Lerner Exoskeleton I

Team G:

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- **Abdullah Alazemi (Document Manager1)**
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- **Barjas Aldoosri (Budget Licenses)**

Introduction

- Project Description.
- Background & Benchmarking.
- Customer Requirements & Weightings.
- Gantt Chart & 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

Figure 1: Adjustable Human-Exoskeleton Mounting Interface

Client

- Zach Lerner, Ph.D.
- Director of NAU's Biomechatronics Lab

- Goal:
  - Reduce the suffering.

Background & Benchmarking

- Berkeley Exoskeleton (Design 1):
  - Most Visible.
  - Focus on Lower Body.
- MIT Exoskeleton (Design 2) :
  - Release Energy.
  - Kinetics and Kinematics.

Figure2: Berkeley Exoskeleton [1]

Figure3: MIT Exoskeleton [2]

Background & Benchmarking

- Sarcos Exoskeleton (Design 3):
  - Full body exoskeleton
  - Rotary hydraulic actuators on the joints
  - Force sensing between robot and user
  - Feet remain stiff and not to bend

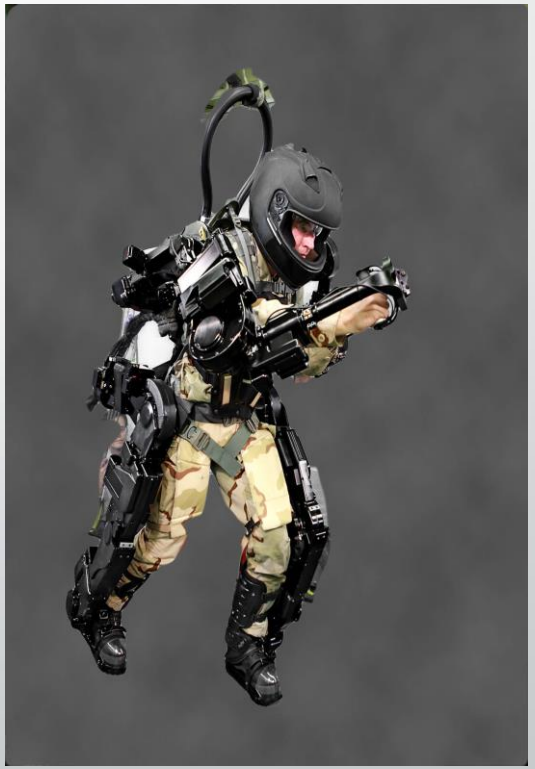
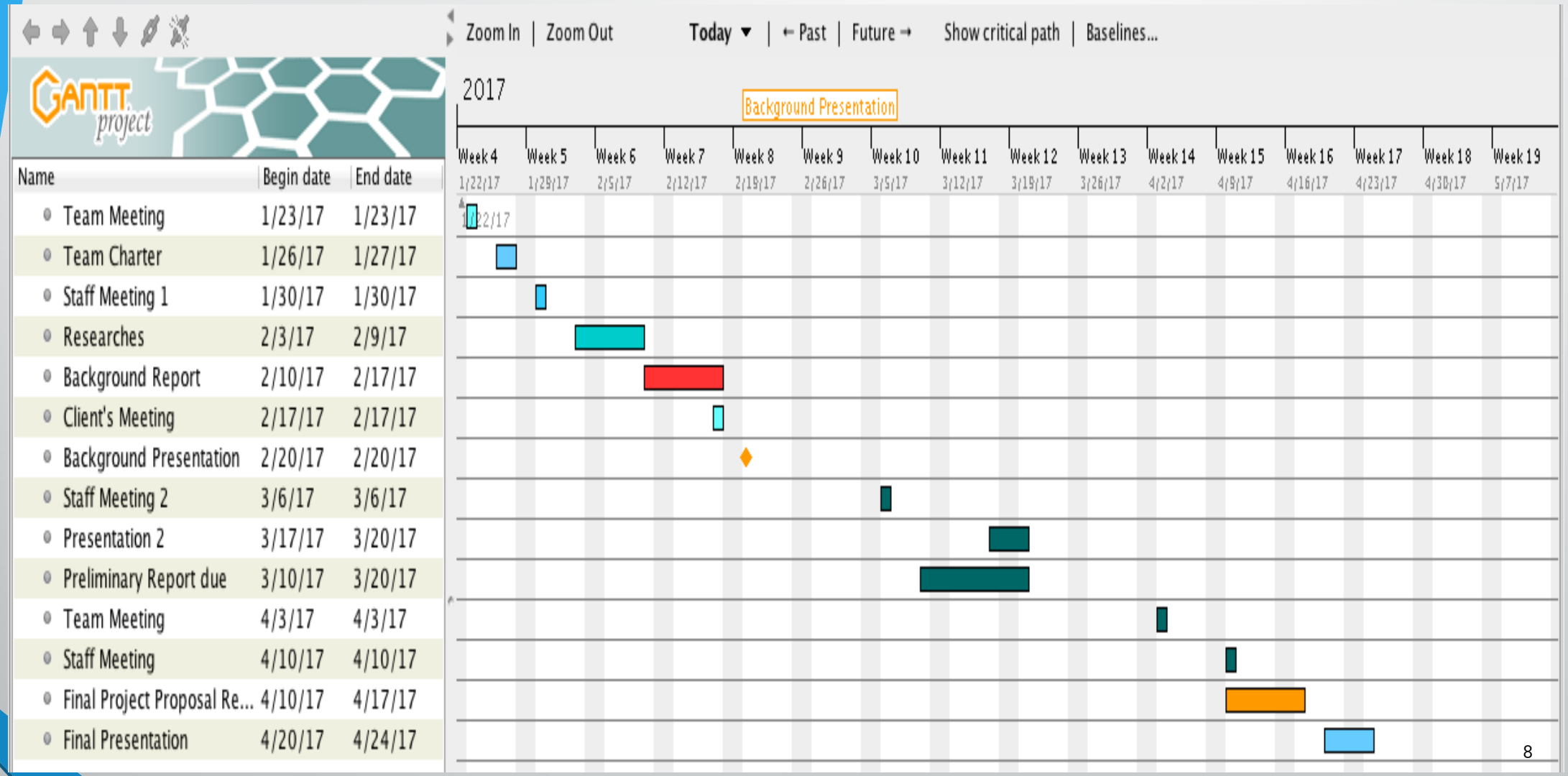


