

Lerner Exoskeleton I

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Introduction

- Project Description.
- Designs Considered (Product).
- Design Selected.
- Schedule & Budget.

Project Description

- Robotic exoskeletons help neuromuscular disorder to walk.
- System provide assistance at the knee and ankle joints.
- The goal is to design adjustable system and to help the disabilities from (13-75) ages.

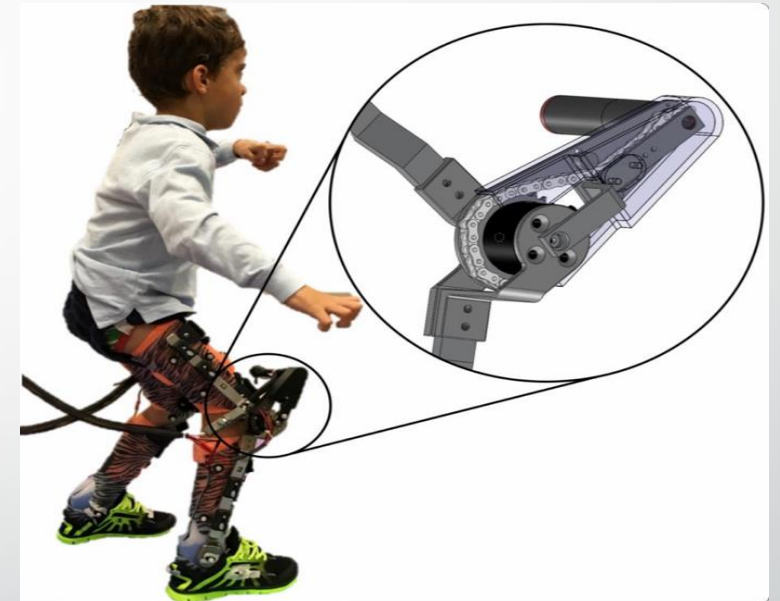
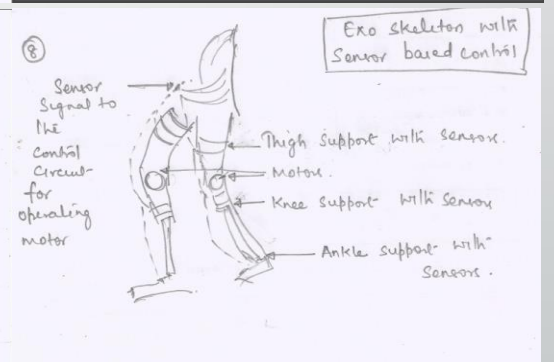
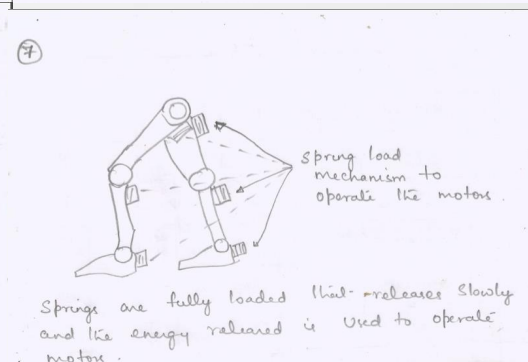
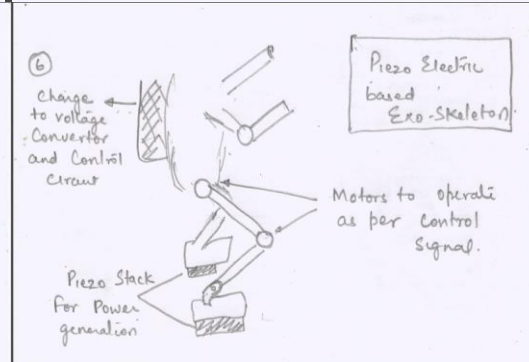
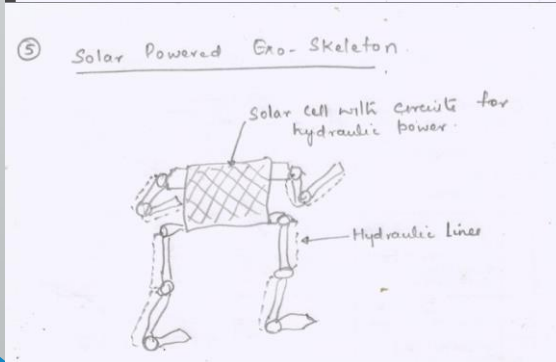
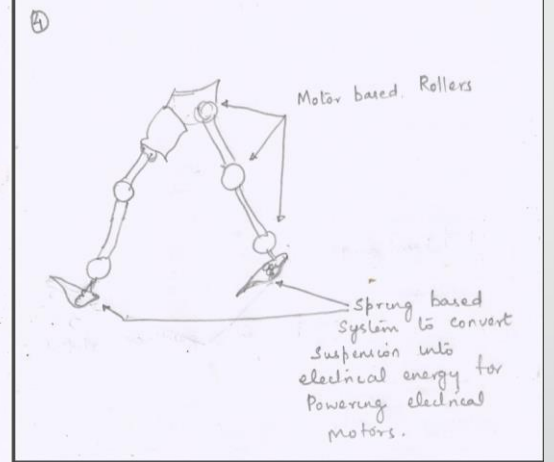
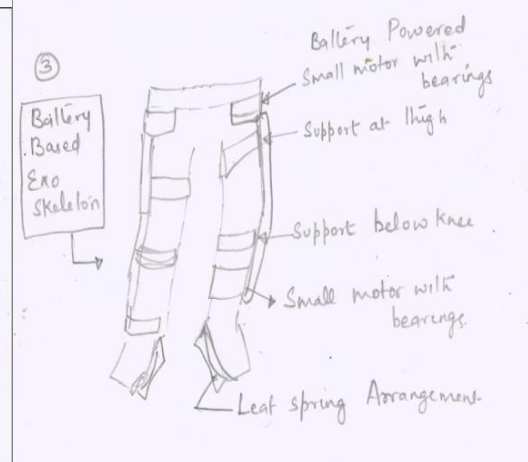
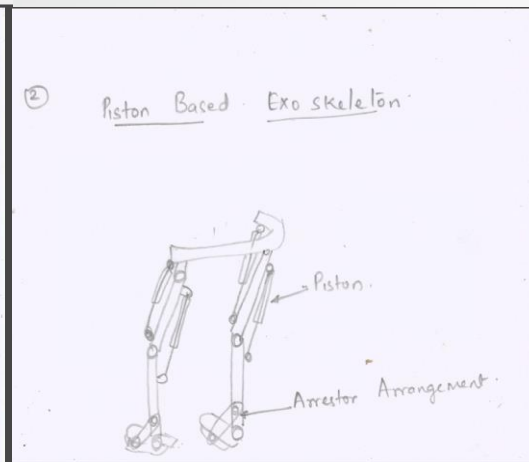
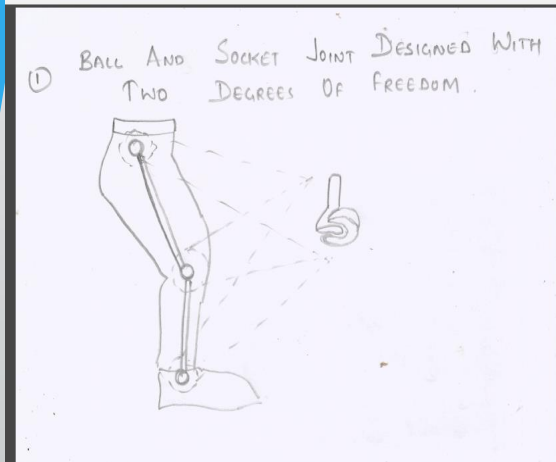


