformation
- measure how much force it takes to open clients hand (each finger)
- phantom finger for testing, spring loaded joint
- Consider a switch to activate/deactivate
- Use screws that can increase/decrease tension
- Build ASAP
- Research if any forms are required before testing on patient

Conclusions/action items:

Use the recommendations when building our first prototype



GABRIEL KLENNER - Oct 17, 2025, 2:16 PM CDT

Title: Advisor Meeting

Date: 10/17/2025

Content by: Gabriel Klenner

Present: David Diancin, Lauren Hain, Gabriel Klenner, Lucy Mcardle, Sydney Smith, Randy Bartels

Goals: Financing Sheet and share progress with Prof. Bartels

Content:

- 3D Printing Process
- Locate a Force Gauge
- Think about angles and directions of forces to pull up fingers
- Shared Funding Sheet with Prof. Bartels

•

Conclusions/action items:

SYDNEY SMITH - Sep 12, 2025, 1:08 PM CDT

Title: Progress Report 1

Date: 09/11/2025

Content by: Sydney Smith

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Continue research, meet with client and advisor, start PDS, work on individual's goals.

SYDNEY SMITH - Sep 12, 2025, 1:04 PM CDT

Title: UW Adapted Fitness: Grip strength improvement mechanism

Claire 08/10.0025
Client: Dit Percis Doyle
Addison Dit Randy Bartis IT-Teart
Client Directin - Sean Leader
Sydney Smith - Core me stoater
Cather Millermen - ISSAC
Leap Millert In- BMMG
Lauren Hain - BMAG

Problem statement

Included as in the LVM Adapted if frees page on may bee chellenges with gips steright had land, their ability to perform day below and participate incouncies. A language or early extraordinate statement of the steright incouncies. A language with total statement of the statemen

Brief status update

On ear instance upposes:

Our group here into per acquirind and begun coordinating next stape. We have sea hed out to the client, Dr. Nacch Dayle, beschedule a resulting and are availing and able obtain.

Additionally, a result of Wet staker's, former lam, who previously verside on this paper individually, has reached out and will be collate sting with us and the client moving forward.

Download

Progress_Report_1.pdf (92 kB)

David Diancin - Dec 04, 2025, 1:31 PM CST

Title: Progress Report 2

Date: 09/18/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Continue research, meet with client and advisor, work with Simon Nam work on individual's goals.

David Diancin - Dec 04, 2025, 1:32 PM CST

Title: UW Adapted Fitness: Grip strength improvement

mechanism

Date: 09/18/0025 Sydney Smith - Con ma ricutor

Problem statement

Individuals in the UM Adapted Fferess pagain may bee challenges with grip stempth that lank their stelly to perform day below and participate incounces. A langther dark with reduced grip stempth man and the sourced consistently to previous participants at 18 may page with the see going terms and vortical quipment. Currant facels in the Connexy Adapted Fferess space are not to like also be in reads, creating a pay in training self-connexes. The payed carbon to design a sale, affordate, and user benefit when the support bageled grip techniquing regions.

Brief status update

Les est in Acquise UpDatte.

Our group hee helt meetings as a gerup and individually with Simon hiere, who proviously worked on this popict, and Dir Puscuriel to get a before undividual noting of our end goal. We nearched out and have activated a meeting with Dr. Nacia Doyle that Pittly to get us (similated without adapted through and the district for our project with to for the debrives a scheduled meeting with our advisor need week Wednesday.

Download

Progress_Report_2.pdf (91.4 kB)



David Diancin - Dec 04, 2025, 1:34 PM CST

Title: Progress Report 3

Date: 09/25/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Create preliminary presentation, begin fake prototype of finger, meeting with advisor and document advice.

David Diancin - Dec 04, 2025, 1:34 PM CST

Title: UW Adapted Fitness: Grip strength improvement

mechanism Date: 08/25/00/25

Client: Dr. Recis Doyle Advisor Dr. Randy Bartinis Tears Coolie Marsten David Diancis - Tears Leader Sydney Snith - Cors na stoater

Lacy Mixed in - BWIG

Problem statement

Individuals in the UM Adapted Fferess pagain may bee challenges with grip stempth that lank their stelly to perform day below and participate incounces. A langther dark with reduced grip stempth man and the sourced consistently to previous participants at 18 may page with the see going terms and vortical quipment. Currant facels in the Connexy Adapted Fferess space are not to like also be in reads, creating a pay in training self-connexes. The payed carbon to design a sale, affordate, and user benefit when the support bageled grip techniquing regions.

Brief status update

This weak, we met with our claim, Dr. Coyle, who introduced us to the boutly at the Abspect Pierses Central Coyling or walk, we have the beating wind observed the different workout machines and sequipment that our other claim. John, usees for physical the eapy. We were storp generated access to the facility and are in the process of compating our HPBA4 training. In addition, we make with our advisor for the facilitims, when we learned about his expectations for the project. Finally, we developed our design matrix where each has manning proposed these designs, and to gather we veled to cream them down to the big these.

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Progress_Report_3.pdf (167 kB)

David Diancin - Dec 04, 2025, 1:36 PM CST

Title: Progress Report 4

Date: 10/2/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Form a budget, research more materials and components needed, meet with client.

David Diancin - Dec 04, 2025, 1:36 PM CST

Title: UW Adapted Fitness: Grip strength improvement

mechanism

Date: 10.00025 Client: Dt. Kecia Doyle Advisor Dt. Randy Boris is Teatr: Cookie Mareters Clavid Diancis - Team Leade Sydney Smith - Core resilicator Gebrie Mienner - ESAC

Lucy Montile - RWIG

Individuals in the UM Adaption of Ferman program may be a challenges with grip stempth that land: their adally to perform day below and performs in eventue. A langthm offers with reduced grip stempth in one and has were identificating to improve unification but distinctions with other complete with total energity ferman and various designers. Custom facels in the Content, Adaption Ferman space are not to be not to the mode, costing an good in harming distinctions. This possible draws to design a make affectable, and such extension the support largested graphed graph to farming, improve independence, and extension of extension according to the content of the

Brief status update
This was, we finished our design motifs and selected our first design correct, We also completed our present prices of a second processor presentation and prepared determination make their processor and processor presentation the "Resilv. Additionally we make their finishing control and control an

Major team goals for the next week

1. Sing it prototyping and build ing take fingers to be mady to test certain designs.

Download

Progress_Report_4.pdf (163 kB)

David Diancin - Dec 04, 2025, 1:37 PM CST

Title: Progress Report 5

Date: 10/9/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Confirm order materials list for ordering, look for improved materials, submit a budget to BME department.

David Diancin - Dec 04, 2025, 1:38 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: Dt. Kecis Doyle Advisor Dt. Randy Borle is Teatr: Cookie Marsters David Dianele - Tears Leader Stydney Smith - Communicator Cabriel Klerner - 85AC Lacy Mount in - BWIG

Including the Intel-WinAppled Fitness program may be challenges with grip storighthat limit filerinality to perform due to the participation in exercise. A largetime due to ethnicized grip storighthan on and has we related considering to improve participation state filering storight exercise may be a supported by the state of th

This weak we completed our preliminary-design aport and have chosen serve initial materials to begin to order With have also begin to be trained the sent lands of mattacks of creating a central passe that connects at the nucleor to make while still seasy being able to hook order distincts in the connects at the nucleor to make while still seasy being able to hook order distincts in the connects and make the nucleor to the distinct and the nucleor to the distinct and the nucleor to the distinct and the nucleor to the nucleor t

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David Diancin - Dec 04, 2025, 1:41 PM CST

Title: Progress Report 6

Date: 10/16/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Begin 3D printing, confirm order for materials

David Diancin - Dec 04, 2025, 1:41 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: De Nacia Doyle Advisor De Randy Boris is Trans Cookin Manten. Dovid Dismeir - Team Leader Sydney Smith - Communicate Cliente (Kienner - BSAC Lary Mountle - BMIC)

Problem statement

Including the Intelligence of the Intelligence of the Intelligence with grip storaghthrottel limit inheritability to perform daily below and performs in recent to A. Intelligence with order storaghthrone and how worked considering to improve principle recent below the Intelligence with both energically there and worked outpresent. Current facels in the Conseny Adepted Pirmos space are not to be and to the meed, creating a page in Intelligence intelligence and the Intelligence and the Intelligence and user-facels are intelligence and user-facels are intelligence and user-facels are intelligence and inte

Brief status update

This weak, we confirmed the malerials for our probleps and bagen 3D printing the rings and giove backing. We also that our client at the LTW Adapted Fitness Center to take accusate measurements of their hand.

Major team goals for the next week

Confirm order for materials that will be used to prototype.
 Confinue to bok for materials or components needed to improve prototype fabrication.

Download

Progress_Report_6.pdf (161 kB)



David Diancin - Dec 04, 2025, 1:42 PM CST

Title: Progress Report 7

Date: 10/23/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Continue to resize 3D print, attach plastic backing to glove

David Diancin - Dec 04, 2025, 1:43 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: Dit Necis Dayle Addisor Dit Randy Barels Team Cookle Mit Inten David Dismoin - Team Leader Sydney Smith - Communicated Calonia (Kienner - BSAC Lecy Mountie - BWIC)

Problem statement

Including the Intelligence of the Intelligence of the Intelligence with grip storaghthrottel limit inheritability to perform daily below and performs in recent to A. Intelligence with order storaghthrone and how worked considering to improve principle recent below the Intelligence with both energically there and worked outpresent. Current facels in the Conseny Adepted Pirmos space are not to be and to the meed, creating a page in Intelligence intelligence and the Intelligence and the Intelligence and user-facels are intelligence and user-facels are intelligence and user-facels are intelligence and inte

Brief status update

This week, we printed our field 3D PLA ring, but a recountered a sizing error. We then so pinted the resized ring with the new backing piele and backing connector, all of which were made for PLA.

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Progress_Report_7.pdf (161 kB)

David Diancin - Dec 04, 2025, 1:45 PM CST

Title: Progress Report 8

Date: 10/30/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Fabricate a working prototype.

David Diancin - Dec 04, 2025, 1:45 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: Dit Necis Dayle Addison Dr. Randy Bankis Team Cackle Ministers David Dismoin - Team Leader Sydney Smith - Commissionto Cachel Klemmer - BSAC Leay Mountle - BWIG Leave Media - RMIG

Problem statement

Including the Intel-WinAppled Fitness program may be challenges with grip storighthat limit filerinality to perform due to the participation in exercise. A largetime due to ethnicized grip storighthan on and has we related considering to improve participation state filering storight exercise may be a supported by the state of th

Brief status update

Bifet status update

The weak we have creded of EL/ring we are confident about but without first TPU prints of
the rings, we can this a support printing enter zince TPU does not support supports when
printing, our second by with TPU used to first give without any supports when
printing, our second of yether TPU used to first give without print supports and calcast ring that
would be slipped on resided of trying to old them. We also cut out a gardening glove and
severed on a policitor for the backing public to go that public yet.

Download

Progress_Report_8.pdf (12.4 MB)

David Diancin - Dec 04, 2025, 1:46 PM CST

Title: Progress Report 9

Date: 11/6/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Finalize initial prototype, begin testing with client.

David Diancin - Dec 04, 2025, 1:46 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: Dit Necis Dayle Addisor Dit Randy Boreis Tearr Cookle Ministers David Disnele - Tearr Leader Sydney Smith - Commissionic Cabriel Klenner - BSAC Lecy Mountle - BWIG

Problem statement

PTODISM Industrial results in the UM Adapted Finess program may be challenges with grip sterighthat limit their stallight performability below and participate in exercise. A language dark with molecular grip sterightmore hand have winded considering to impose burden has still shappies with both executing the valent of explanation. Consider facility in the Consey Adaptive Piness space are not below do to the creating a gap in insimilar effectiveness. This project aims to design a seek, affectable, and use Sensity wearch existing all graphs are insimilar proposed independence, and enhance the client's owner! (Timess experience.)

Brief status update

This weak, we printed TPU rings in verious alons and affacted Schooles to the rubber bands. Luing head-ethnik Lubing, On Pridary we will lest band fit and fermion with the client to identify areas for further probablyse importance.

Major team goals for the next week

1. Final ice protetype

Download

Progress_Report_9.pdf (163 kB)



11/13/2025: Progress Report 10

David Diancin - Dec 04, 2025, 1:48 PM CST

Title: Progress Report 10

Date: 11/13/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Fabricate final prototype design, continue testing with client.

David Diancin - Dec 04, 2025, 1:48 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

David Dianele - Tears Leader Sydney Smith - Communicator Cabriel Klerner - 85AC Lacy Mount in - BWIG

Including the Intel-WinAppled Fitness program may be challenges with grip storighthat limit filerinality to perform due to the participation in exercise. A largetime due to ethnicized grip storighthan on and has we related considering to improve participation state filering storight exercise may be a supported by the state of th

Brief status update

Errief status update
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tension. Baile and Gales used is being sugar to measure the tension of the notice bands which
System modified the hoop to fortiseting a new hole to improve the stability of the Shock and
ordered the contral appearance of the figs. On Fisher, we plant to most withth order to
weakable how the rings fit withboth the nubber bands and the new burges and attachments.

Download

Progress_Report_10.pdf (164 kB)



11/21/2025: Progress Report 11

David Diancin - Dec 04, 2025, 1:50 PM CST

Title: Progress Report 11

Date: 11/21/2025

Content by: David Diancin

Goals: Document progress from the previous week

Content: See attachment below

Conclusions/action items: Finalize prototype and begin dividing out the final poster and final report.