Figure4: Sarcos Exoskeleton [3]

Customer Requirements & Weightings

Customer Requirements	Weighted (x5)
Providing rigid mounting points to foot shank and the thigh	5
To allow the design to be adjusted to various sizes of limbs and accommodate individuals of between the ages of five and seventy-five	3
To make the design easy to doff/don	2
To minimize skin irritation by the physical interface	4
To allow the foot portion to be low profile as well as insert into normal shoes	4
Make the design lightweight and at the same time strong	5

Gantt Chart



Name	Begin date	End date
Team Meeting	1/23/17	1/23/17
Team Charter	1/26/17	1/27/17
Staff Meeting 1	1/30/17	1/30/17
Researches	2/3/17	2/9/17
Background Report	2/10/17	2/17/17
Client's Meeting	2/17/17	2/17/17
Background Presentation	2/20/17	2/20/17
Staff Meeting 2	3/6/17	3/6/17
Presentation 2	3/17/17	3/20/17
Preliminary Report due	3/10/17	3/20/17
Team Meeting	4/3/17	4/3/17
Staff Meeting	4/10/17	4/10/17
Final Project Proposal Re...	4/10/17	4/17/17
Final Presentation	4/20/17	4/24/17

Budget

- The budget is ($500) funded by Dr.Zach Lerner .
- Materials ($200).
- Painting ($50).
- Prototyping($100).
- Remaining($150).

References

- [1] Public Affairs, UC Berkeley | February 3, 2016 March 30, 2016 and P. Affairs, "A new-generation exoskeleton helps the paralyzed to walk," Berkeley News, 30-Mar-2016. [Online]. Available: http://news.berkeley.edu/2016/02/03/a-new-generation-exoskeleton-helps-the-paralyzed-to-walk/. [Accessed: 19-Feb-2017]
- [2] "Exoskeletons for Walking Augmentation," Biomechatronics. [Online]. Available: http://biomech.media.mit.edu/portfolio_page/load-bearing-exoskeleton-for-walking/. [Accessed: 19-Feb-2017].
- [3] "Guardian XO," Sarcos. [Online]. Available: http://www.sarcos.com/?page_id=1369. [Accessed: 19-Feb-2017].

Questions?

- Thanks for your attention.