



# NORTHERN ARIZONA UNIVERSITY

## **Operation/Assembly Manual**

**Team Name:**

**Team 19F03 - HipA**

**Team Members:**

**Lahdan Alfihan**

**Meshal Alghammas**

**Abdullah Almarri**

**Mohammed Janshah**

**Date:**

**May 2<sup>nd</sup>, 2020**

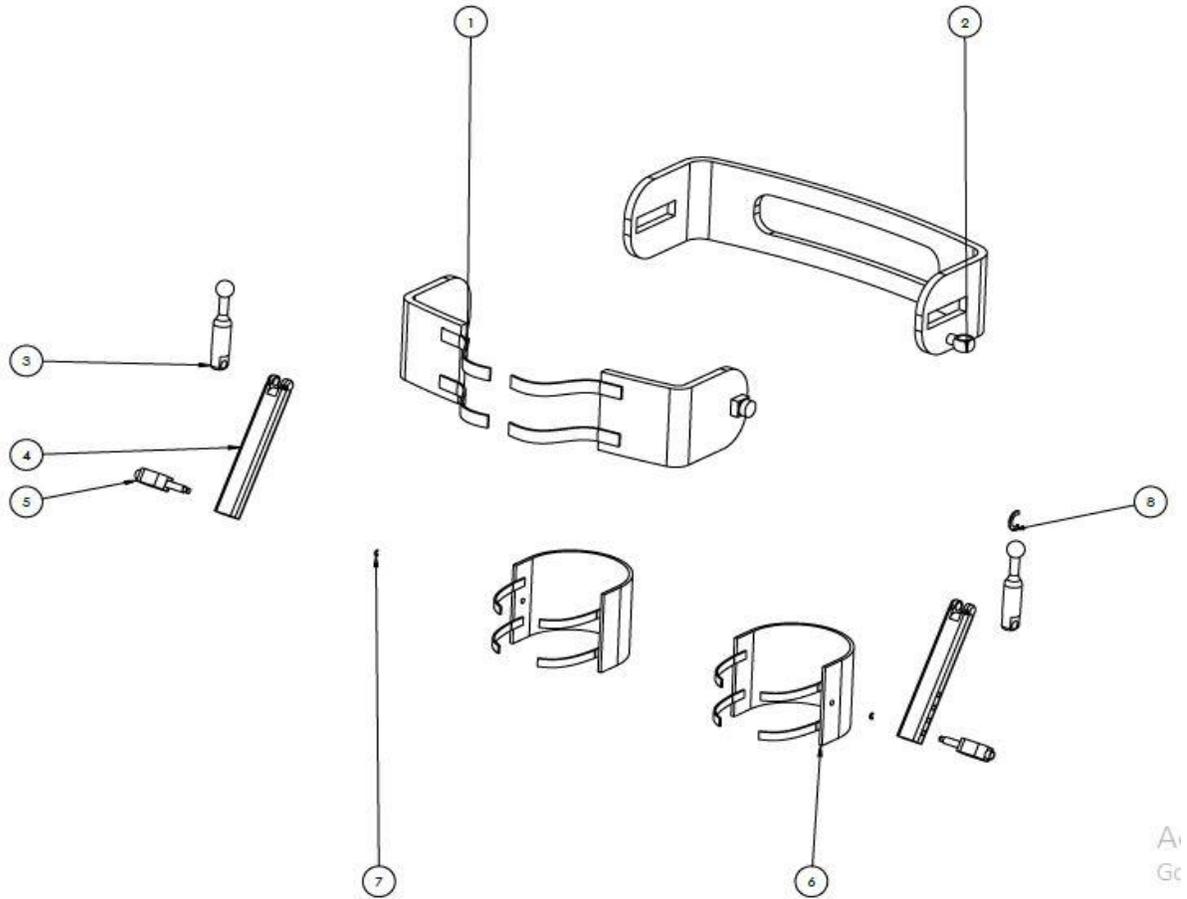
**Section:**

**Spring 2020 M16 (003)**

**Instructor:**

**Dr. David Trevas**

## Exoskeleton operational guide



ITEM NO.	PART NUMBER	QTY.
1	Hipbrace-2	1
2	Hipbrace-1	1
3	Rod Frame	2
4	Rod Frame-2	2
5	Thigh brace-1	2
6	Thigh brace-2	2
7	cotter	2
8	cotter-2	1

### Operational guide

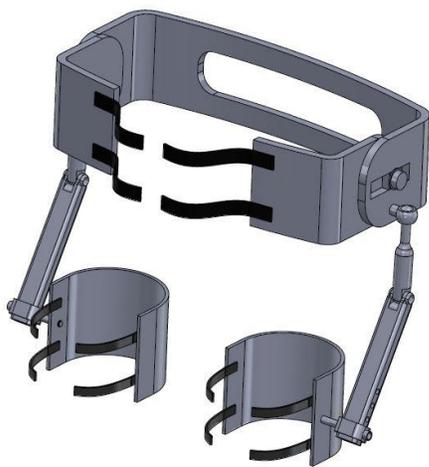
#### Wearing the exoskeleton

- ✓ Open wide open the straps and the fastening buckles for hip braces.
- ✓ Open wide open the straps and the fastening buckles for thigh braces.
- ✓ Fit the waist into the hip brace and Wrap the hip brace around the waist
- ✓ Fasten the hip brace into place using straps and buckle.
- ✓ Do the same to both hip braces i.e.:
- ✓ Fit the leg into the thigh brace and Wrap the thigh brace around the limbs
- ✓ Fasten the thigh brace into place using straps and buckle.
- ✓ Start the power by switch.
- ✓ Adjust gradually as you gain momentum to walk.

## Exoskeleton troubleshooting and mitigation measures

Problem	Solution
Unfit thigh braces	<ul style="list-style-type: none"> <li>Adjust buckle to vary the size of the strap.</li> </ul>
Stiff movements	<ul style="list-style-type: none"> <li>Check flexibility of joints.</li> <li>Check availability of fastener washers</li> <li>Check threaded fasteners.</li> </ul>
Rough surface causing bruises and blisters	<ul style="list-style-type: none"> <li>Check the irreplaceable caution pad .</li> </ul>
Immobility	<ul style="list-style-type: none"> <li>Check the gears (maintenance includes oiling of parts)</li> <li>Check the motor connection wires</li> <li>Service motors and gear moving parts.</li> </ul>

## Exoskeleton operational guide



### Maintenance Guide

- ✓ Regular physical examination of the exoskeleton to identify breakages or lines of weakness.
- ✓ Regular replacement of worn out straps
- ✓ Regular replacement of gear wheels
- ✓ Oiling and lubrication of moving colliding parts.