David Diancin - Dec 04, 2025, 1:50 PM CST

Title: UW Adapted Fitness: Grip strength improvement mechanism

Client: Dr. Necis Doyle Advisor Dr. Randy Bartis I Tearr Cackle Mr Isten David Diencie - Tearr Leader Sydney Smith - Communicatio Cachel Klemmer - BSAC Lacy Mountle - BWIG Lacy Mountle - BWIG

Problem statement

Including the Intel-WinAppled Fitness program may be challenges with grip storighthat limit filerinality to perform due to the participation in exercise. A largetime due to ethnicized grip storighthan on and has we related considering to improve participation state filering storight exercise may be a supported by the state of th

Brief status update

This was it we prinked now 10 fings, to be also the burges conds with the 5 hooks, and slightly redesigned the backing piece. We are now gaing to be vening with the tightly low and contract to best burges on ship, shiptor bords, and possibly backed finding line. Prickly we will be testing band 8 and landon with the burges doors.

Download

Progress_Report_11.pdf (163 kB)



David Diancin - Dec 10, 2025, 5:01 PM CST

Title: Preliminary Report

Date: 10/8/2025

Content by: David Diancin, Lauren Hain, Gabriel Klenner, Lucy Mcardle, Sydney Smith

Present: N/A

Goals: Establish a full report of the preliminary designs.

Content:

See attached document.

Conclusions/action items:

David Diancin - Dec 10, 2025, 5:02 PM CST



UW Adapted Fitness: Grip Strength Improved Mechanism

Perfunitary Report
ARRE 2004209
Cillenti Di. Recia Dayde
Advisor: Profusore Randy Bartela
Beannt David Diazoto (Fonce Louder)
Sydney Smith (Communication
Latere Hold (BPAG)
Lucy McAudie (BWIG)
Cubrid Klemer (BSAC)
Geother Hst. 3025

Download

Preliminary_Report_-_Cookie_Monsters.pdf (3.78 MB)

David Diancin - Dec 10, 2025, 5:03 PM CST

Title: Final Report

Date: 12/10/2025

Content by: David Diancin, Lauren Hain, Gabriel Klenner, Lucy Mcardle, Sydney Smith

Present: N/A

Goals: Establish a full report of the entire project and future steps.

Content:

See attached document.

Conclusions/action items:

David Diancin - Dec 10, 2025, 5:03 PM CST



UW Adapted Fitness: Grip Strength Improvement Mechanism

AME 200380
Client Dr. Roca Dayle
Advisors Professor Randy Barlels
Busser David Disaction (Tears Lender)
Sydney Seath (Communicated)
Laures Hole (BENG)
Lay McAdel (BUNG)
Gabrid Klenner (BSAG)
December 105, 2025

Download

Final_Report_-_Cookie_Monsters.pdf (12.6 MB)

Lauren Hain - Dec 07, 2025, 9:33 PM CST

Lauren Hain - Sep 12, 2025, 12:58 PM CDT

Title: UW Adapted Fitness Grip Strength Improvement Mechanism Accounting Table

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To complete and upload the accounting table for all of our expenses throughout the semester.

Content: Attached in pdf below.

Conclusions/action items: To review all of our materials purchased and make sure all of the expenses are correct.

Lauren Hain - Dec 08, 2025, 1:13 PM CST

born	Description	Marshattu mr	MEPH	Vendo r	TO RELOY CATE	Date	ате	ContEach	Total
Cetegory									
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0 byel	Besie of our design to a mérosa the hand	Drainger	9021	Crainger	35H497	30/8/2025	1	\$18.99	\$19.99
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its printed Hask tacking	Correcting center to attach bunger to different cettings to pull back hand	tre soit Convinces		thendt Commons		20/8/2006		nja	(1.31
its printed Bungee Center	Attack four bungers together	tite sci1 Commons		talendt Commons		10/8/700s		n/a	11.06
Heart Strink. Tubing	Used to attach the rabber hands to the 5 hoole for partiest design idea	Eminger	EPOLE70		2046	10/8/2006	1	\$16.K1	\$16.51
Weehers	Attach the hungers to the 3D printed hand penter	Mandt Commone		Wendt Commons		11/10/2025	10	90.125	\$1.00
Fishing Line	Used as a potential idea to reader the tendors of the hand and provide tendors to open the hand	pata rei	20-2m2m	Pacte na i	931718 907	11/10/26	1	114.22	\$14.22
b.ng+	Used to model the sendons of the hand and a jest he hand from a faz	ongineering Geroers maid ing		magineerin g Cantan mu kil ings		11/10/26	i	tree	
77.77								TOTAL:	509.81

Download

Uw_Adapted_Fitness__Grip_Mechanism_Device_Expense_Table.pdf (95.8 kB)

Lauren Hain - Dec 07, 2025, 9:51 PM CST

Title: Rubber Band Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for the rubber bands we purchased

Content:

Description: Used to model the tendons in the hand and provide enough tension to pull the hand from a fist.

Manufacturer: Stapes

Mft Pt#: 28611-CC

Vendor: Staples

Vendor Cat#: 143297

Date: 10/8/25

QTY: 1

Cost Each: \$5.79

Total: \$5.79

Link: https://www.staples.com/staples-economy-rubber-bands-64-1-4-lb-bag-95-pack-28611-cc/product 143297



Lauren Hain - Dec 07, 2025, 9:53 PM CST

Title: S Hooks Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for the S Hooks we purchased

Content:

Description: Used to attach the bungee cords to the 3D printed TPU rings

Manufacturer: Grainger

Mft Pt#: U17380.000.0075

Vendor: Grainger

Vendor Cat#: 2ZDK2

Date: 10/8/25

QTY: 1

Cost Each: \$4.39

Total: \$4.39

Link: https://www.grainger.com/category/hardware/hooks-eye-pulleys-snap-hooks/s-hooks? attrs=Overall+Length%7C3%2F4+in&filters=attrs&searchQuery=s+hooks&sst=4&tv_optin=true



Lauren Hain - Dec 07, 2025, 9:57 PM CST

Title: Glove Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for glove we purchased

Content:

Description: Base of our design to embrace the hand

Manufacturer: Grainger

Mft Pt#: 902L

Vendor: Grainger

Vendor Cat#: 26H497

Date: 10/8/25

QTY: 1

Cost Each: \$19.99

Total: \$19.99

Link: https://www.grainger.com/product/MCR-SAFETY-Mechanics-Gloves-L-9-26H497

Lauren Hain - Dec 07, 2025, 10:01 PM CST

Title: Heat Shrink Tubing Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for heat shrink tubing we purchased

Content:

Description: Used to attach the rubber hands to the S hooks for our first design idea

Manufacturer: Grainger

Mft Pt#: CPO18706

Vendor: Grainger

Vendor Cat#: 3KH56

Date: 10/8/25

QTY: 1

Cost Each: \$15.51

Total: \$15.51

Link: https://www.grainger.com/product/SHRINK-KON-Heat-Shrink-Tubing-0-19-in-3KH56 ;

Lauren Hain - Dec 08, 2025, 12:40 PM CST

Title: Fishing Line Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for fishing line we purchased

Content:

Description: Used as a potential idea to model the tendons of the hand and provide tension to open the hand

Manufacturer: Fastenal

Mft Pt#: 39-250W

Vendor: Fastenal

Vendor Cat#: 921715807

Date: 10/8/25

QTY: 1

Cost Each: \$14.22

Total: \$14.22

Link: https://www.fastenal.com/product/details/921715807

Lauren Hain - Dec 08, 2025, 1:01 PM CST

Title: Wendt Commons Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for the items we purchased at Wendt Commons

Content:

3D Printed TPU Rings:

Description: TPU 3D printed rings for the joints of the hand

Manufacturer: Wendt

Mft Pt#: n/a

Vendor: Wendt Commons

Vendor Cat#: n/a

Date: 10/8/25

QTY: 15

Cost Each: n/a

Total: \$5.79

3D Printed Hook Backing:

Description: Connecting center to attach bungee to different settings to pull back hand

Manufacturer: Wendt

Mft Pt#: n/a

Vendor: Wendt Commons

Vendor Cat#: n/a

Date: 10/8/25

QTY: 3

Cost Each: n/a

Total: \$1.31

3D Printed Bungee Center:

Description: Attach four bungees together

Manufacturer: Wendt

Mft Pt#: n/a

Vendor: Wendt Commons

Vendor Cat#: n/a

Date: 10/8/25

QTY: 3

Cost Each: n/a

Total: \$1.06

Washers:

Description: Attach the bungees to the 3D printed band center

Manufacturer: Wendt

Mft Pt#: n/a

Vendor: Wendt Commons

Vendor Cat#: n/a

Date: 11/10/25

QTY: 10

Cost Each: \$0.125

Total: \$1.00

Lauren Hain - Dec 08, 2025, 1:03 PM CST

Title: Bungee Expenses

Date: 12/7/25

Content by: Lauren Hain

Present: N/A

Goals: To upload the expenses and details for bungee cords we purchased

Content:

Description: Used to model the tendons of the hand and open the hand from a fist

Manufacturer: Engineering Centers Building

Mft Pt#: n/a

Vendor: Engineering Centers Building

Vendor Cat#: n/a

Date: 11/10/25

QTY: 1

Cost Each: free

Total: free

David Diancin - Dec 09, 2025, 10:04 PM CST

Title: Fabrication Procedure

Date: 12/9/25

Content by: Lauren Hain

Goals: To create a standard procedure for fabrication

Content:

- 1. Measure our clients hand for sizes of each of his knuckles.
- 2. 3D print the hand rings out of TPU using the size measurements of the knuckles of the client.
- 3. 3D prints our bungee center and our hook backing.
- 4. Cut the fingers off of our athletic glove.
- 5. Mark the size of location on the glove of where our 3D printed hook backing will be.
- 6. Using scissors, cut out a slit inside the two layers of fabric in the glove where the top of the hand would be located the size of our 3D printed hook backing.
- 7. Slip in the hook backing and cut holes on the top of the glove for the hooks to poke through.
- 8. Hand sew the slit opening so the hook backing is securely stored in the glove
- 9. Poke holes into the top of our 5 3D printed TPU rings to fit the S hooks inside
- 10. Insert the S hooks in the holes of the rings
- 11. Using a dremel, cut the metal wrapped wire off of our 5 smallest bungee cords.
- 12. Attach the 5 bungee cords onto the S hooks with the knot opening on the top of them.
- 13. Using pliers, open the small washers we purchased to attach the other side of the 4 bungee cords.
- 14. Insert the bungee cords into the small washers and attach this at once to the 3D printed bungee connector.
- 15. Close the washers using pliers to securely fasten to bungees onto the connector.
- 16. Repeat this step for all four of the bungee cords so they are all attached to the connector.
- 17. The connector can then be attached to the hook backing on the glove, completing the fabrication process of our design.

Conclusions/action items:



GABRIEL KLENNER - Dec 10, 2025, 11:27 AM CST

Title: Testing Protocol

Date: 12/10/2025

Content by: Gabriel Klenner

Present: Gabriel Klenner

Goals: Record the steps we took to test our bungee cords.

Content:

To test our band elasticity we used Hooke's Law and Newton's Second Law.

Testing Protocol:

Required equipment: Scale, attachment hooks, weights of varying masses (50g-1000g), ruler, bungee cord, calculator

Steps:

- 1. Put the weight on the scale to measure its exact mass. Weigh the hooks used for attachment. Add these masses together and record the value
- 2. Calculate the force caused by acceleration of gravity using the formula F=ma where a=9.81. Record this force.
- 3. Use the ruler to measure the starting length of the bungee that is being tested, record this value.
- 4. Attach the weight to the bungee cord and hang it over a ledge so that the weight is suspended in the air without touching any walls.
- 5. Use the ruler to measure the new length of the bungee cord, record this value.
- 6. Calculate the displacement (x) by subtracting the initial length from the final length.
- 7. Calculate the spring constant (k) of the band by using the equation k=x/F where x is the displacement and F is the force calculated in step 2.
- 8. Repeat steps 1-7 for each weight.
- 9. Average the calculated k values.

Conclusions/action items:

Follow this protocol to calculate the spring constant of an elastic band.

GABRIEL KLENNER - Nov 11, 2025, 6:07 PM CST

Title: Band Elasticity - first test

Date: 11/11/2025

Content by: Gabriel Klenner, David Diancin

Present: Gabriel Klenner,

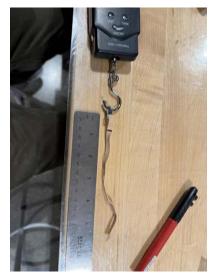
Goals: Determine how much tension force rubber bands and bungie cords will act on the clients fingers when stretched

to different lengths

Content:

Method: A initial mark was made on the band, the band was hooked to a Digital hanging scale and stretched until this mark was a specific length away from where it started. The reading from each distance is recorded on the table below. The Max force was recorded at a distance where the band either snapped or was unable to be pulled further.

Length (in)	Rubber Band (kg)	Bungie Cord (kg)	
0	0	0	
0.5	.225	.655	
1	.390	.845	
1.5	.480	.940	
2	.505	1.130	
Мах	2.2	3.3	





Conclusions/action items:

We will use this method to test each of our band materials several times and find quantitative numbers for how much force is needed and provided to open the clients hand.

GABRIEL KLENNER - Dec 08, 2025, 6:29 PM CST

Title: Bungee Cord Testing

Date: 11/25/2025

Content by: Gabriel Klenner

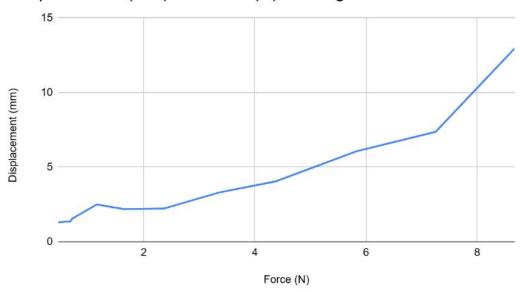
Present: Gabriel Klenner, David Diancin, Sydney Smith

Goals: Test the elasticity of the bungee cords and calculate a K value to use in calculations.

