

# **Open-Source 3D Printed Foot Prosthesis**

**Dr. Sarah Oman  
Team 18F04  
11/19/2018**

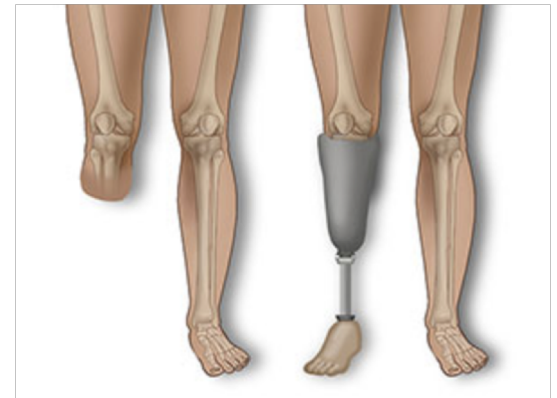
**Abdulwahab Zaidan (Team Manager)  
Ali Abdullah (Secretary / Document Manager)  
Omar Alajmi (Budget Liaison)  
Salman Malallah (Website Developer)**

# Project Description

- **Team goal:**
  - Our team goal is to create and design an 3D printed foot prosthesis leg for below-knee amputees that easy to install and remove, inexpensive, and reachable.
- **Stakeholder:**
  - E-nable Company.
- **Sponsor**
  - Northern Arizona University.

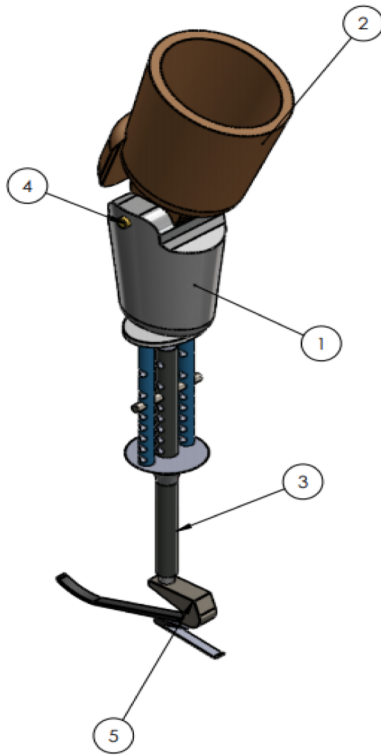


[2]



[1]

# CAD PACKAGE AND BOM



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1		Lower Joint	1
2		Supporting Channel	1
3		Metal Stick	1
4		Pin	1
5		Foot	1

UNLESS OTHERWISE SPECIFIED:		NAME	DATE	TITLE:	
DIMENSIONS ARE IN INCHES		Drawn	Salman		11/15/18
TOLERANCES:		CHECKED	omar	11/17/18	3D printed foot prosthesis
FRACTIONAL ±		ENG APPR.			
ANGULAR: MACH ± BEND ±		MFG APPR.			SIZE DWG. NO. REV
TWO PLACE DECIMAL ±		G.A.			
THREE PLACE DECIMAL ±		COMMENTS:			B Complete Assembly
INTERPRET GEOMETRIC TOLERANCING PER:					
MATERIAL:					SCALE: 1:4 WEIGHT: SHEET 1 OF 1
FINISH:					
DO NOT SCALE DRAWING					

PROPRIETARY AND CONFIDENTIAL  
 THE INFORMATION CONTAINED IN THIS  
 DRAWING IS THE SOLE PROPERTY OF  
 «INSERT COMPANY NAME HERE». ANY  
 REPRODUCTION IN PART OR AS A WHOLE  
 WITHOUT THE WRITTEN PERMISSION OF  
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# DESIGN FUNCTIONS VS IMPLEMENTATION DETAILS

## Methodology

- 1) Attach prosthetic sheath to lower thigh
- 2) Ensure tight fit with thigh
- 3) Join sheath to lower joint
- 4) Adjust the height of lower joint
- 5) Adjust balance of prosthetic leg
- 6) Start walking

