

Spider Cage to Support Cerebral Palsy Patient

Client: Mr. Matt Jahnke - mattjahnke@ucpdane.org

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Team: Kevin Collins - kdcollins2@wisc.edu (Team Leader)

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Stephen Kindem - kindem@wisc.edu (BPAG)

Date: February 1st - February 7th, 2017

Problem Statement:

A spider cage is a device used by therapists to work with individuals (usually children) who have cerebral palsy. The cage supports the patient's weight with the use of bungee cords that are connected to a custom suit that allows the patient to work on building leg and arm strength. This product is available commercially but it is quite expensive. The client is looking for a design that is relatively inexpensive, transportable via trailer, able to fit through a standard doorway, and customized to meet the needs of one particular person.

Last Week's Goals

- Bore hole for anchor pin on top cross member
- Meet with Matt at UCP

Summary of Team Role Accomplishments

- *Leader* - Sent Progress report to TA, client and advisor
- *BWIG* - Updated website
- *BSAC* - No meetings attended at this time.

- *Communicator* - Emailed with OT student about bungee cords, contacted the Wisconsin Integrative Hyperbaric Center about the UEU they use
- *BPAG* - Waiting for funding approval

Summary of Accomplishments:

This week the team was able to visit the facility where the spider cage will be used. The team also met with the client, Matt Jahnke, and the therapist that will be using the cage, Amanda. There was a lot of discussion of future testing for the cage and also how it will be set up in the therapy room. Steve was able to bore out a new hole for the top anchor fastener. The team also researched different harnesses and therapy bands to use with the cage in the future.

Activities

Date	Person	Task	Time (hrs)	Weekly Total	Semester Total
2/3/17	Team	Visit UCP and meet with client about upcoming semester	1.0	1.0	5.0
	Kevin	Harness Research Roll Bar Research	1.5	1.5	4
2/2/17	Darcy	Wrote up detailed list of experiments to perform with the cage, researched therapy centers that use Spider Cages	1.5		
2/7/17		Harness and bungee cord research	1	2.5	5
2/6/17- 2/7/17	Sheetal	Harness and resistance band research	2	2	4
2/5/17	Breanna	Harness and resistant bands research	1		

2/7/17		Revised PDS	1.5	2.5	6.5
2/2/17	Stephen	Completed Mill 1 upgrade to machine front crossbar.	2	3.5	6
2/7/17		Resistance band Research	.5		
2/7/17		Machined crossbar	1		

Team Goals

- Submit harness and bungee research to Matt
- Reassemble top of cage
- Work on presentation and report

Individual Goals

- *Kevin:* Work on presentation (BME and ME)
- *Darcy:* Work on presentations, report, and CAD cage animation
- *Sheetal:* Work on presentation and report
- *Breanna:* Begin work on presentation and report
- *Stephen:* Acquired Mill1 upgrade, milled front crossbar.

Project Timeline

Task	January	February	March	April	May											
	19	25	2	9	16	23	2	9	16	23	30	6	13	20	27	4
Project R&D																
Base Support	X	X														
Padding																
Assembly Tools																
Fabrication																
Order Materials																
Create Fastener Hole		X														
Trim Mesh																
Base Support																
Padding																
Assembly Tools																
Testing																
Exercise Simulation																
Force/Stiffness Calculations																
Assembly Directions																
Redesign																
Deliverables																
Progress Report	X	X	X													
Individual Presentation																
Preliminary Presentation																
Preliminary Deliverables																
Poster																
Final Deliverables																
Meetings																
Advisor	X		X													
Client			X													
Team	X	X	X													
Website																
Update	X	X	X													
Colored Cells: Projected Timeline																
X: Completed Tasks																

Expenses

- Fall 2016: Total cost of materials: \$1,702.75
- Spring 2017: No expenses at this time

ME Technical Section

Harness Systems:

Spider cage therapy requires a patient to wear a harness that is supportive and has connection points for bungee cords. Now that the cage is almost fully built, the client has asked the team to consider what kind of harness system would work well with the cage. A system specifically created for spider cage therapy is called the TheraSuit. This design is typically used for children but would be able to accommodate adults as well. The TheraSuit covers the body from the feet up to the shoulder and has additional arm attachments that can be seen in Figure 1. Although this would be a complete and relatively comfortable harness system, it costs \$2,500, which is not feasible for our client.



Figure 1: The TheraSuit is a full body harness system with multiple bungee attachment points.

Being mindful of budget, climbing harness are another option the team is considering. The positives about climbing harnesses are that they are supportive, have attachment points for bungees, and they can be purchased for under \$100. One downside is that they may not be as comfortable as a full body harness system and padding may have to be added in areas where potential rubbing could occur such as between the legs. The harness in Figure 2 is a generic system that could be used with the spider cage.



Figure 2: Zoro full body harness for fall protection.

The ideal harness would offer bungee connection points, be supportive, adjustable, comfortable, and affordable. Ultimately, the harness selected will be decided by the client.

Written By: Breanna Hagerty
Reviewed By: Sheetal Gowda