Content:

We tested the elasticity of our bungee cords by using Hooke's Law. By attaching weights to our cords and measuring the displacement we can get a force value. By setting this force equal to the force on the object caused by gravity. By averaging out these values given several different weights we determined the k value of the bungee cord is 0.75 N/m. The results are shown on the graph and table below

Displacement (mm) vs. Force (N) of Bungee Cords



Mass (g)	Starting Length (mm)	Final Length (mm)	Displacment (mm)	F (N)	Calculated K (N/m)
46.8	62.19	63.49	1.3	0.459108	0.35316
69.2	62.19	63.56	1.37	0.678852	0.4955124088
72.14	62.19	63.73	1.54	0.7076934	0.4595411688
117.58	62.19	64.69	2.5	1.1534598	0.46138392
167.15	62.19	64.38	2.19	1.6397415	0.748740411
240.87	62.19	64.42	2.23	2.3629347	1.059611973
342.83	62.19	65.5	3.31	3.3631623	1.016061118
445.81	62.19	66.24	4.05	4.3733961	1.079850889
594.29	62.19	68.26	6.07	5.8299849	0.9604587974
739.43	62.19	69.56	7.37	7.2538083	0.9842345047
884.58	62.19	75.16	12.97	8.6777298	0.6690616654
weight of 1 band = 1.58 grams				Average K Value:	0.7534197142

Conclusions/action items: If we were to continue this project we could use this calculated K value to determine how far the band needs to be pulled back to provide a certain amount of force.



David Diancin - Sep 24, 2025, 1:11 PM CDT

Title: Team Meeting

Date: 2025/9/12

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Lauren Hain, Sydney Smith

Goals: Establish standard meeting time, confirm meetings and communication with client and advisor

Content:

- Created a list of questions for client meeting
- Established a standard meeting time for Monday nights as a group
- Scheduled a group meeting for Sunday evening

Conclusions/action items:

- Contact advisor and client to continue to schedule a meeting time

David Diancin - Sep 14, 2025, 5:26 PM CDT

Title: Team Meeting

Date: 2025/9/14

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith

Goals: Establish meeting times with UW adapted fitness and Dr. Puccinelli

Content:

-Email was sent to Dr. Puccinelli about meeting times and email was sent to adapted fitness to meet and spectate an adapted fitness session during this week

Conclusions/action items:

- Continue research and begin short drafts of the PDS with current information

David Diancin - Sep 16, 2025, 8:57 AM CDT

Title: Previous Team Questions

Date: 9/12/2025

Content by: David Diancin

Present: David Diancin, Lauren Hain, Sydney Smith, Simon Nam

Goals: Connect with Simon Nam from BME 300 2024 team on adapted fitness grip strength

Content:

What didn't work with previous designs that needs to be added/improved upon?

- Previous project tried a pulley system with a glove to open the hand but did not have a strong enough torque/motor for certain clients.
- In Simon's work, he tried an air compression decompression system with much more complexity.

What is our budget for this project?

- Budget can be found through the BME department

What's the best way we can contact you?

- A good priority is to use contact Dr. Doyle to get in communication with the clients that will be using this device.

Where is this product going to be used (gym, home, physical therapy etc.)

- This product is going to be used at the adapted fitness gym at the Bakke Fitness Center.

Conclusions/action items:

- Complete these questions with client during the client meeting



Lauren Hain - Sep 22, 2025, 3:56 PM CDT

Title: Team Meeting to Discuss Advisor Meeting

Date: 9/22/2025

Content by: Lauren Hain

Present: Lauren, David, and Gabe

Goals: Discuss action items with out advisor and the best next steps to take for prototyping.

Content: Gave us advice on how to start our design matrix. Talked about the importance of quantifying data and how we should think out what we want to quantify in the design matrix. Also helped us in brainstorming some designs different from the previous years. Gave us the idea of creating a model finger to practice our prototypes on throughout the design process.

Conclusions/action items: Each team member will begin to brainstorm their own designs and we will come together to create a design matrix.

David Diancin - Sep 30, 2025, 10:32 AM CDT

Title: Team Meeting

Date: 9/24/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Sydney Smith

Goals: Share individual designs and pick three strong designs for the design matrix

Content:

We have all compiled our individual designs and have chosen three designs for the design matrix and have separated up the work for explanation of each criteria.

Conclusions/action items:

- Individually, complete portion of the design matrix explanation by Thursday.

David Diancin - Sep 30, 2025, 10:42 AM CDT

Title: Team Meeting

Date: 9/29/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Sydney Smith, Lauren Hain

Goals: Go over this weeks workload and confirm each members tasks

Content:

- We have divided out the presentation for who will fill out the slides and who will present what and plan to have a presentation to present to Dr. Bartels by our weekly meeting on Thursday, afterwards we plan to practice our presentation afterwards.
- We have set up a meeting with Simon Nam on Wednesday to go over more about the client to confirm information on our presentation
- We also plan to complete CAD models of the three designs to be put in our presentation

Conclusions/action items:

- Individually, complete portion of the presentation



David Diancin - Oct 06, 2025, 8:34 PM CDT

Title: Team Meeting

Date: 10/1/2025

Content by: David Diancin

Present: David Diancin, Sydney Smith, Simon Nam, Lauren Hain

Goals: Receive feedback on design matrix from Senior BME.

Content:

General thoughts on design matrix:

Notes made on slides

- Using more rings on the band would be better
- Thinking about the uses of not only opening the hand but closing the hand for grip strength

Conclusions/action items:

- Use feedback to implement new ideas into the hooks and bands design.

David Diancin - Oct 06, 2025, 8:37 PM CDT

Title: Team Meeting

Date: 10/6/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lucy McArdle, Sydney Smith, Lauren Hain

Goals: Work on solidifying group next steps

Content:

- We have broken up the preliminary report for it to be turned in by Wednesday night
- We have made initial plans on fabrication to complete our biggest problem with our current design is creating a mechanism strong enough to hold the bands to the rings.
- We have started our plan to order different materials and to look at the path to finalize our budget.

Conclusions/action items:

- Complete preliminary report and begin early phases of fabrication

David Diancin - Oct 13, 2025, 7:49 PM CDT

Title: Team Meeting

Date: 10/13/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith

Goals: Confirm different materials to create prototype

Content:

- Confirmed the process of funding through the BME department.
- Gabe will continue with creating a real 3D model for the hooks and backing of the glove
- Sydney will email the mother of the client about funding and research into 3D printing designs
- Lauren will complete the funding document to send to the BME department
- David will look for alternative materials for the rings and wire while assisting with the 3D printing designs

Conclusions/action items:

- Complete individual assignments for meeting on Friday.

David Diancin - Oct 17, 2025, 1:53 PM CDT

Title: Team Meeting

Date: 10/17/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith, Lucy McArdle

Goals: Confirm and begin 3D print of rings, divide out work for creating prototype and completing work to order materials.

Content:

Started the process of 3D printing a prototype ring

Confirmed materials that will be ordered

Conclusions/action items:

David Diancin - Oct 22, 2025, 1:15 PM CDT

Title: Team Meeting

Date: 10/20/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith, Lucy McArdle

Goals: Continue to print and confirm roles for prototyping and fabrication

Content:

Confirmed a new print and created the current model of the backing middle connecter and the backing plate as well as resizing the rings to 3D print.

Conclusions/action items:

SYDNEY SMITH - Dec 10, 2025, 11:42 AM CST



Download

IMG_7509.jpeg (2.87 MB)

David Diancin - Oct 23, 2025, 5:57 PM CDT

Title: Team Meeting

Date: 10/23/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Lauren Hain, Sydney Smith, Lucy McArdle

Goals: Review current progress on prints and next steps

Content:

Currently, we have three different sizes of prints of rings and a printed backing connected that we like and a full backing print that we are going to reprint along with other rings that have a much rounder edge to enhance patient comfort.

Conclusions/action items:

- Meet again and test the size of the rings on the patient.

SYDNEY SMITH - Dec 10, 2025, 11:25 AM CST

Title: Team Meeting

Date: 11/3/2025

Content by: Sydney Smith

Present: Sydney, David, Lauren, Lucy, Gabe

Goals: Start working on the fabrication of the prototype

Content: Planned a meeting to go to Wendt and start fabrication of the rubber bands to the S hooks.

Conclusions/action items: Completed meeting



SYDNEY SMITH - Dec 10, 2025, 11:29 AM CST

Title: Team Meeting

Date: 11/10/2025

Content by: Sydney Smith

Present: Whole Team

Goals: Fabricate Rubber bands to washers, to connectors

Content: Worked with heat-shrink tubing to attach rubber bands to S hooks. Connected the rubber bands to the washers to the connectors so they wouldn't fall off. Sewed backing into the back of the glove and cut off the finger of the glove to make it easier to put on.

Conclusions/action items: Started to think about options B and C if rubber bands don't work out.

SYDNEY SMITH - Dec 10, 2025, 11:38 AM CST

Title: Team Meeting

Date: 11/17/2025

Content by: Sydney Smith

Present: Whole Team

Goals: To work with bungee cords and nylon string

Content: We fabricated the bungee cords as a stronger tendon-like "rubber band," and we braided nylon string, which ended up being

elastic but not as strong as the bungee cords.

Conclusions/action items: Completed fabrication

SYDNEY SMITH - Dec 10, 2025, 11:39 AM CST



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SYDNEY SMITH - Dec 10, 2025, 11:41 AM CST

Title: Team Meeting

Date: 11/24/2025

Content by: Sydney Smith

Present: Whole Group

Goals: Worked on final poster

Content: We assigned a role for the final poster and report. We completed testing for the bungee cords.

Conclusions/action items: Complete testing for bungee cords.

David Diancin - Dec 03, 2025, 3:13 PM CST

Title: Team Meeting

Date: 12/1/2025

Content by: David Diancin

Present: Gabriel Klenner, David Diancin, Sydney Smith, Lucy McArdle

Goals: Review final steps to final presentation.

Content:

- The parking pass needs to be picked up on wednesday at parking services
- The team will complete each induvidal part by wednesday night, and printing will happen tuesday,
- There will be confirmation if a meeting next week will be necessary but overall we each have our assigned part for the final report.

Conclusions/action items:

- Confirm final meeting for Advisor recommendations on project.

SYDNEY SMITH - Dec 10, 2025, 11:43 AM CST



Download

IMG_8649.jpeg (2.61 MB)

David Diancin - Sep 14, 2025, 9:04 PM CDT

Title: Hand Rehabilitation Robotics on Poststroke Motor Recovery

Date: 9/14/25

Content by: David Diancin

Present: N/A

Goals: Gain a better understanding and overview of the rehabilitation process of motor recovery in the hand

Search term: PubMed: poststroke motor rehabilitation

Citation:

Yue Z, Zhang X, Wang J. Hand Rehabilitation Robotics on Poststroke Motor Recovery. Behav Neurol. 2017;2017:3908135. doi: 10.1155/2017/3908135. Epub 2017 Nov 2. PMID: 29230081; PMCID: PMC5688261.

Content:

- · Loss of hand function strongly impacts daily living and quality of life, even more than other limb deficits.
- Recovery of proximal arm movement is often better than distal (hand/fingers), making hand rehab more challenging.
- · More than half of stroke survivors lose independence in daily activities (feeding, self-care, mobility).
- · Complexity of hand movement makes it hard for therapists or devices to provide sufficient, varied training.
- Traditional therapy often lacks finger individuation, limiting recovery of fine motor control.
- · Robots reduce therapist workload by providing repetitive, precise, and intensive training.
- · Devices range from exoskeletons (moving fingers directly) to systems controlled by patient biosignals

Conclusions/action items:

-Research more about rehabilitation process for motor recovery

David Diancin - Sep 14, 2025, 7:48 PM CDT



he more and dense for basic activities of clash being (ADA) blas feeding, odd care, and multiday (a).

The fluorant furnish are very complex and ventable fluoraction show that the relationship between the during apper floods (i.e., burnil function and the ability to professe that the contract of the c nation througher are disquested y method.

Robot-amined therapy for posteriole rebuild intent is a
new kind of physical therapy, through which patients pracice their partic limb by resenting to or resisting the force
offend by the robots [14]. For example, the MIT-Marson

Download

Behavioural_Neurology_-_2017_-_Yue_-_Hand_Rehabilitation_Robotics_on_Poststroke_Motor_Recovery.pdf (7.52 MB)

David Diancin - Oct 23, 2025, 3:30 PM CDT

Title: Traumatic Brain Injury Management In The Intensive Care Unit

Date: 10/23/25

Content by: David Diancin

Present: N/A

Goals: Gain a better understanding and overview of Traumatic Brain Injuries

Search term: PubMed: TBI therapy

Citation:

Robba C, McCredie V, Chesnut RM, Citerio G, Gauss T, Hawryluk GWJ, Helbok R, Meyfroidt G, Newcombe V, Sarwal A, Taccone FS, van der Jagt M, Wahlster S, Zanier ER, Bouzat P. Traumatic brain injury management in the intensive care unit: standard of care and knowledge gaps. Intensive Care Med. 2025 Jun;51(6):1112-1127. doi: 10.1007/s00134-025-07967-1. Epub 2025 Jun 16. PMID: 40522481.

