Team Sane Fix

Monkey Bar Prosthesis

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Outline

- Problem Statement

- Need Finding

- Design Concepts

- Future Work

Problem Statement

Create a device that enables a child with upper limb amputation to do the monkey bars

Monkey Bar Videos

Kids on monkey bars

http://www.youtube.com/playlist?list=PLiRsmYcclIrmCUWGAn7aUowoRrzE2gBqI

Interview with Gary Berke

- Prostheses are designed to withstand compressive loads

- Current prostheses can't hold someone up

- Mostly patients between ages 6 and 9 want to do the monkey bars

Future Interview with Potential User

Questions we are interested in:

- How much do cosmesis and coolness matter to the child?

- When would the device be used?

- Would you let your child use this device?

Need Statement

A child with upper limb amputation needs to be able to keep up with his or her friends during jungle gym play on the monkey bars.

Existing Solutions

Gary Berke:

"None. There aren't any."

Solutions to Related Problems

- Harnesses

- Sports Prostheses

- Weight-bearing hooks

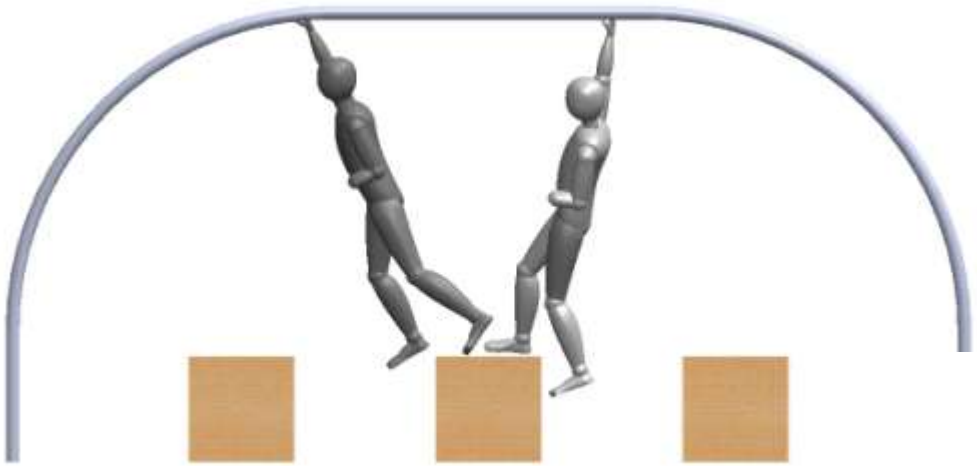
Brainstormed Ideas

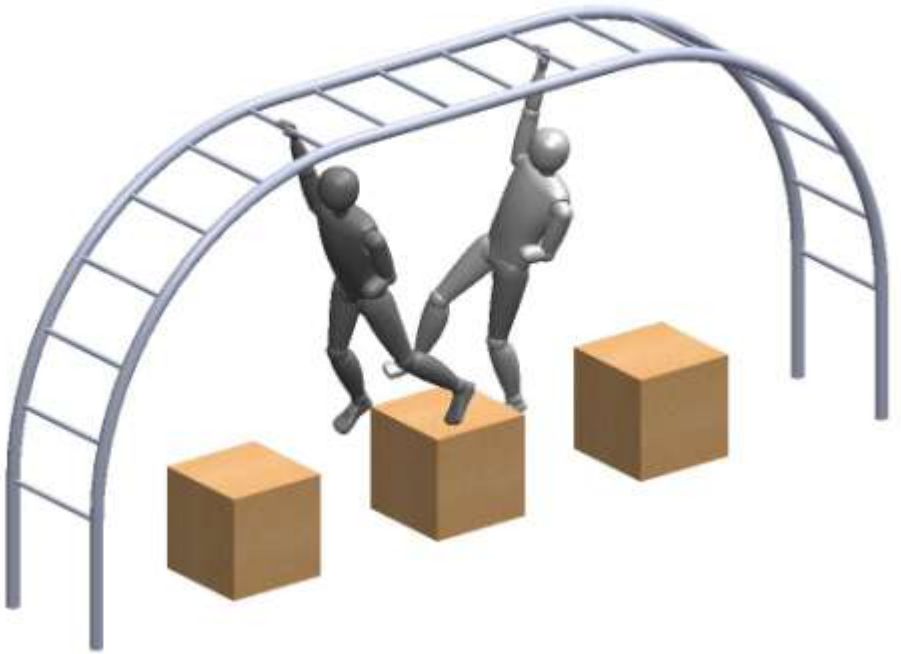
1. **Change the Environment**
    - ***Stepping Boxes***.
    - ***Reinvent the jungle-gym***

2. **Standalone Prosthesis**
    - ***Additional Weight-Bearing Means***
        - *Upper-body harness/vest*
        - *Mid-body harness*
        - *Lower-body harness/footstrap*
    - ***Better Arm Sleeve***

3. **Special End-Effector for Existing Prosthesis**
    - ***End Effector Far from Wrist***

Design Concept 1:
Stepping Boxes





Design Concept 2:
Additional Wearables

Analysis of Design Alternatives

5 - Best 1 - Worst	Stepping Boxes	Reinvent Jungle Gym	Upper-body harness /vest	Mid-body harness	Lower-body harness /footstrap	Add-on end effector
Comfort	2	5	3	2	2	5
Cosmesis	3	5	3	2	2	2
Function	1	2	3	4	5	4
Cost	4	1	4	4	4	5
Coolness	2	5	1	1	1	4
Total	12	18	14	13	14	**20**

Selecting a Design:
A Note on Posture and Faulty Assumptions

Selected Design:
Overhead Hook

Selected Design:
Overhead Hook in Action

Future Work

- Interview more people

- Prototype connection between device and existing prostheses

- Prototype and refine hook geometry

Special Thanks to Gary Berke

Sources of Videos and Images

Monkey Bars Videos:

http://www.youtube.com/watch?v=SXZ5bETIdGk

http://www.youtube.com/watch?v=l5uaH-Qydxk

Images:

http://www.animatedknots.com/harness/index.php

http://www.heightec.com/equipment/harnesses/tower-rigging-harnesses/zero-g-tower-climbing-riggers-harness-w.-side-ds-xl_1.html

http://www.oandp.com/products/trs/assets/images/sr_hockey_2.jpg

3D Model Seed:

http://www.3dcontentcentral.com/secure/download-model.aspx?catalogid=171&id=191554