

ACTION ITEMS

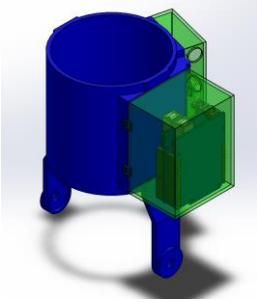
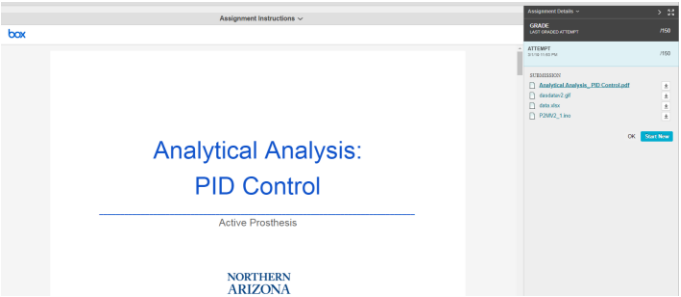

TEAM 12: Active Prosthetic Arm

Due Date:
Wednesday, March 6, 2019 5:30pm

The following are the Action Items from last week:

Team Member: Felicity Escarzaga

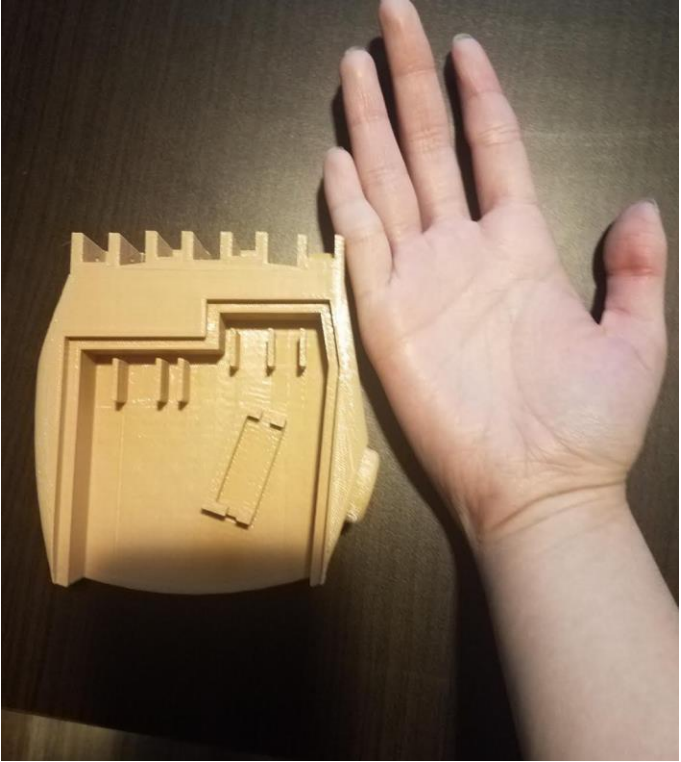
Action Item	Date Due	Date Completed	Result/Proof of Completion
1. Meeting with Whinfrey	3/4	3/6	<p>Meeting moved to 3/6 Discussed new board to use instead of arduino and shield.</p> <ul style="list-style-type: none"> • Board will reduce the overall size of microcontroller needed. • Board included all servo and sensor ports needed • Board included XBee module needed
2. Contact Cline to get them certified to print	3/6	2/28	<p>Email was sent 2/28 discussing procedure for cline library to be certified.</p> <p><small>From: Felicity Escarzaga <fesc@asu.edu> Sent: Thursday, February 28, 2019 10:04:28 AM To: Andrew L See, Kathleen Lorick Schmand Cc: Kyle Nathan Whinfrey, Sophia Celano Frimoz, Bridget Rovani Subject: Re: Creating 3D Printed Prosthetics</small></p> <p><small>Hallo Ms. Schmand and Mr. See,</small></p> <p><small>I am glad to hear you might be willing to work with us to create these arms. We would only need one staff member certified to fabricate for when an arm piece is requested. Certification for fabrication is fairly easy, especially since your staff already know how to run the printers. I have outlined a procedure to being certified below. If you have any more questions please feel free to ask.</small></p> <ol style="list-style-type: none"> <small>1. You need to create a Badge account so that when you receive your certification it can be verified.</small> <small>2. You will select an arm from the e-Nable website to print. I recommend the Phoenix hand v2 (which I have attached STL's of below) as it can be printed at a 1:1 scale on a single 8" x 8" build plate.</small> <small>3. Once the hand is selected, you will print the hand following any specific instructions for the selected device. In the link to the Phoenix hand v2 there are specific print settings. These settings are recommended since the hand will be later transformed and support material/craft might be difficult to remove from certain pieces. When certain arms are requested by ENP, our members will specify these in their instructions along with the specific scaling of the device. Scaling the arm on the table to the right may allow for pallets. Any scaling requested must be followed for the device to fit our clients properly.</small> <small>4. Once the device is printed you will take pictures of the hand, making sure there is enough detail that the quality of the print is visible.</small> <small>5. Fill out the e-Nable Badge Request Form. If you choose to send the Phoenix hand the "Badge being requested" would be Phoenix v2 - Fabrication. Other badge names are located in the e-Nable website link. For the "Evidence URL," you may post the pictures of your printed hand either to our ENP Facebook Page or become a member of e-Nable Badge Events and post them there. Once posted publicly, copy the URL to the "Evidence URL."</small> <small>6. You should receive a confirmation email when you submit. Since e-Nable is a volunteer organization, it may take some time for you to be approved, and it is likely they will want you followed the recommended print settings with other settings needed for your specific printer. You may have as many of your staff certified as you like, but only one active member needs to be certified in order to print e-Nable hands in your makerspace. Your staff does not have to assemble the hand or be certified to assemble hands unless they wish to.</small> <p><small>Thank you very much for your consideration in helping us create these amazing devices.</small></p> <p>Response below states they will discuss and get back to me.</p> <p>Re: Creating 3D Printed Prosthetics</p> <p><small>Andrew L. See to: Ms. Kathleen Lorick Schmand, Bridget</small></p> <p><small>PL, Mar 1, 10:10 AM (14 days ago)</small></p> <p>Thanks Felicity. We will discuss and get back with you.</p> <p>Best, Andrew</p> <p><small>Andrew See Head, User Services and Experience Northern Arizona University Cline Library andrew.see@asu.edu Office: 520-532-5228 Cell: 520-456-9407 Protonmail: ms.see@protonmail.com</small></p>
3. Add forearm attachments to cuff	3/6	3/4	<p>Forearm attachments added and re-enforced. Arduino casing and battery casing re-designed to be attached separately.</p>