Content:

Traumatic Brain Injury (TBI):

- · One of the leading causes of disability in the world
- · TBI is a spectrum and not a single disease entity

ICU Management of TBI

- Primary goal: is to minimize a secondary brain injury
- Early Priorities: Prevent hypoxia, hypotension, metabolic abnormality

Airway and Ventilation

- Intubation/mechanical ventilation if:
 - GCS < 9
 - · Severe agitation or loss of airway reflexes
 - GCS > 8 with thoracic/abdominal injuries
- Maintain:
 - o SpO₂ > 94%
 - PaO₂ = 80–120 mmHg
 - · Avoid hyperoxemia (can be harmful)
- PaCO2 target: 35-45 mmHg
 - Prevents both hypercapnia-induced ICP rise and hypocapnia-induced ischemia
- Hemodynamic Control
- Avoid hypotension (<90 mmHg) strongly linked to poor outcomes
- · Maintain Cerebral Perfusion Pressure (CPP):

- CPP = MAP ICP
- Target: 60-70 mmHg (Brain Trauma Foundation guidelines)
- Newer approaches: individualized CPPopt based on autoregulation
- Age-based systolic BP targets:
 - o ≥100 mmHg (general)
 - o ≥110 mmHg (elderly)
 - MAP > 80 mmHg
- · Fluid and Circulatory Management
- Use isotonic crystalloids (first-line)
- Avoid:
 - $\bullet \quad \text{Hypo-osmolar solutions} \ \to \ \text{can worsen cerebral edema} \\$
 - \circ Hypertonic saline \rightarrow no clear outcome benefit
- · Vasopressors may be used to maintain pressure
- · Avoid volume overload
- Maintain normoglycemia and normothermia
- Tranexamic acid in isolated TBI → no proven benefit
- Summary of Early Phase Care
- No large RCTs, but:
 - Protocolized control of oxygenation, ventilation, hemodynamics, and physiology
 - o Consistently linked to improved survival

Conclusions/action items:

- Continue to research about TBI and rehabilitation processes.

David Diancin - Dec 10, 2025, 11:14 AM CST

Title: Initial Design Ideas

Date: 9/24/2025

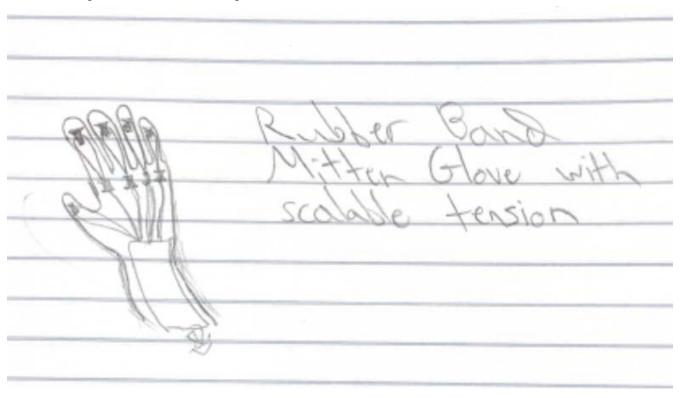
Content by: David Diancin

Goals: Create a strong first design and brainstorm individually some designs or solutions for the project.

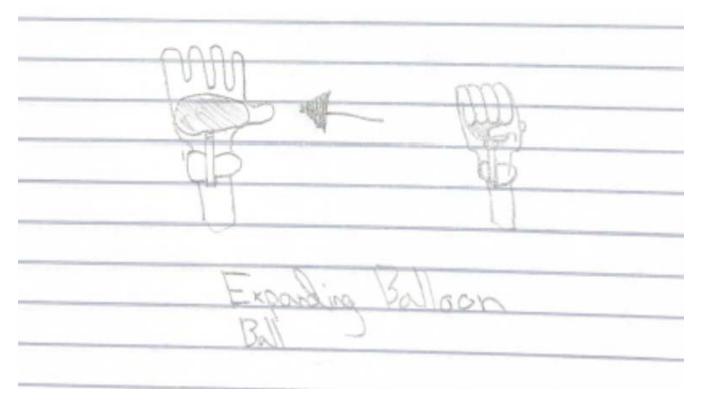
Content:



This first design involves a single velcro strap around the wrist and on the back of the hand have elastic rubber rings that attach to the finger and thumb that meet at a central backing which then connects to a lower backing connector that encompasses the thumb.



This next design is a glove design that attaches horizontal hoops on the top of the finger that allows the rubber bands to be guided. The tension in the bands were designed to be adjustable but the adjustability is contained under the sleeve and left to be designed later.



The last design is meant for under the hand. This was brainstormed before we had the understanding of rehabilitation and the need to have an open hand while using different equipment. This design uses a balloon to expand the hand from a closed fist to an open hand but still required a small motor on the wrist and a tube to inflate and deflate the balloon.

Conclusions/action items:

David Diancin - Dec 08, 2025, 7:16 PM CST



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Screenshot_2025-12-08_at_6.46.52_PM.png (1.04 MB)



2025/31/10-Human Subjects Research

David Diancin - Dec 10, 2025, 11:15 AM CST

Title: Human Subjects Research Certificate

Date: 10/31/2025

Content by: David Diancin

Goals: Complete required training for bme 300.

Content: See certificate below

Conclusions/action items: Completed

David Diancin - Dec 10, 2025, 11:16 AM CST



Download

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David Diancin - Sep 10, 2025, 2:07 PM CDT

Title: BME Career Prep, Getting ready for the career fair AND job searching

Date: 9/10/2025

Content by: David Diancin

Goals: Learn more about BME career prep

Content:

- Co-op means a spring or fall semester as well as the joining summer
- A summer internship only takes place in the summer
- Good sites are Handshakes, Linkin, and the direct site, do not go to agragete sites.
- Experience is better than no experience
- Tailor your resume to the position with quick changes
- Make sure your resume is unique to you with different ways you went about different problems
- December, May, August are the only months you should have a degree on your resume
- Identify that you have much more overlap with other disciplines
- Don't put objective statements during a one to one interview
- Skills section should be real and technical
- -Introduce yourself, tell them why you are interested, "I wanted to understand a little bit more about...",

Conclusions/action items:

- Review resume and add current experiences

David Diancin - Sep 17, 2025, 2:00 PM CDT

Title: Leadership

Date: 9/17/2025

Content by: David Diancin

Goals: Learn more about Leadership

Content:

Effective Leader Skills: Communication, Understanding, assertive, organized, confident, inclusive, and engaged.

Leadership Styles

- Power Model: Being in control is the most important thing, this style has hierarchy, authority, and command
- Servant: Being of service to others and sharing power is important, this style focuses on empathy, empowering, and shared decision making
- Authentic: Being your genuine self you will build trust, this style focuses on transparency, genuineness, and honesty.

Clifton Styles:

- People: Glues the team together
- Process: Sets the pace for the team
- Thought: Thinks about the big picture
- Impacts: Pushes for excellence

Goal Setting

Personal Leadership Goal: By the end of semester I would like to improve my communication skills in my group by trying to be on top of things and making sure that I am engaged in each team discussion.

Conclusions/action items:

- Continue to progress with my leadership goal during this project

2025/9/24: Lecture 3 Near Peer Mentoring

David Diancin - Sep 24, 2025, 1:52 PM CDT

Title: Near Peer Mentoring

Date: 9/24/2025

Content by: David Diancin

Goals: Learn more about mentoring peers

Content:

A very important part of mentoring BME 200 students is

- Learning team leadership skills
- Peer mentors are much more approachable
- Learning transferable skills for mutual benefits (Leadership, communication, active listening, and self awareness)

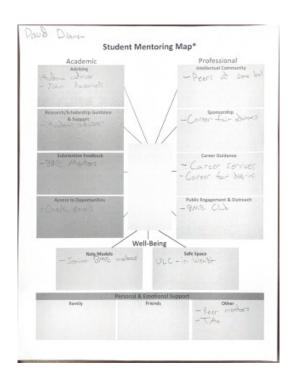
Being a good mentor includes

- Building Trust
- · Psychological Safety
- Reliability
- Support
- · Being available

Conclusions/action items:

- Continue to progress with my leadership goal during this project

David Diancin - Sep 24, 2025, 1:54 PM CDT



Download

David_Diancin.pdf (8.9 MB)

2025/10/1: Lecture 4 Sustainability in BME

David Diancin - Oct 01, 2025, 2:06 PM CDT

Title: Sustainability in BME

Date: 10/1/2025

Content by: David Diancin

Goals: Learn more about sustainability specifically in BME

Speaker: Prof. Andrea L. Hicks, PhD Director of Sustainability Education and Research

Content:

Sustainablity

- To pursue sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support present and future generations.

Important example: Kurig is the same amount of sustainability as a coffee pot is. Coffee pods create a lot of plastic while the coffee pot uses a lot of electricity and is less efficient. This is based of off carbon footprint.

Another example: The white paper that is normally covering examination tables at the doctors office was replaced by disinfectant spray for economic and sustainability reasons.

A few ways to make our design more sustainable: Choice of material is important and if materials in rubber bands are used till they are broken or are never intended to be broken after a certain number of uses.

Conclusions/action items:

- Start implementing what I have learned in this lecture to further my own design and future ones.

2025/10/8: Lecture 5 Patents & licensing with WARF

David Diancin - Oct 08, 2025, 2:07 PM CDT

Title: Patents & licensing with WARF

Date: 10/8/2025

Content by: David Diancin

Goals: Learn about patents and how licensing works

Speaker: Jeanine Burmania Senior Director, IP and Licensing & Justin Anderson, JD Senior IP Manager

Content:

· WARF works by securing IP rights after an invention is made an assessed. This leads to protection of the IP, then to marketing.

The four types of IP:

- 1. Patents
- 2. Copyrights Protections on creative expression, something like software.
- 3. Trademarks Protection on names, marks, logos, dress, required on commerce.
- 4. Trade Secrets Can be used to use anything of value, good as long as concept is not generally known.
- The utility (Non-provisional) Patents are the most common patent that WARF uses.

The Requirements for Patenting

- Must be Eligible, cannot be a product of nature, abstract idea, or natural phenomenon
- · Must be Novel, must be new
- Must be Non-obvious, cannot be simple modification of existing concepts
- Enabled and Described, must provide enough detail to teach others how to use the invention

Conclusions/action items:

- Use these notes for current and future projects.
- Decide whether the current project is eligible for a patent or if that is necessary.



2025/10/15: Lecture 6 Valuation of Intellectual Property

David Diancin - Oct 15, 2025, 2:10 PM CDT

Title: Valuation of Intellectual Property

Date: 10/15/2025

Content by: David Diancin

Goals: Learn more about patents and how they work

Speaker: JeAndrea Arndt Partner at Dickinson Wright PLLC

Content:

· Warf is great

Importance of IP for BMEs

- · BMEs create life changing solutions
- IP protection allows research to safely transfer into products, processes, and systems
- · IP enables investment, partnerships, and ethical competence

Legal Career Paths for Engineers in IP

- · Technical Advisor stem
- Patent agent stem + patent bar
- · Patent examiner stem and eventually patent bar
- Patent attorney law + patent bar
- Patent litigator law + stem
- IP license attorney law + stem
- tech transfer manager stem with law optional
- · engineer stem

To get a patent it must be

- · Novelty must be new
- Non obviousness must not be a obvious solution
- · Utility must work
- Enablement must describe how to make it

Conclusions/action items:

David Diancin - Oct 22, 2025, 1:42 PM CDT

Title: Advising day part II: Post-graduate planning

Date: 10/22/2025

Content by: David Diancin

Goals: Learn about the general planning format for post graduation

Speaker: Prof. John Puccinelli, PhD Assoc. Chair of the Undergraduate Program

Content:

- · Use your undergraduate experience to build a story.
- · Gain experience while you can while you are in school
- · Research is very important for all post degrees
- · Look up your ideal career
- · what programs have the opportunities you are looking for
- · Think about letter writers early

When writing a personal statement, write first what you want to do and start with narrow experiences and how they apply to the big picture and your broad interest.

Graduate school options

- · Masters: stepping stone/ change directions / gain depth/ expand credentials for future
- · Doctoral: Desire to be independent researcher, write research grants, lead projects in industry, startups, and consulting

Three MS options

- Research: (1.5 to 2 years)
- · Accelerated program: (1 year)
 - Accelerated: Coursework only, independent study/research allow
 - · Biomedical Innovation: Project based, partnership with business school

Conclusions/action items:

2025/10/29: Lecture 8 Regulatory Pathways

David Diancin - Oct 29, 2025, 2:03 PM CDT

Title: Regulatory Pathways

Date: 10/29/2025

Content by: David Diancin

Goals: Learn about regulation in the engineering

Speaker: Prof. Kip Ludwig Dept. of Neurological Surgery and Biomedical Engineering

Content:

There is a common way to test most drug that is regulated. Devices are not the same and neither is biomaterials.

There are three classes of devices. Each are based on the risk on different pathways. A tongue depressor is a class one. It is already in the FDA system. Materials are not regulatorily approved. The FDA may approve of titanium for a leg implant but does not mean you can use it in lenses.

A class two device needs a 510K or 510K De Novo.

A class three needs a PMA or a HDE.

The Cardiac Pacing. The patient trusted the sugeon who trusted the doctor who trusted the device. They were promised to provide a pulse for 3 to 5 weeks but at the time they only lasted a few hours. This was before the FDA.

The Dalkon Shield was a contraceptive that was marketed as a alternetive to pills. Years later it saw that it has 6.7% for the devices to be expused, much higher risk of maternal death pregnecy. This was in 1974. There was no regulation. There was a large incentive for there not to be regulated by the officials. It was important that a regulatory body to test for the people.

There are many strengths and weakness of this current regulatory body with too much and far too little regulation.

There still is no market problem with creating a device that does not live for its span or for it to even work. They still make money and it is hard to get their news out to the public because media does not cover the fraud like other stories.

It is very important with every project to understand that any very small side effect during testing could be caughastrophic depending on how many patients will be using this device and patients.

Conclusions/action items:

- Review these notes for future projects.