Figure 1: Adjustable Human-Exoskeleton Mounting Interface

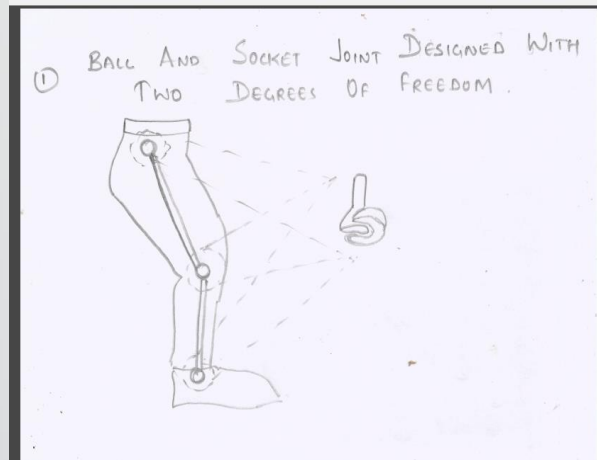
Project Description

- Our Client is Zach Lerner, Ph.D, director of NAU's Biomechatronics Lab.
- Engineering requirements were specified from customer requirements.
- From the HoQ, the team has developed different designs.
- Design selected can be described by Pugh Chart and Decision Matrix.

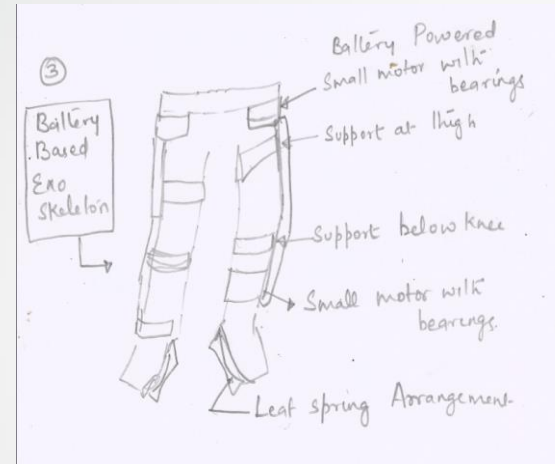
Design Considered



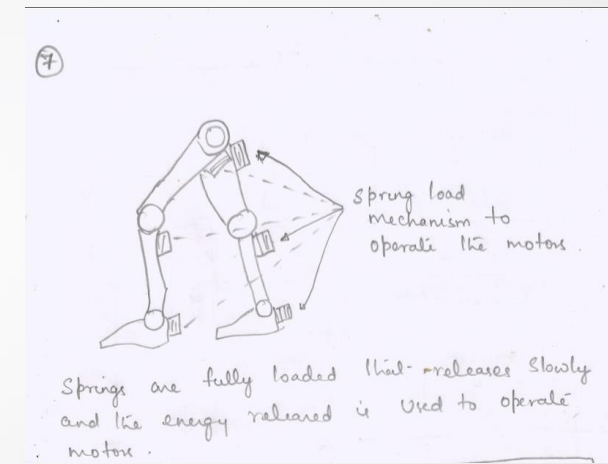
Design Considered



Design #1



Design #3



Design #7

Table 1: Pros and Cons

	Design #1	Design #3	Design #7
Pros	<ul style="list-style-type: none"> · Available for user from ages (13-75) · Lightweight 	<ul style="list-style-type: none"> · Multifunctional for thigh and knee · Easy to move 	<ul style="list-style-type: none"> · Low cost material. · Easy to do on and off.
Cons	<ul style="list-style-type: none"> · Not flexible · Breakable 	<ul style="list-style-type: none"> · Hard to monitor · Heavy for the user 	<ul style="list-style-type: none"> · Durability of the spring. · Low amount of energy.

Design Selected:

Table 2: Pugh Chart

Criteria / Design #	1	2	3	4	5	6	7	8
Providing rigid mounting points	+	-	+	D	+	+	-	-
Adjustable	-	-	+	A	-	+	+	-
Easy to do on and off	+	-	+	T	-	+	-	-
Minimize skin irritation	+	+	+	U	-	-	+	-
Allow foot portion to be low profile	-	-	-	M	+	-	+	-
Lightweight	+	+	+		+	-	-	-
Strong material	+	-	+		-	-	+	-
$\Sigma +$	5	2	6		3	3	4	0
$\Sigma -$	2	5	1		4	4	3	7

Design Selected:

Table 3: Decision Matrix

Customer Requirements	Weightings	Design #1	Design #3	Design #7
Rigid mounting points	15%	5	5	4
Adjustable	13%	5	7	3
Easy to do on and off	10%	5	6	5
Minimize skin irritation	12%	4	6	4
Low profile foot portion	10%	4	5	4
Lightweight	20%	8	3	4
Strong material	20%	2	8	3
	100%	33	40	27

