Meeting Minutes Week 04/17/17-04/23/17

Meeting: April 27, 2016 3:30-5:30 pm in Capstone lab

Team Meeting Discussion/Activity:

- Group continued Testing Procedures

4. Toxicity (No materials should be toxic to child during use according to EPA)

The team searched for the toxicity of the device materials according to the EPA.

Material	Analysis
• Steel	• Chemical: Dust/fumes cause allergic skin reactions and cancer from inhalation. Inhaling dust can also cause respiratory damage. • Solution: Steel in frame of EZ-up, fasteners, and track will generate no dust/fumes from use.
• Paint	• Chemical: Paints with lead are hazardous in case of skin contact, eye contact, ingestion, and inhalation • Solution: Aesthetic paints must be water base (60-65%) lead-free paints to avoid contact with user from touching and breathing in paint fumes.
• Polyester	• Chemical: Dust from material may be considered as a nuisance dust. • Solution: Polyester materials in use with system such as buckles, PVC fittings, and wheels will not generate enough friction to create dust from Polyesters.
• Polypropylene	• Chemical: No exposure risk to humans when used for designated purpose. (Temperatures do not exceed 700 degrees Fahrenheit)

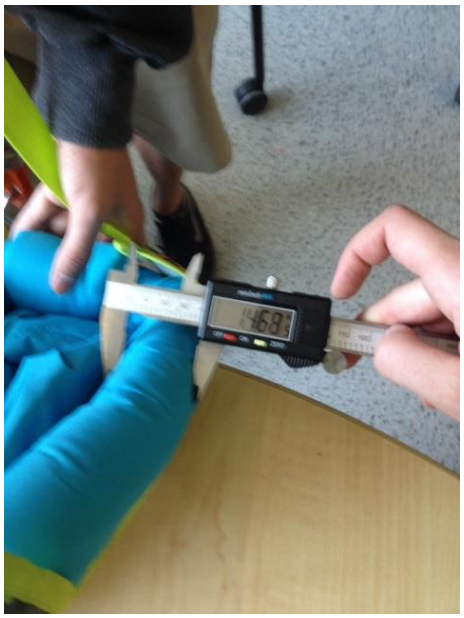
	• Solution: Quick-release/harness straps use variations of this material

As long as the device is used properly and not heated to 700 degrees F and pounded into dust there should be no problem with toxicity.

5. Padding (Padding should be thicker than 0.5”)

The padding on the harness has been measured using calipers from the lab.

The width result = 1.468”



1.468”

Since the padding was thicker than 0.5”, the harness passed the test.

6. Loose Ropes (There should be no loose sections of rope/cord longer than 3”)

The biggest issue was the tow strap, though the end was eligible for trimming to fit parameters, this would remove the ability to adjust for children growing.

This was solved by tying up the loose end, which now measures 2.5”, less than 3”, and so passing the test. The instruction manual with direct parents to trim the end ~3ft after the desired length and zip tie the remainder together so it is not accessible to children.

7. Parts and Fasteners (Parts number < 20 and fasteners <100)

Parts (20 total) =20

Parts: Easy Up, 6 U shaped Sections, harness, PVC, tow strap, swivel, bearing, middle bar, 2 T shaped PVC, 4 wheels, and bungee cord.

Fasteners (46 total) <100

Fasteners: 12 screw and bolt combo, 12 reinforcement strips, 16 washers, and 6-12in sections nylon rope.

8. Elasticity Test (No deformation above 10% original length with force gauge)

The team borrowed an electronic force gauge from another capstone group that could be used to measure forces up to 500N. However, even though the team specified forces of 200N on each elastic material, the members could only manually pull enough on the materials to ~150N. The team was still able to test the deformation of the materials (nylon rope, tow strap, harness straps) with less force and a ruler.

The nylon rope (original length 10in) did not deform at all under 140N of force.

The tow strap (Lo=10in) deformed 0.1in under 170N, which is less than 10% of original length.

The harness strap (Lo=6in) deformed 0.07in, which is less than 10% of the original length.