			
4. Complete Analytical Analysis	3/1	3/1	<p>Analytical analysis submitted 3/1/19</p> <ul style="list-style-type: none"> • Code complete • Testing done with one motor • Future tests will use several motors and sensors once ordered. 
5. Print Allison's Forearm	3/6	3/6	 <ul style="list-style-type: none"> • Started print 3/4 • 24 hr print • Filament jammed four times • Filament ran out and had to be replaced, jammed again. New extruder may be needed.
6. Updated BOM	3/6	2/22-3/6	<ul style="list-style-type: none"> • BOM has been in progress since start of semester. • New BOM completely restarted in February. (Most parts were changed) • All materials, the price, quantity, and links have been added. • New board has been updated.

Part	Weight	Order	Price	Quantity	Link
Axians	25 g		25.99	1	https://www.amazon.com/dp/B013111111
Meters X5	45 g	Digital Servo x4	25.99	4	https://www.amazon.com/dp/B009687808
Shield	20 g	Arduino Pro Mini 328 - 5V/16K	8.95	2	https://www.sparkfun.com/products/11113
Pin A (Assume!)	1000 g	SparkFun Silver Explorer Kit	12.25	2	https://www.sparkfun.com/products/11313
Battery	44 g	Battery 1Ahv	9.95	2	https://www.sparkfun.com/products/13813
Total Weight	1134 g	Battery 2Ahv	12.95	1	https://www.sparkfun.com/products/12813
	2.50000000 lb	Charger and Booster	19.95	3	https://www.sparkfun.com/products/14111
Color Key	7	Force Sensitive Resistor 0.5"	8.95	5	https://www.sparkfun.com/products/8713
No longer needed		Wiring meter	9.99	1	https://www.amazon.com/dp/B013111111
Out of Stock		Low torque Spring	12.57	1	https://www.granger.com/products/GRANGER-APPROVED-270-Degree-Carbon-Steel-Music-30
Low or no stock		High torque Spring	5.15	1	https://www.granger.com/products/GRANGER-APPROVED-270-Degree-Carbon-Steel-Music-30
Out of Stock		Foam Pad	14.25	1	https://www.amazon.com/dp/B013111111
Out of Stock		Force Sensitive Resistor - Sm	8.95	5	https://www.sparkfun.com/products/9573
Out of Stock		Amphenol FCI Director Cable	1.95	10	https://www.sparkfun.com/products/14198
Out of Stock		SparkFun Breadbit Breadboard	52.99	1	https://www.sparkfun.com/products/12997
		Total	431.52	41	