Gantt Chart

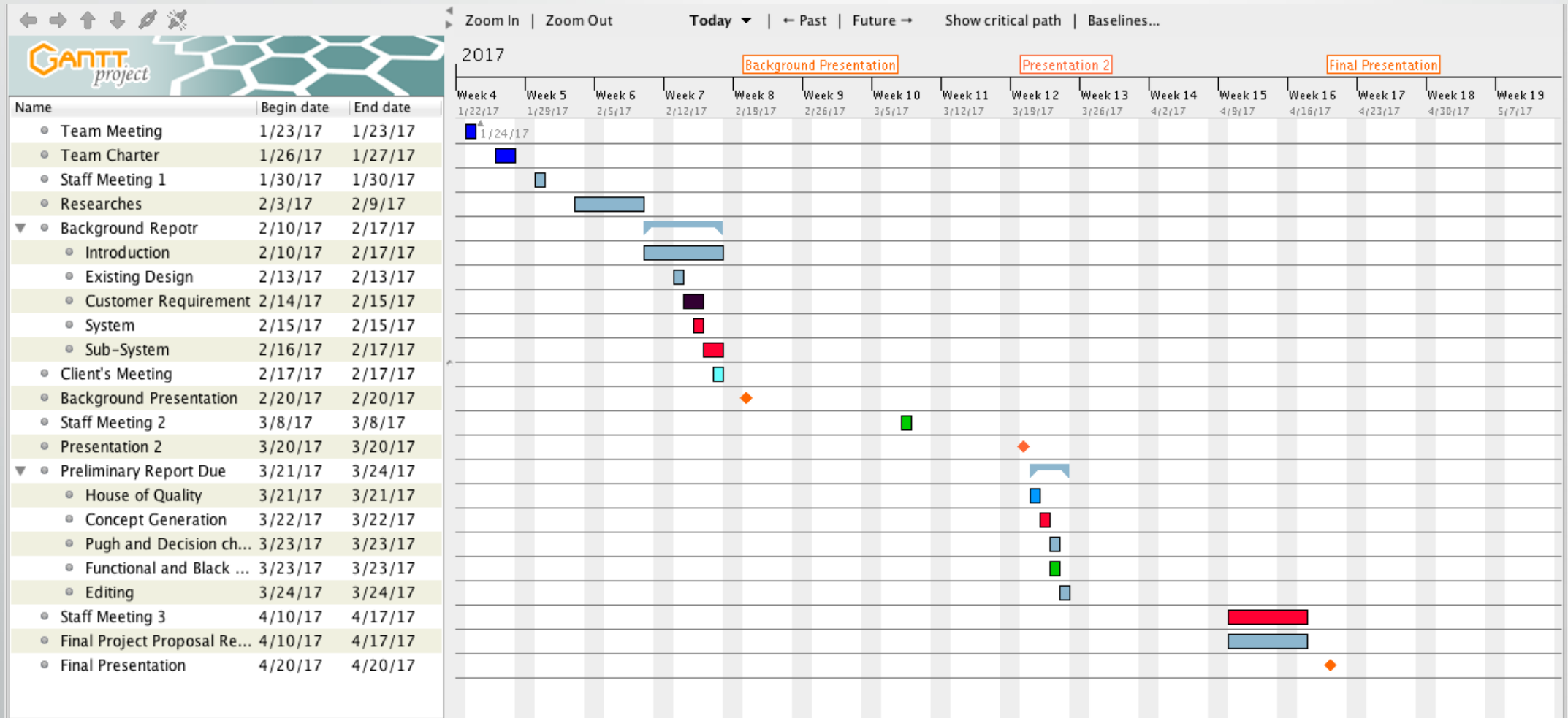


Figure 2: Gantt Chart

Budget

- The budget is (\$500).
- Materials (\$300).
- Painting (\$50).
- Prototyping(\$100).
- Remaining(\$50).



Figure 3: Budget [1]

References

[1] N. Management, "Budget 101 | NC OSBM", Osbm.nc.gov, 2017. [Online]. Available: <https://www.osbm.nc.gov/budget/budget101>. [Accessed: 20- Mar- 2017].

Questions?

- Thank you for your attention.