2025/11/5: Lecture 9 Bringing Biologics to Market

David Diancin - Nov 05, 2025, 1:33 PM CST

Title: Bringing Biologics to Market

Date: 11/5/2025

Content by: David Diancin

Goals: Learn more about regulation in the engineering

Speaker: Prof. William Murphy, PhD Dept. of Biomedical Engineering & Director, Forward BIO Institute

Content:

- · CDRH is for devices
- · CDER covers drugs
- · CBER covers biological

351 Products:

Regulated as drugs/biologics.

Require significant time, effort, and expense for approval.

361 Products:

Comparatively less regulated.

Subject to fewer FDA requirements.

- Each stage has unique risks and challenges.
- Proper risk management is key to successful commercialization.
- Distinguish between:
 - · "Critical path studies" (essential for development)
 - "Good research projects" (useful but not required).

Target Product Profile (TPP)

- · Represents the product vision.
- Defines:
 - Indication / patient identification
 - Efficacy (patient benefits)
 - Safety (patient risks)
- · Helps determine if a product is medically and commercially compelling.

Conclusions/action items:

- Review these notes for future projects.

David Diancin - Nov 12, 2025, 1:26 PM CST

Title: Do I need an Institutional Review Board (IRB)?

Date: 11/12/2025

Content by: David Diancin

Goals: Learn more about the IRB

Speaker: Stephanie Metzger, PhD IRB Analyst Health Sciences Team

Content:

- Nuremberg Code (1947)
 - · Emphasis on voluntary consent.
- Declaration of Helsinki (1964)
 - · Focused on medical research ethics.
- National Research Act (1974)
 - · U.S. response to the Tuskegee Study.
 - Led to the Belmont Report (1979) and creation of Institutional Review Boards (IRBs)

Belmont Report Principles

- 1. Respect for Persons / Autonomy
 - · Recognize and respect individuals autonomy.
 - · Protect those with diminished autonomy.
- 2. Beneficence
 - · Maximize benefits minimize harms.
- 3. Justice
 - · Fair distribution of research benefits and burdens.

Rule Criteria for Approval

- Risks: No unnecessary risks; minimized where possible.
- Benefits: Reasonable relation between risks and benefits.
- Equitable Subject Selection: Fair recruitment and inclusion of vulnerable groups.
- Informed Consent: Must be obtained or waived appropriately.
- Privacy & Confidentiality: Adequate protections required.

Examples of Human Subjects Research

- Studies involving:
 - o Drugs, devices, or biologics.

- Surveys, interviews, observations.
- · Medical or employment records.
- Biological materials (blood, DNA, tissues, etc.) linked to individuals.

IRB Review Process

- 1. Administrative Review: Checks training, documentation.
- 2. Pre-Review: Ensures clarity, regulatory compliance.
- 3. Committee/Non-Committee Review: Determines approval or requests modifications.

Tips for Successful IRB Submissions

- · Answer all questions thoroughly.
- · Don't rush; avoid copy-paste or missing documents.
- · Communicate with reviewers when clarifications are needed.
- Remember: IRB staff are there to help.

Conclusions/action items:

- Review these notes for future projects.

Hand Grip-EMG Muscle Response- 2025/17/9

Lauren Hain - Sep 17, 2025, 5:14 PM CDT

Lauren Hain - Sep 17, 2025, 5:35 PM CDT

Lauren Hain - Sep 12, 2025, 12:58 PM CDT

Title: Hand Grip-EMG Muscle Response

Date: 9/17/25

Content by: Lauren Hain

Present: Lauren Hain

Goals: Research about the muscles in the hand to get a better idea of how grip strength works.

Search Term: Hand grip muscles

Citation: R. Baranski and A. Kozupa, "Hand Grip-EMG Muscle Response," 2014. file:///C:/Users/laure/Downloads/Hand_Grip_EMG_Muscle_Response.pdf

Content:

- · Skeletal muscles are what affects the movement
- · Isotonic contraction- stable voltage during shortening the length of the muscle
- · Isometric- changing voltage of muscle without changing its length
- · Muscular fibers create a motor unit
- · Forearm muscles responsible for hand movement
 - · Anterior division of forearm muscles play most important part in flexing joints
- · Two divisions of anterior
 - Superficial and profundus
- · Flexor carpi radialis flexed hand and fingers
- flexo r carpi ulnaris flexes and adducts the hand
- · Palmaris longus muscle flexes hand
- · Flexor digitorum profundus that flexes and adducts the hand
- Flexor pollicis longus muscle that flexes and abducts the hand
- · strongest flexor of the hand is exor digitorum supercialis
 - · Lies deeper than other two flexors: carpi ulnaris and carpi radialis

Conclusions/action items: Research about previous grip strengthening mechanisms that have been made and potential materials we could use.

Lauren Hain - Sep 17, 2025, 5:28 PM CDT

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needs to be reconstructed. Publications [5-8] refer to the problem of modeling hand-som system obvertions.

Minutes are themes well specialized in shanging shemilar deepey of suganic substances, like glurane or fatty acids, to mechanical energy of the movements. This work focuses on shelted substant remains which are forming structures that are responsible for every form of mechanical activity of the body - the shelted muscles.

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corresponding author, o-mail: prograssings, eds. pt

them which create the motor sait are not collected it one branch, yet they are located on a hig arm between branches of other saits. It has a declaive significant for the regulation of the contraction strength through it creasing the frequency of discharge in single motor us and through componence of other notice units.

in see engrase or coming man overag manuscu to prepare lead changes which are taking place in measurable fiber Such signals can be registered through two types of sitrodes: • Noodle electrodes — inserted straight into the muscle

(A-7)

Download

Hand_Grip_EMG_Muscle_Response.pdf (512 kB)

Lauren Hain - Sep 21, 2025, 8:15 PM CDT

Title: Recovery of the Precision Grip in Children After Traumatic Brain Injury

Date: 9/21/25

Content by: Lauren Hain

Present: Lauren Hain

Goals: Research how grip strength is affected by TBI.

Search Term: TBI Effect on Grip Strength

Citation: M. Gölge, M. Müller, M. Dreesmann, B. Hoppe, R. Wenzelburger, and J. P. Kuhtz-Buschbeck, "Recovery of the precision grip in children after traumatic brain injury," Archives of Physical Medicine and Rehabilitation, vol. 85, no. 9, pp. 1435–1444, Sep. 2004, doi: https://doi.org/10.1016/j.apmr.2003.11.029.

Content:

- · Studied kids after injury or crash and were in rehabilitation center
- Weight had to be grasped and lifted with precision grip of 1 hand
- · Children with TBI used additional fingers to stabilize crip
- 15 consecutive trails recorded
- Forces of thumb and index finger measured separately
- Measured peak grip forces, peak load force, sum of both fingers, maximal negative load force, coordination of grip force and load force, mean grip force
- · Peak load
- Results
 - Control and precision grip force impaired in patients with TBI
- Children with more severe TBI and more severely disabled shower stronger changes of grip variables then less affected patients
- · Worse injury, more pronounced improvements
- · Children with TBI had deficits in force regulation
- Excessive force to certain objects
- · Coordinate contractions of 15 different distal arm and hand muscles needs to generate and adjust grip force
- Grip force produced by distal arm and hand muscles
- · generation of load force is more dependent on proximal muscles guiding elbow and shoulder movements
- TBI patients have more problems with control of distal arm and hand muscles than forces by contraction of proximal muscles

Conclusions/action items: Conduct more research on previous grip strength mechanisms that have already been made.

Lauren Hain - Sep 21, 2025, 8:15 PM CDT

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Lauren Hain - Sep 21, 2025, 8:14 PM CDT

Title: Bionic Soft robotic glove with EMG-based gesture and grip strength

Date: 9/21/25

Content by: Lauren Hain

Present: Lauren Hain

Goals: Research current grip strength mechanisms that have already been made.

Search Term: Grip Strength Mechanism

Citation: J. Zhang et al., "Bionic soft robotic glove with EMG-based gesture and grip strength synchronized prediction for grasping assistance," Biomedical Signal Processing and Control, vol. 112, p. 108516, Aug. 2025, doi: https://doi.org/10.1016/j.bspc.2025.108516.

Content:

- · Rigid exoskeletons
 - · Mounted on the back of the hand
 - Motion does not interfere with user's natural hand movement
 - Exoskeletons lack compliance due to bulk structure
 - Can lead to misalignment in fingers and lead to injuries
- · Soft robotic gloves
 - Flexible materials to transmit force to dorsal and palmer sides
 - Join-free designs
 - Elimite rigid france allowing for adaptations
 - Simulating contraction and relaxation of muscles
 - · Limited to generate predefined bending twisting, or stretching
 - Tendon driven robotic gloves
- EMG signal have contributed to evaluation of robotics
- Track performance by capturing muscle activity
- Bionic design of soft robotic glove
 - Hand extension more easily achieved than grip
 - Design independently actuate things and couples index fingers
 - Steel wires: provides high tensions transmission
 - Down all of the fingers
 - Tight spiral spring set on outside of sheath tube to prevent bending deformation and ensure rigidness
 - Anchors around hands to keep wires in place
 - Power: used miniature linear actuators on forearm to shorten force transmission path
 - Pulling force of 90N
 - Mounted on forearm
 - Powered by 12 V battery

Conclusions/action items: Research more previous designs and start to research patents



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1-s2.0-S1746809425010274-main.pdf (4.52 MB)

Lauren Hain - Dec 08, 2025, 1:26 PM CST

Title: Glove Design Idea 1

Date: 9/15/25

Content by: Lauren Hain

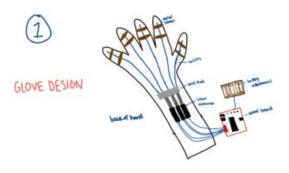
Present: n/a

Goals: To create a design prototype for our grip mechanism device.

Content: Attached in pdf below.

Conclusions/action items: Continue to brainstorm and sketch more design ideas.

Lauren Hain - Dec 08, 2025, 1:25 PM CST



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Lauren Hain - Dec 08, 2025, 1:28 PM CST

Title: Glove Design Idea 2

Date: 9/15/25

Content by: Lauren Hain

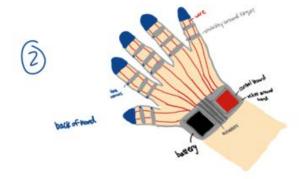
Present: n/a

Goals: To create a design prototype for our grip mechanism device.

Content: Attached in pdf below.

Conclusions/action items: Continue to brainstorm and sketch more design ideas.

Lauren Hain - Dec 08, 2025, 1:27 PM CST



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Screenshot_2025-12-08_132506.png (116 kB)

Lauren Hain - Dec 08, 2025, 1:28 PM CST

Title: Glove Design Idea 3

Date: 9/15/25

Content by: Lauren Hain

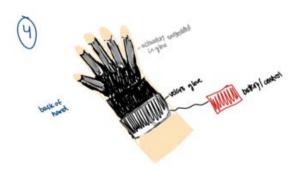
Present: n/a

Goals: To create a design prototype for our grip mechanism device.

Content: Attached in pdf below.

Conclusions/action items: Continue to brainstorm and sketch more design ideas.

Lauren Hain - Dec 08, 2025, 1:28 PM CST



Download

Screenshot_2025-12-08_132517.png (135 kB)

Lauren Hain - Dec 08, 2025, 1:12 PM CST

Title: Chemical Safety Training

Date: 10/10/31

Content by: Lauren Hain

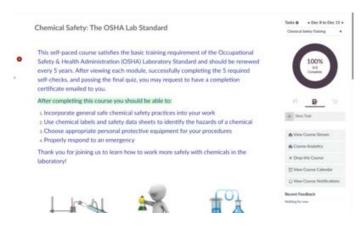
Present: n/a

Goals: To successfully complete the chemical safety training on canvas.

Content: Attached in pdf below.

Conclusions/action items: Continue to complete the rest of the trainings.

Lauren Hain - Dec 08, 2025, 1:13 PM CST



Download

Screenshot_2025-12-08_131304.png (350 kB)

Lauren Hain - Dec 08, 2025, 1:27 PM CST

Title: Machine Training

Date: 10/31/25

Content by: Lauren Hain

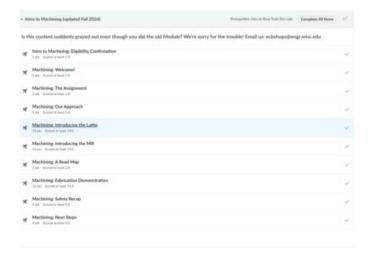
Present: n/a

Goals: To successfully complete the machine training on canvas and in person.

Content: Attached in pdf below.

Conclusions/action items: Continue to complete the rest of the trainings.

Lauren Hain - Dec 08, 2025, 1:16 PM CST



Download

Screenshot_2025-11-02_144906.png (160 kB)

Lauren Hain - Dec 08, 2025, 1:28 PM CST

Title: Biosafety Training

Date: 10/31/25

Content by: Lauren Hain

Present: n/a

Goals: To successfully complete the Biosafety training on canvas.

Content: Attached in pdf below.

Conclusions/action items: Continue to complete the rest of the trainings.

Lauren Hain - Dec 08, 2025, 1:17 PM CST



Download

Screenshot_2025-11-02_144824.png (238 kB)



Prognostic factors for digital range of motion after intrasynovial flexor tendon injury and repair: Long-term follow-up on 273 patients treated with active extension-passive flexion with rubber bands

GABRIEL KLENNER - Nov 11, 2025, 9:52 AM CST

Title: Prognostic factors for digital range of motion after intrasynovial flexor tendon injury and repair: Long-term follow-up on 273 patients treated with active extension-passive flexion with rubber bands

Date: 11/11/25

Content by: Gabriel Klenner

Present: N/A

Goals: Gain a better understanding of how rubber bands could help with rehabilitation efforts of the hand

Search term: Rubber band rehabilitation of hand

Citation:

Edsfeldt, Sara, Martin Eklund, and Monica Wiig. "Prognostic Factors for Digital Range of Motion After Intrasynovial Flexor Tendon Injury and Repair: Long-Term Follow-Up on 273 Patients Treated with Active Extension-Passive Flexion with Rubber Bands." *Journal of Hand Therapy* 32.3 (2019): 328-33. *ProQuest.* Web. 11 Nov. 2025.