The bungee cord (Lo=3in) did not pass the test, as it deformed over 1in with only 60N of force. The team switched to using nylon rope on the bearing connection since it deformed the least of all elastic materials.

The team might advise users to search for stronger bungee cords because it allows the child to have a little give for jumping motions and such. But with the amount of deformation experienced under low forces, these bungee cords are unsuitable for supporting weight safely.

9. Cost (Parts budget should be <$400 and tools <$150)

The tools that used to construct this device were the following:

Power drill=$25

Screw driver=$26

Wrench=$8

Saw= $10

Total Tools= $69 <$150

The parts total according to the team budget is $388<$400.

Easy up: $175

6 U shaped sections: $57

Harness: $16

PVC: $2

Tow Strap: $10

Swivel: $25

Bearings: $31

Middle bar: $12

2 T Shaped PVC: $3

4 wheels: $24

12 screws and bolt combo =$4

12 reinforcement strips=$21

16 washers =$1.92

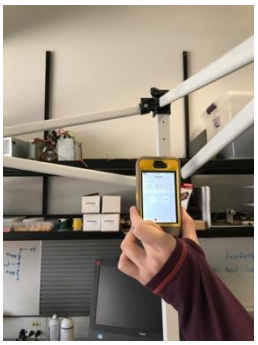
6-12 in sections nylon rope=$6

Therefore, the team succeeded in following the limits for their spending.

10. Assembly Time (Should be less than 24 hours total)

The team tested the assembly time with two group members starting from scratch on each component. The middle bar total assembly took ~30 minutes, which including cutting PVC, the middle bar, drilling holes for the wheels, and allowing 10 min for the PVC glue to dry. The longest time taken was to cut through the metal middle bar with a handsaw. Additionally, there may be some fine tuning with bolt and washer placement to maximize wheel rolling efficiency, but this should not exceed 10 min.

The time for two people to unfold the Easy Up and remove the 6 bolts required for the top tent section to be taken down was 24 min.



Finally, the time taken to cut the PVC and assemble the harness took 9 minutes and 20 seconds.

The team understands that several of these times might be longer for individuals not familiar with the project or working alone, but even with significantly increased estimates, the time should not exceed a total of 24 hours of work unless the user is making significant deviations from the manual. Our total time to assemble was roughly one hour, so as long as the user has preordered what they need, this project will not take more than a weekend to make alone.

11. Range of Adjustability (Adjustable materials scale at least 1” in each direction)

The team tested the ability for the adjustable material to adjust in both direction. The test worked and it did not exceeded 1” both direction.

12. No Specialized Parts

As seen in the bill of materials (Test 9), all parts are commercially available to all individuals.

13. Pinch Points (There should be no pinch points for the child to get fingers stuck in)

The team used the same silk scarf as the sharp edges test and inserted it areas that a child might put their fingers. The device was loaded and the scarf pulled through under tension. If the scarf caught, the area in question was covered.

The only area with significant pinching was the easy release buckle on the tow strap connecting harness to swivel. The team covered it with a cut sock so the buckle was not acceptable to children.

After the sock there were no further areas where the scarf got caught under tension so the test was considered complete.

14. Sharp Edges (There should be no sharp edges for a child to hurt themselves on)

The team used a silk scarf and ran it all over the device that was in reach of a child during use. If the scarf got caught, the area needed to be covered. The team has included in the instruction manual that components usually out of reach of child during use may contain sharp edges and should be stored in areas similarly out of reach.

Weekly Tasks 04/17/17-04/23/17

Team Member	Tasks Assigned

Khaled	• Complete Testing Procedures Report • Register Team for UGRADs
Hasan	• Register Team for UGRADs • Complete Testing Procedures Report
Noah	• Email Dr. Winfree to confirm next meeting time • Email Oman to determine time to meet for hardware review 2 • Complete Instruction Manual
Eileen	• Begin Creating Poster Draft
A.J.	• Submit meeting minutes by 04/23/2017 • Compare current list of materials to EPA lists to find any health hazards • Complete Construction Manual

Next Steps:

- Team meeting Monday at 4:30 pm.
- Meet with Dr. Winfree Thursday at 11:00 am
- Prepare for Hardware review