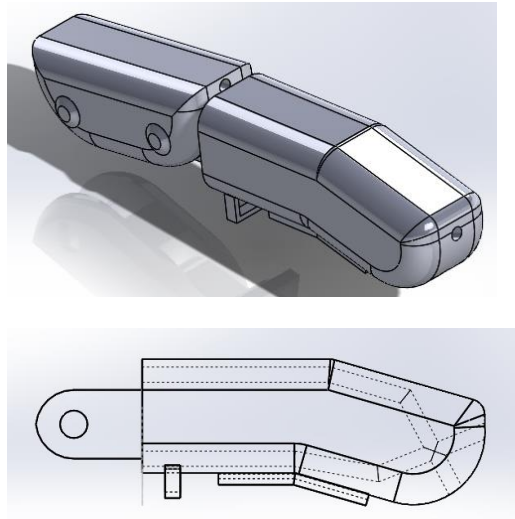
[https://electronics.stackexchange.com/questions/43198/the-appropriate-code-attribute-of-ibm-432041329](#)


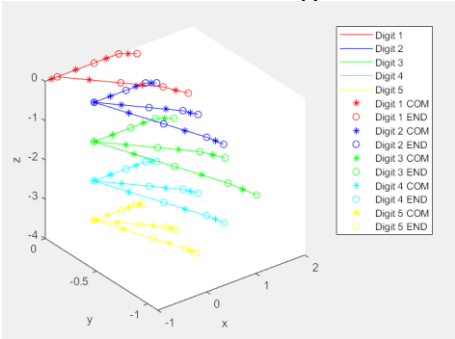
Team Member: Antoinette Goss

Action Item	Date Due	Date Completed	Result/Proof of Completion
Print palm and hinge to understand the dimensions	3/06/2019	3/06/2019	<p>Palm has printed although the dimensions are a bit bigger than what was given. This could be due to some small error from the makers lab, so it will need to be reprinted as the hinge does not fit.</p> 
Work with Janelle to connect fingers to palm.	2/27/2019	2/27/2019	<p>Incomplete because the fingers have been delayed. Goal moved to next week. Fitting however, was discussed in team meeting.</p>

Complete individual analysis	2/27/2019	2/27/2019	Submitted Friday 11:00pm
Discuss arm with Allison	3/03/2019	3/03/2019	Discussed during Sunday Team meeting. The palm needs to be adjusted to the connection form the enable arm This means that the palm will now be edited to incorporate such.

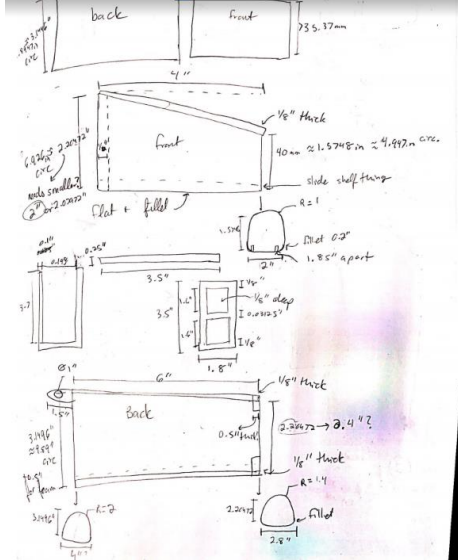
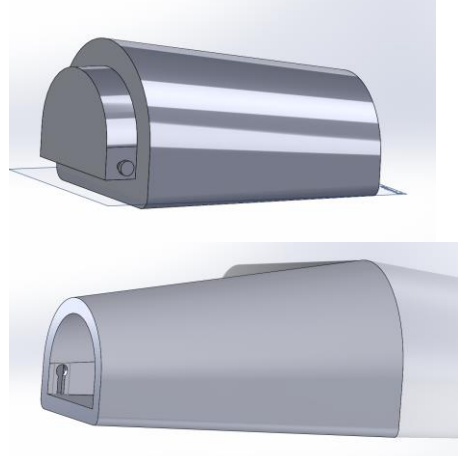
Team Member: Jannell Broderick