Content:

- Older patients generally take longer to regain digital range of motion than younger ones
- patients were treated with active extension-passive flexion with rubber bands to maintain the involved fingers in flexion (similar to our glove method)
- "Rubber bands were attached to the fingertips and forearm and running under a pulley in the palm"
- · Bands released at night but otherwise remained on, patients would perform exercises 10 times every hour to improve ROM
- · These patients were not TBI survivors, though they did have nerve damage in their hands

Conclusion:

Are rubber bands the best option we have for rehabilitation or should we switch to a different method?

Enhancing Grasping Function with a Thermoresponsive Ionogel Adhesive Glove for Patients with Rheumatic Diseases

GABRIEL KLENNER - Sep 18, 2025, 5:48 PM CDT

Title: Enhancing Grasping Function with a Thermoresponsive Ionogel Adhesive Glove for Patients with Rheumatic Diseases

Date: 9/18/2025

Content by: Gabriel Klenner

Present: N/A

Goals: Learn more about other grip strength devices and see how previous ideas can be applied to our project.

Search term: Pubmed: flex sensor AND grip measurment

Citation: Wang S, Liu S, Zhang J, Yu Z, Shao Y, Zhao C, Ma J, Fu X, Yang M, Chen L, Liu M, Wen L. Enhancing Grasping Function with a Thermoresponsive Ionogel Adhesive Glove for Patients with Rheumatic Diseases. Adv Sci (Weinh). 2025 Jul;12(26):e2414761. doi: 10.1002/advs.202414761. Epub 2025 Mar 26. PMID: 40140959; PMCID: PMC12245102.

Content:

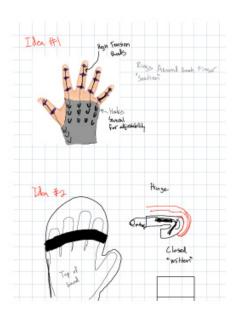
- Two types: rigid wearable hand exoskeletons and soft wearable assistive gloves.
- "five key components: four smart adhesive pads, a hands-free control interface based on IMU, a flexible printed circuit board (FPCB), a rechargeable lithium-polymer battery, and a commercially available textile glove."
- Smart Adhesive Pads: These are attached to all fingers except the pinky allowing for "independent control of the switchable adhesion for each finger"
- The hands free control allows the user to control flexion or extension movements using the pinky finger as a signal for object/grip release
- The circuit board and battery are attached at the back of the glove.
- this design requires assistance to put on (it is a normal glove with modular attachments)
- modular, easy to repair or replace parts

Conclusions/action items:

Consider modularity and flexibility when choosing what to use for our glove. Rigid electronics and sensors will be uncomfortable and prone to breaking.

https://doi.org/10.1002/advs.202414761

GABRIEL KLENNER - Dec 08, 2025, 6:36 PM CST



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GABRIEL KLENNER - Dec 08, 2025, 6:08 PM CST





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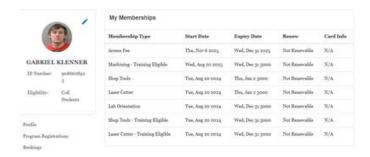
GABRIEL KLENNER - Dec 08, 2025, 6:07 PM CST



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GABRIEL KLENNER - Dec 08, 2025, 6:06 PM CST



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image_2025-12-08_180643858.png (63.6 kB)

Stroke Survivors' Interaction With Hand Rehabilitation Devices: Observational Study

Lucy McArdle - Sep 19, 2025, 8:31 PM CDT

Title: Stroke Survivors' Interaction With Hand Rehabilitation Devices: Observational Study

Date: 9/18/25

Content by: Lucy McArdle

Present: Lucy McArdle

Goals: Understand other leading products on the market for helping stroke/TBI patients regain grip strength

Search Term: leading devices for improved grip strength for stroke survivors

Citation: Wodu, Chioma Obinuchi, et al. "Stroke Survivors' Interaction With Hand Rehabilitation Devices: Observational Study."

JMIR Biomedical Engineering 9.1 (2024): e54159.

Content:

Study observing stroke patients interacting with various kinds of rehabilitation devices over 8 weeks

Repetitiveness, intensity, and specific task motions all factors in improving grip strength

Devices in study included: NeuroBall, GripAble, and Semi-Circular Peg Board

Neuroball connects to tablet, measures activities

GripAble has user play therapy games aimed at improving grip strength and assesses data

Semi-Circular Peg Board has pegs of different shapes and sizes for users to pick up and place in holes

80% of patients with poor hand function couldn't interact with any of the devices

Tightness in hand (devices wouldn't fit)

Weakness in upper limb in hand (could not perform actions needed)

Range in hand function of hemiplegic patients effects the goals of rehabilitation

Clenched hand is a feature of spasticity

Rehabilitation gloves are being developed

Must have low spasticity and some range of motion in hand to use rehabilitation glove

Conclusions/action items: continue to research different devices and hand grip function

Lucy McArdle - Sep 28, 2025, 8:25 PM CDT

	Windle on all
Original Paper	
Stroke Survivors' Interaction With Hand Rehabilitation Devices: Observational Study	
Chiorna Ohimuchi Wodu ¹³ , BTECH, MSc, Gillian Sveeney ¹ , PhD, Milena Slachet	ia1, BSc; Andrew Kerr ¹ , PhD
Topuranous of Winneshood Engineering, University of Stantischole, Clingero, United Kingdom	
Department of Household Technology, University of Port Housest, Port Housest, Nigoria	
Corresponding Author:	
Chioma Obinzalii Woda, BTECH, MSc	
Department of Biomedical Engineering	
University of Simulad yde	
106 Hoticstory	
GL0KW Glaupes	
Cangon; United Kingdom	
Phone: 4479 3055 4076	
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Abstract Budground: The hand is crucial for carrying-out activities of duly living as well as see	
upper limb is affected in up to 55% to 15% of stoke servi vos. It to be insertic after stroke. But and around or habilitation devices have been designed to improve hand function. However, as in another with more service loss of function.	
	nose to those doxicos is compostriced
and coveral orbibilisation-devices have been designed to improve hand function. Here we, as in people with more severe loss of function. Objective: In this study, we almost to observe studie survivors with post hand function in	cost to those dovine, is, compounded toucking with a range of commonly go-ouriched what litation gyar. The work, Each participan communicated and chappening hand function as pror- wed during their interactions with 3 well during their interactions with 3

Construction: For all studes carries with impairments in their hands can rate and of contently available shadehilized characteristics. There will be a MACE to rest of Constructive System and with hand shadehilized where, we they cannot carry out the hand seveness an excessory for each interaction. The design of devices for shaded which distribute should consider the secondard passes of those with part hard function.

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biomedeng-2024-1-e54159.pdf (1.33 MB)

Lauren Hain - Oct 07, 2025, 11:00 PM CDT

Title: Factors affecting grip force: anatomy, mechanics, and referent configurations
Date: 9/19/25
Content by: Lucy McArdle
Present: Lucy McArdle
Goals: Understand what factors affect grip strength
Search Term: hand grip anatomy
Citation: Ambike, S., Paclet, F., Zatsiorsky, V.M. et al. Factors affecting grip force: anatomy, mechanics, and referent configurations. Exp Brain Res 232, 1219–1231 (2014). https://doi.org/10.1007/s00221-014-3838-8
Content:
Flexor Digitorum Profundis contributes to flexing of wrist and grip force
Entendor Digitorum Communis is extension of wrist and grip force
Bulk of the muscles contained in forearm
Extrinsic (forearm muscles) provide most of the grip strength
Intrinsic muscles (only in hand) affect grip function but not wrist movement

Intrinsic muscles responsible for fine motor control

Extensor digitorum and extensor carpi responsible for wrist stabilization

Conclusions/action items: continue researching grip strength devices to create designs for our client

Lucy McArdle - Sep 28, 2025, 8:23 PM CDT

Factors affecting grip force: anatomy, mechanics, and referent configurations

Satyaja Araba- Theast Padel - Violete's M. Zasherig- Mark I. Lateb

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Power Grip Exoskeleton Design as Rehabilitation Devices for Post-Stroke Survivors

Lucy McArdle - Sep 28, 2025, 8:21 PM CDT

Title: Power Grip Exoskeleton Design as Rehabilitation Devices for Post-Stroke Survivors

Date: 9/28/25

Content by: Lucy McArdle

Present: Lucy McArdle

Goals: Understand other leading products on the market for helping stroke/TBI patients regain grip strength

Search Term: leading devices for improved grip strength for stroke survivors

Citation: D. Kuswanto, B. Iskandriawan and P. S. Mahardhika, "Power Grip Exoskeleton Design as Rehabilitation Devices for Post-Stroke Survivors," 2018 1st International Conference on Bioinformatics, Biotechnology, and Biomedical Engineering - Bioinformatics and Biomedical Engineering, Yogyakarta, Indonesia, 2018, pp. 1-6, doi: 10.1109/BIOMIC.2018.8610556. keywords: {Exoskeletons;Thumb;Muscles;Servomotors;Wrist;Medical treatment;Rehabilitation

Exoskeleton;Independent;Regular;Post-Stroke},

Content:

Strokes result in restricted oxygen to the brain which in turn causes dead brain cells (presents similar to TBI)

Exoskeleton has to be light for home use

An exoskeleton must be able to grasp objects

Used an adjustable finger ring system to fit hands of all sizes

Exoskeleton is externally powered by an actuator

3D printed the exoskeleton using PLA (Polylactic Acid)

Motor uses fishing line as the reel

Tight, waterproof glove used as barrier between the hand and the exoskeleton

Neoprene is used for the gloves because it absorbs sweat

When tested weight was light, and glove took 60 seconds to put on

Biggest flaw of design was wrist area

Wrist area is bulky with the motor and fully encircles the wrist which makes glove less adjustable

Use braided fishing line for more strength in pulley system

Conclusions/action items: design looks similar in some ways to ours, worked well, and accomplished most of the goals set by researchers

https://ieeexplore.ieee.org/abstract/document/8610556

Lucy McArdle - Sep 28, 2025, 8:22 PM CDT

2018 1st their natural Carlierence on Bioinformatics, Biotechnology, and Bornedical Engineering (BioMC) rogs as arts, Indonesia

Power Grip Exoskeleton Design as Rehabilitation Devices for Post-Stroke Survivors

Djoko Karamati Depa mener of Debase of Des Januar Friendige Sepulah Rapember (ES) Santono, Indonesia Hamburg I class dervan. Separate on of Seukanial Des Juniper Enhantery Departs be Superative (STE) Standages, I tale mode Pauli State Mahashika Department of Industrial Designation Faction Fathering Republic Representation (EEE) Surpheys, Indonesia market (EEE)

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Download

Power_Grip_Exoskeleton_Design_as_Rehabilitation_Devices_for_Post-Stroke_Survivors.pdf (4.16 MB)

10/31/25 - Chemical Safety Training

Lucy McArdle - Dec 09, 2025, 8:45 PM CST

Title: Chemical Safety Training

Date: 10/31/25

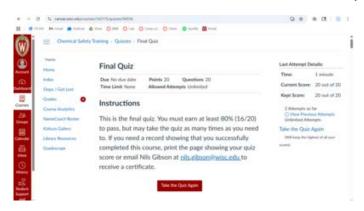
Content by: Lucy McArdle

Present: n/a

Goals: To successfully complete the Chemical Safety training on canvas.

Content: Attached in pdf below.

Lucy McArdle - Dec 09, 2025, 8:46 PM CST



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Screenshot_2025-12-09_203839.png (303 kB)

Lucy McArdle - Dec 09, 2025, 8:47 PM CST

Title: Machining Training

Date: 10/31/25

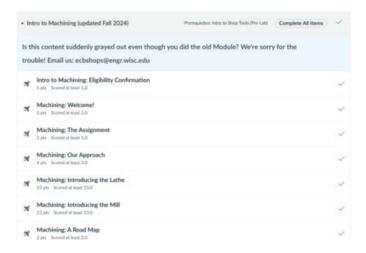
Content by: Lucy McArdle

Present: n/a

Goals: To successfully complete the machining training on canvas and complete the mill and lathe training in the shop.

Content: Attached in pdf below.

Lucy McArdle - Dec 09, 2025, 8:47 PM CST



Download

Screenshot_2025-12-09_204113.png (124 kB)

Lucy McArdle - Dec 09, 2025, 8:48 PM CST

Title: Biosafety Training

Date: 10/31/25

Content by: Lucy McArdle

Present: n/a

Goals: To successfully complete the Biosafety training on canvas.

Content: Attached in pdf below.

Lucy McArdle - Dec 09, 2025, 8:48 PM CST



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Screenshot_2025-12-09_204242.png (160 kB)

Lucy Mcardle/test 106 of 133



9/18/25-Handgrip Strength as an Indicator of Overall Strength and Functional Performance

SYDNEY SMITH - Sep 18, 2025, 8:23 PM CDT

Title: Handgrip Strength as an Indicator of Overall Strength and Functional Performance

Date: 09/18/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn more about the biomechanics of the hand and previous research of stiffness in the hand.