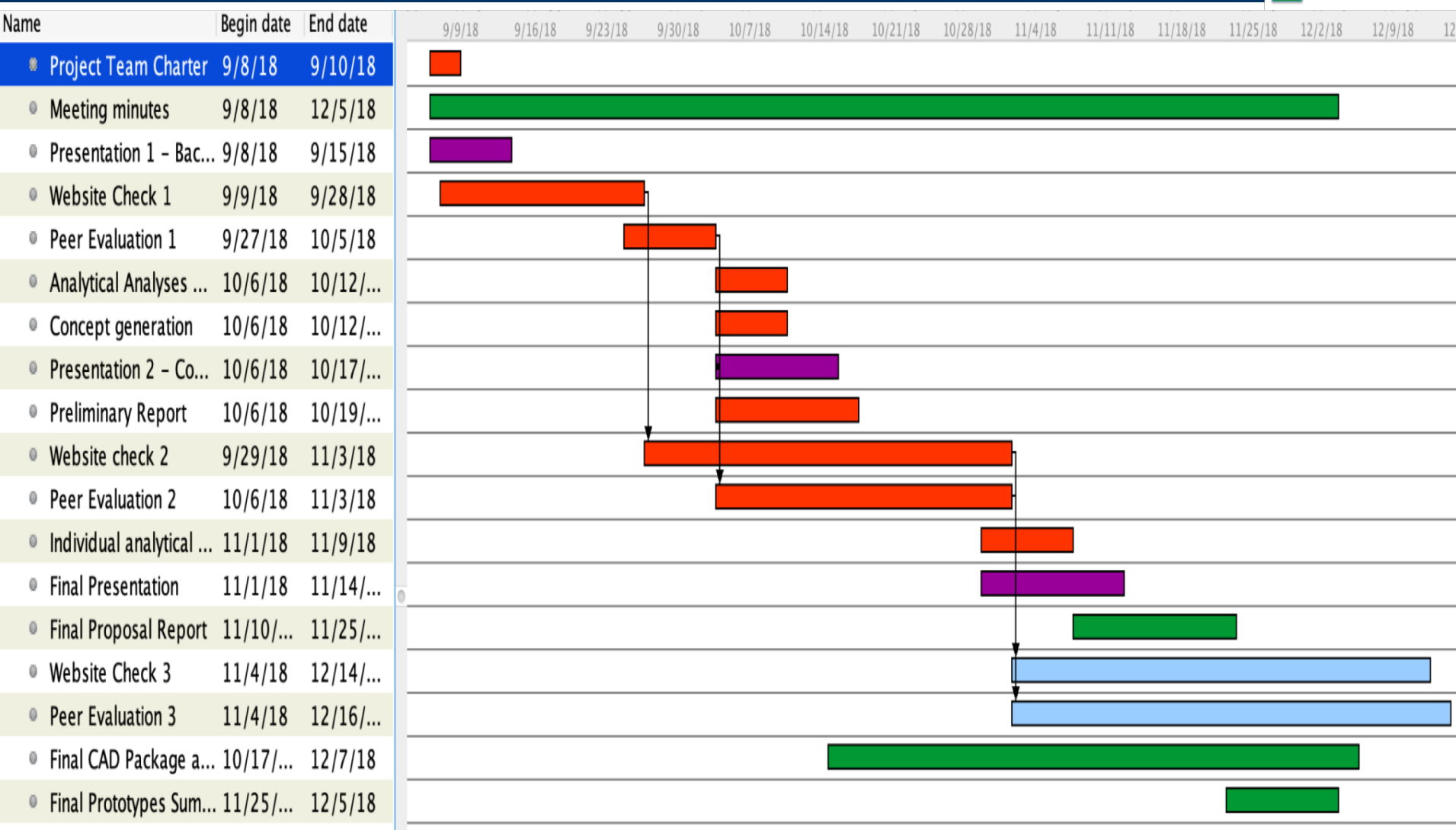
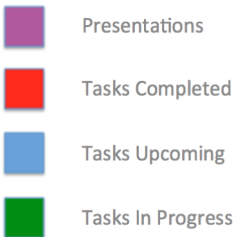