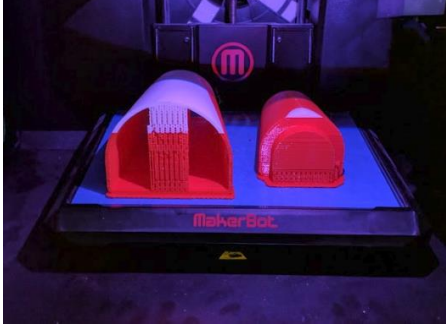
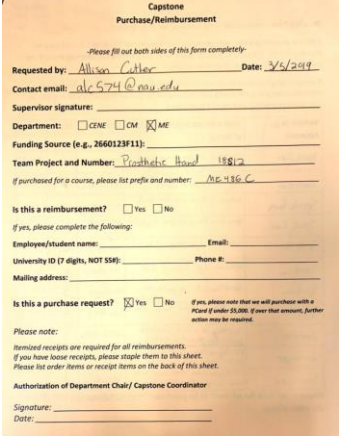
Action Item		Date Due	Date Completed	Result/Proof of Completion
Alter Finger Design		Mar 5	Mar 6	<p>The new finger design incorporates the sensors and grips. A channel was added to hold the sensor wires in place. In addition, the inner channels for the artificial tendons was altered. The fishing line (or other tendon substitute) will loop back around. Thus, the finger can be moved in both directions.</p> 
Print finger		Mar 6	Mar 6	<p>After the new design was drawn in CAD. A request was sent to the makers lab to print a sample finger. The print can be seen below.</p>

				
Individual analysis		Mar 1	Mar 1	<p>The individual analysis has been changed from Opensim to MATLAB. Once completed, the code will plot the movement of the fingers (and rest of forearm if time permits). It will also be able to calculate the position of the tip and center of mass of each finger section. I am also hoping to plot the movement in 3d of various angles. This shows different degrees of motion during flexion. Unfortunately, I was not able create code for determining the velocity of each segment of the finger (creating the pseudo code and code for position was a challenge and I did not have time to finish the code for velocity).</p> 
Work with Toni to connect fingers to palm.		Mar 6	Incomplete	This can not be completed until the fingers are printed. The request was sent to the maker lab and will hopefully be completed before the end of the week.
Update website (make it look more aesthetically pleasing)		Mar 9	Incomplete	I am working to improve the appearance of the website. I will be changing the color scheme and pictures. Some of the layout may change but the links and pages should all have the same information. Potentially, do a photo shoot for the team.

Team Member: Allison Cutler

Action Item	Date Due	Date Completed	Result/Proof of Completion
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<p>Sketch Forearm Design</p>	<p>3/1/2019</p>	<p>3/1/2019</p>	 <ul style="list-style-type: none"> • Sketch made detailing dimensions of forearm halves and how the motor-holder will slide in • New design is a hollow back half and a front half that will house the motors • New design already in circular shape, no thermoforming necessary
<p>CAD Forearm Design</p>	<p>3/4/2019</p>	<p>3/4/2019</p>	 <ul style="list-style-type: none"> • Top image is front half, bottom image is back half of forearm

Print Forearm Design	3/6/2019	3/6/2019	 <ul style="list-style-type: none"> Printed at Felicity's
Build Budget-Purchasing Request	Unassigned	3/6/2019	 <ul style="list-style-type: none"> Form is filled out, needs to be signed and submitted

The following are the Action Items for next week:

Team Member	Action Items	Date Due
Felicity	<ol style="list-style-type: none"> Meeting with Winfree Fix prusa MK3i3 Print Cuff Work of PP slides for Presentation 	<ol style="list-style-type: none"> 3/11/2019 3/13/2019 3/13/2019 3/13/2019
Antoinette	<ol style="list-style-type: none"> complete testing on door design to see if latch design is successful. Print latch component Work with Jannell to connect fingers to palm Begin working on Midpoint presentation for design Work on Midpoint report. In charge of design description as well as all edits. Will discuss palm design as well as individual analysis Modify palm for new forearm edit 	<ol style="list-style-type: none"> 3/13/2019 3/13/2019 3/13/2019 3/13/2019 3/13/2019

Jannell	<ol style="list-style-type: none"> 1. Work with toni to connect fingers to palm 2. Make minor modifications to the fingers 3. Modify rotating base of thumb (needs to allow the tendons to run through while and keeping it's range of motion) 4. Make Edits and add Sections to proposal (executive summary, Manage Design Description) 	<ol style="list-style-type: none"> 1. 3/13/2019 2. 3/13/2019 3. 3/13/2019 4. 3/13/2019
Allison	<ol style="list-style-type: none"> 1. Make edits to Fall Final Proposal Sections 3.1, 4, 5.2.1, and 6 2. Write Midpoint Report Sections 7 intro, 7.2.2 3. Work on Midpoint Presentation Slides on Update, Testing Plans, Schedule, and Budget 4. Re-draft forearm prints and begin redesigning (write notes on model) 	<ol style="list-style-type: none"> 1. 3/13/2019 2. 3/13/2019 3. 3/13/2019 4. 3/13/2019