Search Term: biomechanics literature on hand and grip function

Link: https://pmc.ncbi.nlm.nih.gov/articles/PMC5438998/#abstract1

Citation: [1] H. Höppner, M. Große-Dunker, G. Stillfried, J. Bayer, and P. van der Smagt, "Key insights into hand biomechanics: Human grip stiffness can be decoupled from force by Cocontraction and predicted from electromyography," Frontiers in neurorobotics, https://pmc.ncbi.nlm.nih.gov/articles/PMC5438998/#abstract1 (accessed Sep. 18, 2025).

Content:

-There is a positive correlation between HGS and the strength of upper limbs, trunk, and lower limbs in many but not all studies. The strength of correlation depends a lot on testing protocol, age, measurement position, whether strength is isometric vs. isokinetic

Measurement protocols and positions matter a lot:

- -Many studies use the American Society of Hand Therapists (ASHT) protocol (elbow at 90°, seated, forearm/wrist neutral) for HGS measurements.
- -MDPI Variations (standing vs seated; elbow extended vs flexed; dominant vs non-dominant hand) lead to different correlation strengths.
- -Elderly populations show consistent correlations, though weaker in some muscle groups.

MDPI

-Young, healthy, or physically active groups tend to show stronger correlations between HGS and strength in other limbs.

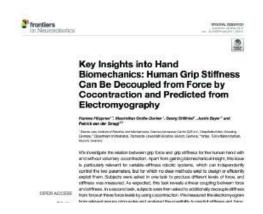
MDPI

- -In people with disabilities (stroke, etc.), the relationships are more variable.
- -For training or assistive device design, consider that grip alone sometimes reflects deficits elsewhere (e.g., lower limb or trunk strength) but not always; beware of assuming grip improvements always generalize

Conclusions/action items:

Track both hands separately; expect that dominant hand may show greater baseline strength and perhaps different curve of improvement. Adapt mechanism to accommodate asymmetry. Use grip strength device not just for "training" but also for regular monitoring; design in a way that allows easy quantitative measurement (e.g., sensor or dynamometer built in) so you can track improvements.

SYDNEY SMITH - Sep 18, 2025, 8:24 PM CDT





Download

Key_Insights_into_Hand_Biomechanics__Human_Grip_Stiffness_Can_Be_Decoupled_from_Force_by_Cocontraction_and_P redicted_from_Electromyography.pdf (11.6 MB)



9/28/25-Effectiveness of Using Virtual Reality–Supported Exercise Therapy for Upper Extremity Motor Rehabilitation in Patients With Stroke: Systematic Review and Meta-analysis of Randomized Controlled Trials

SYDNEY SMITH - Sep 28, 2025, 1:21 PM CDT

Title: Effectiveness of Using Virtual Reality–Supported Exercise Therapy for Upper Extremity Motor Rehabilitation in Patients With Stroke: Systematic Review and Meta-analysis of Randomized Controlled Trials

Date: 9/28/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn how virtual reality helps in upper limb physical therapy

Link: https://www.jmir.org/2022/6/e24111/

Search Term: Hand therapy stroke

Citation: C. Chen, J. Lee, H. M. Kim, Y. M. Kim, and H. J. Lee, "Effectiveness of using virtual reality–supported exercise therapy for upper extremity motor rehabilitation in patients with stroke: Systematic review and meta-analysis of randomized controlled trials," J. Med. Internet Res., vol. 24, no. 6, p. e24111, Jun. 2022. doi: 10.2196/24111

Content:

Virtual reality (VR) technologies are increasingly being integrated into rehabilitation to provide engaging, augmented feedback for motor training.

Outcomes considered: impairments (e.g. motor function, strength, spasticity, range of motion), activity/participation (e.g. daily living independence), and quality of life.

They followed PRISMA guidelines and searched multiple databases (CINAHL Plus, MEDLINE, Web of Science, Embase, Cochrane) up to December 31, 2021.

The authors aimed to systematically review randomized controlled trials (RCTs) assessing VR-supported exercise therapy for upper extremity rehabilitation poststroke, and to quantify effectiveness via meta-analysis.

Conclusions/action items:

VR-supported upper extremity exercise therapy after stroke can yield real benefits in improving motor function, range of motion, strength, and some aspects of daily activity independence over conventional or no therapy.

However, the evidence is not uniform across all metrics, and the sustainability of those benefits post-intervention remains uncertain.

SYDNEY SMITH - Sep 18, 2025, 8:59 PM CDT

Title: Best Physical Therapy Tools for Hands: Improve Strength, Mobility, and Function With Rehab Tools at Home

Date: 09/18/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about different devices which help with strengthening hand muscles

Link: https://www.flintrehab.com/physical-therapy-tools-for-hands/

Search Term: devices for stiff fingers to help strengthen

Citation: Flint Rehab, "9 Best Physical Therapy Tools for Hands: Improve Strength, Mobility, and Function With Rehab Tools at Home," Flint Rehab, July 21, 2025. [Online]. Available: https://www.flintrehab.com/physical-therapy-tools-for-hands/. [Accessed: Sept. 18, 2025].

Content:

-Therapy Putty

Flexible/resistant material used for squeezing, fine motor work.

Flint Rehab

Helps with grip & pinch strength; multiple resistance levels available.

Flint Rehab

-Hand Exercise Balls

Silicone or foam balls, varying firmness.

Flint Rehab

Useful early in recovery or for light maintenance: grip strength, stress relief, circulation.

Flint Rehab

-Finger Extension Bands

Bands (or even rubber bands) that help train opening the hand (extensors), which counters or balances grip/flexor strength.

Flint Rehab

Helps with muscle imbalance and joint alignment.

Flint Rehab

-Spring-Loaded Grip Strengtheners

Classic devices for full-grip or individual finger training.

Flint Rehab

Good for improving forearm endurance and "crushing" grip.

Flint Rehab

-MusicGlove (Flint Rehab)

A gamified tool combining timing, rhythm, visual cues with interaction through gripping and fine motor tasks.

Flint Rehab

Useful for neurological recovery, motivation, and shows clinically proven improvements in hand function with consistent use.

Flint Rehab

-Hand Therapy Webs

Stretchy, multi-directional resistance tools for both flexion and extension.

Flint Rehab

Good for overall hand mobility and when managing conditions like arthritis or stiffness.

Flint Rehab

-Peg Boards & Therapy Puzzles

Tools involving small, precise movements, placing/removing pegs, problem solving.

Flint Rehab

Employed to improve dexterity, coordination, cognitive engagement.

Flint Rehab

FitMi (Flint Rehab)

Interactive, technology-assisted tool with wireless "pucks" and software guiding exercises.

Flint Rehab

Helps with high repetition, feedback, structure, adaptability to user ability; useful beyond just hand exercises (wrist/arm/core) in some tools.

Flint Rehab

-Therapeutic Hand Splints and Stretchers

Used passively for stretch, positioning, reducing spasticity or preventing contractures.

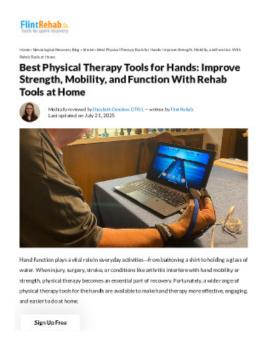
Flint Rehab

Should generally not be worn continuously; used in conjunction with active exercises.

Conclusions/action items:

the importance of balancing flexion and extension (finger extension bands) suggests the design should consider opposing muscle groups, not just grip.

SYDNEY SMITH - Sep 18, 2025, 9:00 PM CDT



Download



9/27/25-Cable-Driven Finger Exercise Device With Extension Return Springs for Recreating Standard Therapy Exercises

Title: Cable-Driven Finger Exercise Device With Extension Return Springs for Recreating Standard Therapy Exercises

Date: 9/27/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about previous mechanisms and technology used to help extend the finger from a fist position.

Link: https://watermark02.silverchair.com/med_008_01_014502.pdf?

token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAABP0wggT5BgkqhkiG9w0BBwagggTqMIIE5gIBADCCBN8GCSqGSlb3DQEHATAeBglghkgBZQMEAS-7AgEQgIIEsOqvNn64LgJr4WEYuBmKsbpuN15LIdEHbaEgNpuEjCHW6mLpx0rkjoVWgvWThgYjXczZ6QDn5cMF0H0e6SF45ZsMaPsnYKaPQYKL052ixkiu6C8Oj9nBjUQgMtQieapSAVsJrKFKk7pBRGR64WjEq2N8d3DEIEE26JY_O0XH65joAMBpKZbxkkjJTv0qyFY4turgWpMJRHAgdlXlPCO_WguUwxFdE1nlGwHdHsuQ1OG6LiRvZnDuFkAwvBkUnew4EiCz51k8uo1u5rWwFel-RUywKNh6QFNq1Nnn5DPsAYpbE9l6ixqqRaWv-

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Search Term: Medical device extension for fingers

Citation: C.-H. Yeow, A. T. Baisch, S. G. Talbot, and C. J. Walsh, "Cable-driven finger exercise device with extension return springs for recreating standard therapy exercises," J. N. 10.1115/1.4025449.

Content:

Results:

Both designs successfully reproduced targeted motions.

Design 2 offered greater versatility, replicating all standard therapy exercises with appropriate sequencing of joint flexion.

Cable forces and joint angles were consistent across trials, showing reliability of the mechanism.

Design 1 (same spring stiffness): Able to replicate table top, straight fist, and fist exercises.

Design 2 (differential spring stiffness): Achieved all six key therapy exercises, including distal interphalangeal (DIP) blocking, proximal interphalangeal (PIP) blocking, and hook fis

Conclusions/action items: The study shows that a cable-actuated, spring-return system can successfully replicate standard hand therapy exercises. This groundwork could lead to

Cable Driven Finger Exercise Device
With Extension Return Springs for
Recorating Sandard Through Exercise
Call Your
Recorating Sandard Sandard
Call Carlot of Sandard
C

SYDNEY SMITH - Sep 27, 2025, 8:09 PM CDT

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SYDNEY SMITH - Dec 10, 2025, 12:44 PM CST

Title: Design Ideas

Date: 12/10/2025

Content by: Sydney Smith

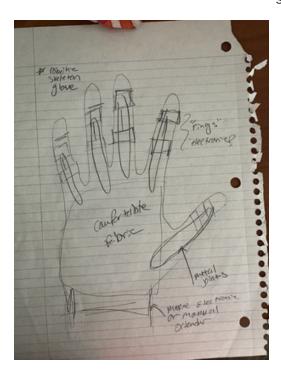
Present: N/A

Goals: To come up with some possible ideas for our project

Content: See pictures below

Conclusions/action items: Went with a combination of David's and Gabe's ideas

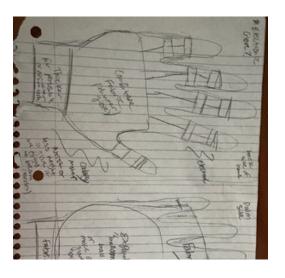
SYDNEY SMITH - Dec 10, 2025, 12:45 PM CST



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SYDNEY SMITH - Dec 10, 2025, 12:45 PM CST





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IMG_7619.jpeg (971 kB)



SYDNEY SMITH - Dec 10, 2025, 11:08 AM CST

Title: Human Subjects Research Certificate

Date: 10/31/2025

Content by: Sydney Smith

Present: N/A

Goals: To complete the training Content: See certificate below

Conclusions/action items: Completed

SYDNEY SMITH - Dec 10, 2025, 11:08 AM CST



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SYDNEY SMITH - Dec 10, 2025, 12:50 PM CST

Title: HIPAA Training

Date: 12/10/2025

Content by: Sydney Smith

Present: N/A

Goals: Complete HIPAA Training on Canvas

Content: Completed the required modules and test for HIPAA training.

Conclusions/action items: Completed the HIPAA test.

SYDNEY SMITH - Sep 10, 2025, 2:07 PM CDT

Title: BME Career Prep

Date: 9/10/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about future jobs and how to prepare for the work field

Content:

Job Searching: ECS tracking sheet, quality of sources such as Handshake, LinkedIn, indeed

Connect before you are a candidate

follow-up 2-3 weeks ----takes time

Resume Tips: Tailor your resume to the position

create balance---show full picture

"flawless" product-ATS proofed resume is doable

-MS Word

-No Columns, charts, colors

-Design projects without years or semesters

-Technical skills and coursework

-Jobs: organization +location, position + title+ dates

Cover Letter: Always based on job posting

custom to each job

amplify the greatest selling points

clear and concise support

Demonstrate employer knowledge

address to person

Career Fair: identify your purpose-more than an internship

looking beyond the obvious

research employer

develop your "valued added" statement

Conclusions/action items:

Learned a lot about career fair prep. How to look for jobs that you are interested in using Handshake. How to correctly make your resume

SYDNEY SMITH - Sep 17, 2025, 2:07 PM CDT

Title: Leadership

Date: 9/17/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about leadership

Content:

Effective leadership: Communication, confident, inclusive, listening, assertive, understanding, organized

Anatomy of a good leader: Self-awareness, vision, transparency, communication, decision making, empathy

Self-assessments are Myers-Briggs, Clifton Strengths, and Disc

Styles of Leadership:

Power model-leadership=power

Servant-Leadership=Mutual Service

Authentic-Leadership=Authentic

I am servant style

People-oriented leader

process-oriented leader

thought-oriented leader

impact-oriented leader

Goal Setting:

My personal leadership goal is to work on being more communicative and developing confidence. I will practice by talking to different types of people who may be more assertive and have deeper knowledge on certain topics for projects. Success would be having more confidence and being able to lead small groups of people without severe anxiety of feeling like everything I say is wrong or stupid.

Conclusions/action items:

Leadership styles and goals were set.