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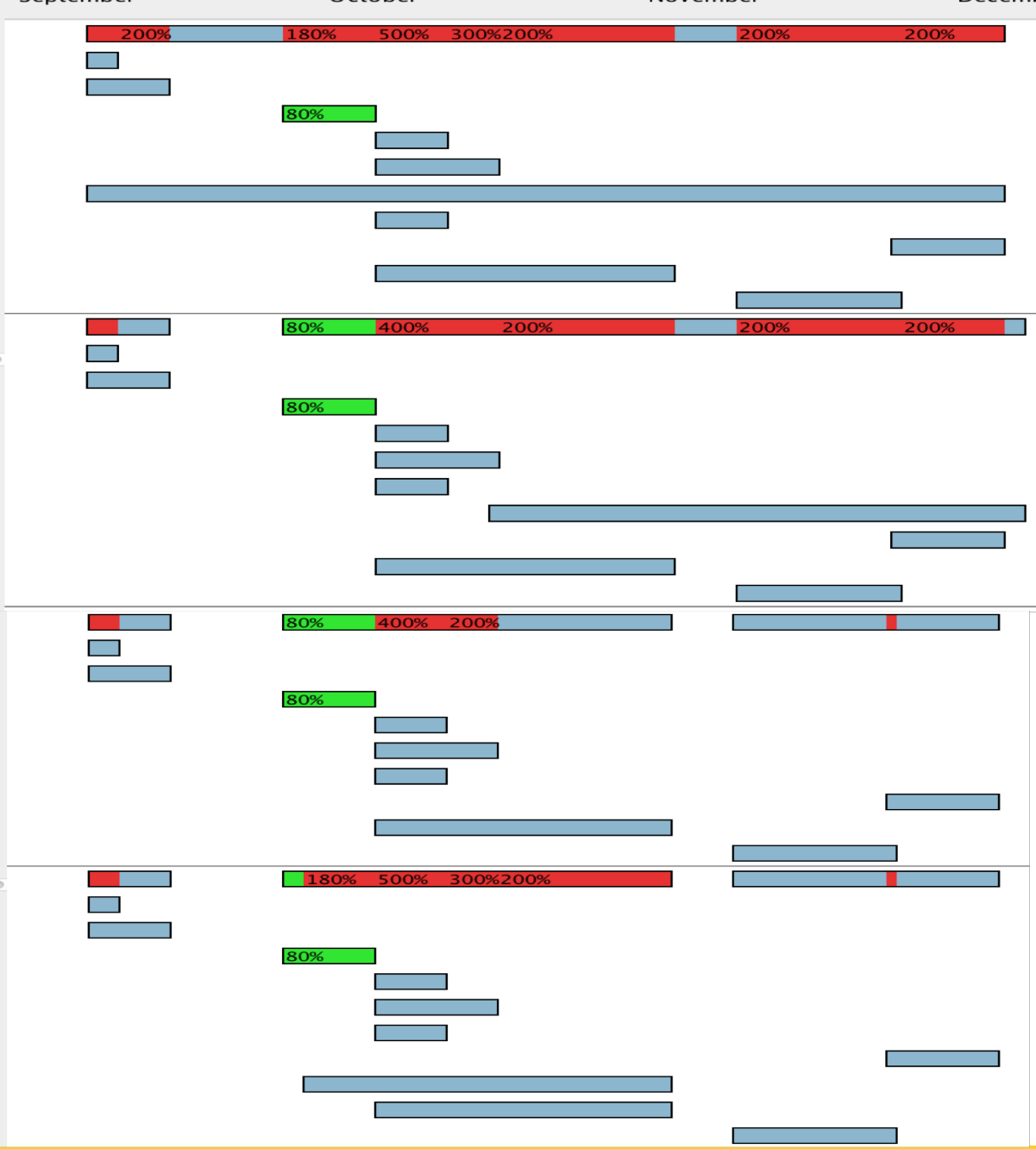
# CUSTOMER REQUIREMENTS VS DESIGN