SYDNEY SMITH - Sep 24, 2025, 1:55 PM CDT

Title: "Near peer mentoring"

Date: 9/24/2025

Content by: Sydney Smith

Present: N/A

Goals: Mentoring BME 200 students

Content:

-Additional support

-Active listening skills

-effective study practices

-self-awareness

-interpersonal skills

-increased confidence

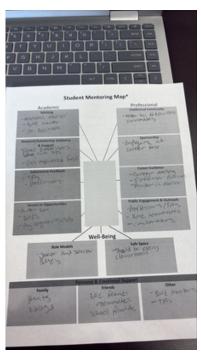
-increased patience

-positive habits

Mentor Map: see below

Conclusions/action items: Talked over how to be a good BME 200 mentor

SYDNEY SMITH - Sep 24, 2025, 1:56 PM CDT



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SYDNEY SMITH - Oct 01, 2025, 2:05 PM CDT

Title: Sustainability in BME

Date: 10/1/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn more about how to apply BME with the sustainability of reusable resources.

Content:

There is an environmental effect with white paper in doctors offices

-reduce carbon footprint and waste

-stainless steel

life cycle greenhouse gas emissions of anesthetic drugs-different kinds of effects

-A lot of NO2 release

Talked a lot about coffee pods vs Keurig

Conclusions/action items: For our project use materials that are reusable or are more sustainable.

SYDNEY SMITH - Oct 08, 2025, 2:03 PM CDT

Title: Intro to WARF, IP, Disclosing

Date: 10/8/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn more about WARF and how to patent our products

Content:

Technology transfers include:

- -intellectual property
- -industry-sponsored research
- -consulting arrangements
- -fee for service

Types of IP:

- -patents
- -copyrights
- -trademarks
- -trade secrets

other WARF IP:

- -biomaterials
- -technique and know-how (akin in some ways to trade secrets)
- -data

Copyright: protection for creative works that are expressed in a tangible medium. A wide range of subject matter, including software code

Trademark: protection for names, marks, logos, dress, etc. Requires use in commerce. source identifying function

Trade Secrets: can be used to protect anything of value. Protection is good so long as the concept is not generally known

Patents Generally:

A patent is a property right granted by a governmental agency

- -US Patent
- -no global patent

Patent holders have the right to exclude others from making, using, selling, or importing the claimed invention

Types of patents:

Design- 15-year term, limited to ornamental features

Plant- new variety, 20-year term, asexually reproducing, non-tuber

Utility- Issued for the invention of a new and useful process, machine, manufacture, or composition of matter

Requirements for Patenting:

101-Eligible; cannot be a product of nature, an abstract idea, or a natural phenomenon

102-Novel; it must be new

- 112-Enabled and Described; must provide enough detail to teach others how to make or use the invention
- 103- Non-obvious; it cannot be a simple modification or combination of existing concepts

Conclusions/action items: Patents are expensive. there are many different kinds and takes a lot of time to be appliciable. Patent scientists look over possible patented inventions to make sure they fill the requirements.



SYDNEY SMITH - Oct 15, 2025, 2:10 PM CDT

Title: Valuation of Intellectual Property

Date: 10/15/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn more about the legal side of engineering

Content:

-IP protection allows research to safely transfer into products, processes and/or systems

medical device -> patent filing -> marketplace

-IP enables investment, partnerships, and ethical competition

Legal career paths:

Technical advisor-Stem degree

patent advisor-STEM degree + patent Bar

patent attorney-

patent litigator-

IP License Attorney

Tech Transfer Manager

Engineer

Conclusions/action items: I learned a lot about being an attorney.

SYDNEY SMITH - Oct 22, 2025, 2:00 PM CDT

Title: BME Advising

Date: 10/22/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about post-grad plans, engineering experience, research, and other organizations

Content:

- -Important to "build your story," get experience, especially in research.
- -Do homework
- -Think about letter writers
- -For personal statements, start with what you want to do-thesis statement

Graduate school options:

- -Master's, MS
- -Doctoral, PhD

Some reasons:

-opens doors, higher starting salary

Conclusions/action items:

Learned a lot about post-grad opportunities and things that I should accomplish by graduation.

SYDNEY SMITH - Oct 29, 2025, 2:08 PM CDT

Title: To Regulate, Or Not To regulate

Date: 10/29/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about regulation

Content:

FDA determines if the benefits outweigh the risks

there are different classes 1, 2, and 3

FDA doesn't necessarily mean its completely safe

Hypothesis 1: Abnormal returns attributable to medical device recalls are negligible

- Hypothesis 2: Abnormal returns attributable to recalls are less negative for firms with greater project scope
- Hypothesis 3: Abnormal returns attributable to recalls are more negative for firms with high growth prospects
- Hypothesis 4: ... more negative for firms with lower sales
- Hypothesis 5: ... less negative for firms with high debt to equity ratio.

Although medical device recalls represent a firm's failure to deliver quality over the product life cycle causing significant discomfort to consumers, firms face little by way of capital market penalties

- Product scope, sales, growth prospects and the capital structure of a firm effect magnitude of financial consequences
- As firms broaden their product scope, likelihood of product failures and subsequent recalls increases
- Likelihood of recalls decrease with the cumulative recall experience of the firm.

Conclusions/action items: Learned a lot of new facts about FDA related news articles.

SYDNEY SMITH - Nov 05, 2025, 1:44 PM CST

Title: "Bringing biologics to market"

Date: 11/5/2025

Content by: Sydney Smith

Present: N/A

Goals: Understand the overall structure of the FDA, regulations, and advanced therapeutics

Content:

- -CDER (Center for Drug Evaluation and Research): regulates drugs NDA, IND.
- -CBER (Center for Biologics Evaluation and Research): regulates biologics BLA, IND.
- -CDRH (Center for Devices and Radiological Health): regulates medical devices PMA, 510(k), IDE.

Advanced therapies can fall under one or more centers depending on product type.

Regulatory Framework for CGT

-Development is guided by laws, regulations, and FDA guidance documents.

Example: Framework for hemophilia gene therapy regulation.

- -Section 351 vs. 361 (HCT/Ps):
- -351 products = regulated as drugs/biologics (highly regulated, expensive, lengthy).
- -361 products = lower regulation, typically minimal manipulation and homologous use.

Product Development Lifecycle

- -Each stage (research → clinical → manufacturing → commercialization) carries specific risks and safety concerns.
- -Distinguish between critical-path studies (required for approval) vs. exploratory "good research" projects.

Target Product Profile (TPP)

- -A strategic planning tool defining the intended use, indication, safety, and efficacy profile.
- -Ensures the product is both medically and commercially compelling.
- -Aligns with FDA quality guidance documents Q8, Q9, Q10.

Quality and Manufacturing

- -Quality Management Systems (QMS): Ensure consistent, compliant product quality via documented policies, processes, and controls.
- -cGMP (Current Good Manufacturing Practice): Standards for manufacturing under controlled, classified environments.
- -Emphasis on Quality by Design (QbD) and risk-based thinking.
- -"Quality with a capital Q" means embedding quality into every development stage.

Practical Quality Exercises

Examples of applying quality systems:

- -Managing process changes.
- -Optimizing workflow efficiency.
- -Conducting investigations and CAPA (Corrective and Preventive Actions).

Career Paths in Regulated Environments

-Chemistry, Manufacturing, and Controls (CMC): Process design, validation, and product consistency.

Nonclinical and Clinical Development: Translational research and safety testing.

-Quality, Compliance, and Regulatory: Quality culture, auditing, FDA submissions (IND, NDA, BLA, PMA, etc.), risk management, and data integrity.

Conclusions/action items: Developing cell and gene therapies requires integrating scientific innovation with regulatory strategy. A strong Quality culture and understanding of the FDA's structure are key to bringing safe, effective products to market and pursuing careers in biotech regulation or manufacturing.

SYDNEY SMITH - Nov 12, 2025, 2:29 PM CST

Title: An Introduction to Research and the IRB

Date: 11/12/2025

Content by: Sydney Smith

Present: N/A

Goals: Explain what the Institutional Review Board (IRB) is, why it exists, what kinds of research require review

Content:

Purpose of IRB

Protect rights & welfare of human research participants

Ensure ethical + regulatory compliance (Belmont Report, Common Rule, HIPAA, etc.)

Required before any human research begins — no retroactive approval

Historical Background

Unethical studies: Tuskegee Syphilis, Nazi experiments, Guatemala Syphilis, Willowbrook hepatitis

Led to ethical codes:

Nuremberg Code (1947) - voluntary consent

Declaration of Helsinki (1964) - medical ethics

Belmont Report (1979) – foundation of U.S. research ethics

Belmont Report Principles

Respect for Persons: autonomy + protection for vulnerable populations

Beneficence: maximize benefits, minimize harm

Justice: fair selection + distribution of research burdens/benefits

Regulatory Framework

Common Rule (45 CFR 46) - defines research + IRB requirements

Revised Common Rule (2018): simplified some processes, reduced admin burden

IRB Composition

Must include:

Scientists (MD, PhD, MPH, etc.)

Non-scientists & community members

Diverse backgrounds (race, gender, culture)

Definitions

Research: systematic investigation → generalizable knowledge

Human subject: living person providing data, specimens, or identifiable info

Examples of Human Subjects Research

Surveys, interviews, observation

Medical records or biological samples

Device/drug studies

Not Research (usually)

Quality Improvement (QI) / Program Evaluation (PE)

Not generalizable, not investigator-initiated

Usually internal to one organization

Exception: Device studies (FDA rules apply)

HIPAA Considerations

Directly identifiable: name, contact info

Coded: identifiers removed, linked via study ID

De-identified/anonymized: all identifiers removed

Must protect participant privacy + data confidentiality

Types of IRB Review

1. Exempt Research (minimal risk):

Category 2: Surveys/interviews/educational tests/public observation

Category 3: Benign behavioral interventions (short, harmless, no specimens)

Category 4: Secondary use of existing, non-identifiable data/samples

2. Non-Exempt Research:

Requires expedited or full IRB review

Examples: research with children, identifiable data, interventions, blood draws, devices

IRB Process (via ARROW system)

Administrative Review: checks training & completeness

Pre-Review: ensures compliance with laws/policies

Committee/Reviewer Review: approves or requests changes

After approval:

Use approved documents only

Submit protocol changes for re-approval

Report unanticipated events/noncompliance

Some studies require annual continuing review

Tips for Successful Submissions

Answer all questions clearly

Don't rush or copy-paste incomplete answers

Explain disagreements with reviewer notes

Ask IRB staff for help—they're a resource

Conclusions/action items: The Institutional Review Board (IRB) plays a critical role in ensuring that all research involving human participants is conducted ethically, safely, and in compliance with federal and institutional standards.

SYDNEY SMITH - Nov 19, 2025, 1:47 PM CST

Title: How New Product Development Works in the Medical Device Industry

Date: 11/19/2025

Content by: Sydney Smith

Present: N/A

Goals: To learn about the medical device industry

Content:

Medical device new product development (NPD) is highly regulated, expensive, resource-intensive, and competitive, which is why most companies use structured processes—especially the Stage-Gate system—to reduce risk and improve success.

How Companies Select Projects

Medical device companies evaluate ideas annually and prioritize them based on resources, market opportunity, regulatory risk, and strategic fit. Projects fall into four categories:

Line extensions (new sizes, configurations)

Product improvements

New-to-company devices

New-to-world innovations (highest risk/time/cost)

Who Works on an NPD Team

Cross-functional teams include engineering, marketing, project management, quality, regulatory/clinical, manufacturing, packaging, legal, finance, and sales.

Stage-Gate Process

The standardized development path goes through:

Stage 0 - Ideation

Identify opportunities, study market trends, gather customer unmet needs, and propose high-level solutions.

Stage 1 – Exploration

Define the problem, develop early concepts (8–10), perform preliminary market and technical assessments, and review intellectual property.

Stage 2 - Concept Definition

Narrow to 1–2 strong concepts, refine business cases, conduct deeper customer research, forecast sales, evaluate IP, and prepare for a go/no-go decision.

Stage 3 - Design Development

Create functional prototypes, test iteratively with users, confirm regulatory path, and begin Design Controls (documentation aligned with FDA/EMA requirements and risk management).

Stage 4 – Design Confirmation

Perform verification & validation testing, finalize drawings, advance manufacturing planning, freeze the design, and submit regulatory filings (e.g., FDA 510(k)).

Stage 5 – Design Transfer & Commercialization

Build tooling, finalize testing, prepare Instructions for Use, train service teams, ramp up manufacturing, and launch the product.

Post-Market Surveillance

After launch, companies must document complaints, track issues, and review sales and feedback regularly to drive improvements and ensure regulatory compliance.

Conclusions/action items:

Medical device development is complex, costly, and collaborative.

Structured processes like Stage-Gate help reduce technical, financial, and regulatory risks.

Even great products can fail commercially without strong market fit, pricing, and execution.

2014/11/03-Entry guidelines 132 of 133



John Puccinelli - Sep 05, 2016, 1:18 PM CDT

Use this as a guide for every entry

- Every text entry of your notebook should have the **bold titles** below.
- Every page/entry should be **named starting with the date** of the entry's first creation/activity, subsequent material from future dates can be added later.

You can create a copy of the blank template by first opening the desired folder, clicking on "New", selecting "Copy Existing Page...", and then select "2014/11/03-Template")

Title: Descriptive title (i.e. Client Meeting)

Date: 9/5/2016

Content by: The one person who wrote the content

Present: Names of those present if more than just you (not necessary for individual work)

Goals: Establish clear goals for all text entries (meetings, individual work, etc.).

Content:

Contains clear and organized notes (also includes any references used)

Conclusions/action items:

Recap only the most significant findings and/or action items resulting from the entry.

2014/11/03-Template 133 of 133

Lauren Hain - Sep 12, 2025, 12:58 PM CDT

Title:	
Date:	
Content by:	
Present:	
Goals:	
Content:	
Conclusions/action items:	