<b>CR</b>	<b>Design</b>
<b>Below Knee</b>	Fits the descriptions
<b>Holds up to 200 lb adult male</b>	Needs to be checked when printed
<b>Must be printed from 3D printer</b>	Can be printed
<b>Weights 7 lb at most</b>	Must be printed
<b>Limited filament materials</b>	ABS, PLA, PET, HIPS
<b>Fits different height sizes</b>	Adjustable metal stick
<b>Comfortable</b>	Test it first
<b>Safety</b>	Test it first

# SCHEDULE



Name	Default role
▼ ● Ali Abdullah	doc writer
● Project Team Charter	
● Presentation 1 – Backgr...	
● Peer Evaluation 1	
● Analytical Analyses 1 T...	
● Presentation 2 – Conce...	
● Meeting minutes	
● Concept generation	
● Final Prototypes Summary	
● Peer Evaluation 2	
● Final Proposal Report	
▼ ● Omar Alajmi	undefined
● Project Team Charter	
● Presentation 1 – Backgr...	
● Peer Evaluation 1	
● Analytical Analyses 1 T...	
● Presentation 2 – Conce...	
● Concept generation	
● Final CAD Package and ...	
● Final Prototypes Summary	
● Peer Evaluation 2	
● Final Proposal Report	
▼ ● Abdulwahab Zaidan	project ma...
● Project Team Charter	
● Presentation 1 – Backgr...	
● Peer Evaluation 1	
● Analytical Analyses 1 T...	
● Presentation 2 – Conce...	
● Concept generation	
● Final Prototypes Summary	
● Peer Evaluation 2	
● Final Proposal Report	
▼ ● Salman Malallah	web desig...
● Project Team Charter	
● Presentation 1 – Backgr...	
● Peer Evaluation 1	
● Analytical Analyses 1 T...	
● Presentation 2 – Conce...	
● Concept generation	
● Final Prototypes Summary	
● Website check 2	
● Peer Evaluation 2	
● Final Proposal Report	



# BUDGET



Estimation Based on :

1. Labor.
2. Materials.  
( ABS & Nylon, ABS, Carbon fiber, Nylon )
1. Renting the 3D printer.


**Minimum \$1000 / Maximum \$5000**

[ 4 ]



# References

- [1] “Transtibial (Below-Knee) Amputation,” *American Physical Therapy Association*, 17-Sep-2018. [Online]. Available: <https://www.moveforwardpt.com/symptomsconditionsdetail.aspx?cid=c6bc380c-09fc-4dd5-987b-4bbba87e45bc>. [Accessed: 19-Nov-2018]
- [2] Witt, M. (2018, August 29). In with the new: NAU welcomes two new deans. Retrieved from [http://www.jackcentral.org/news/in-with-the-new-nau-welcomes-two-new-deans/article\\_3bc2e738-c5ea-59e0-bc98-7cdc5162d216.html](http://www.jackcentral.org/news/in-with-the-new-nau-welcomes-two-new-deans/article_3bc2e738-c5ea-59e0-bc98-7cdc5162d216.html)
- [3] Sheath, P. (2018). *Paceline TuffToe Sheath | Free Shipping over \$45 | Prosthetic Sheath/Sock*. [online] [www.mmarmedical.com](http://www.mmarmedical.com). Available at: <https://www.mmarmedical.com/Paceline-TuffToe-Sheath-p/3000160-3000660.htm> [Accessed 19 Nov. 2018].
- [4] 3D Printing Service - Dream | Design | Deliver - Stax3D printing. (n.d.). Retrieved from <https://stax3d.com/>



THANK  
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