NORTHERN ARIZONA UNIVERSITY

GORE
Creative Technologies Worldwide

In Home Anti-Gravity Harness

Team 10
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Project Description

WEARABLE INFORMATICS LABORATORY

- The goal of this project is to design a DIY manual for an anti-gravity balancing harness system
- The client is Dr. Kyle Winfree from the Wearable Informatics Lab at NAU
- The product is directed towards children (under the age of 5)

Project Description

Current Design

Updates – What's Been Accomplished

- Installed track system to frame

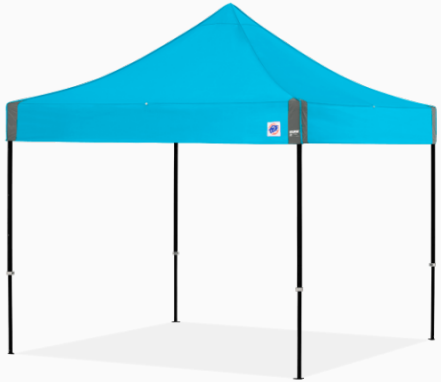
- Assembled full harness system

Updates – Design Changes

- Used a rock climbing swivel to enable changing of directions
- Considered adding bearings to move harness system
- Ran nylon rope through PVC sliding bar to distribute weight

Updates – What's Left

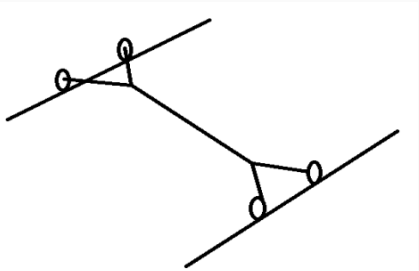
- Build design with steel material frame



- Use T-track shape to better enclose/secure the wheels to the railing system

Updates – What's Left

- Change connection from one wheel on each side to two/multiple
  - Prevent frame from bending
- Use data from Design of Experiments (DOE) to find the best way to install bearings
- Finalize attachment method to connect spreader/harness assembly to bearings



Updates – DOE

- The DOE focused on maximizing the ease of movement of the device
- Changed the length of PVC section (2ft vs. 4ft), the material of the wheels (nylon vs. steel), and the method of lateral movement (bearings+PVC vs. PVC alone)
- Evaluated by the total distance traveled (lateral movement added to forward movement)

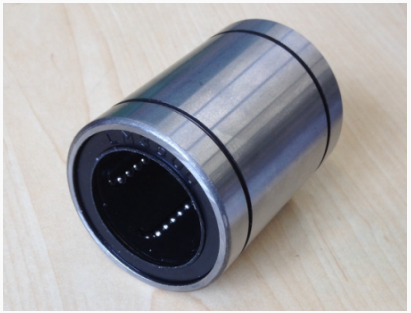
	Wheel Material	Length of PVC	Bearings vs. PVC
Effects	12.75	-1.375	-10.625
	3*SD= 25.117		

- DOE showed steel wheels and PVC alone worked best, though not statistically significantly

Moving Forward - Manufacturing

- The first manufacturing step is to improve the rail system safety and mobility
  - This includes integrating bearings onto sliding bar
- Build our own spreader bar to be lightweight
- Upgrade design with higher quality materials and increase safety

- Specific tasks include:
  - Hasan - ordering parts
  - Khaled - update website
  - Eileen and A.J. - instruction manual
  - Noah - rail system research



Moving Forward - Testing

Testing Procedures

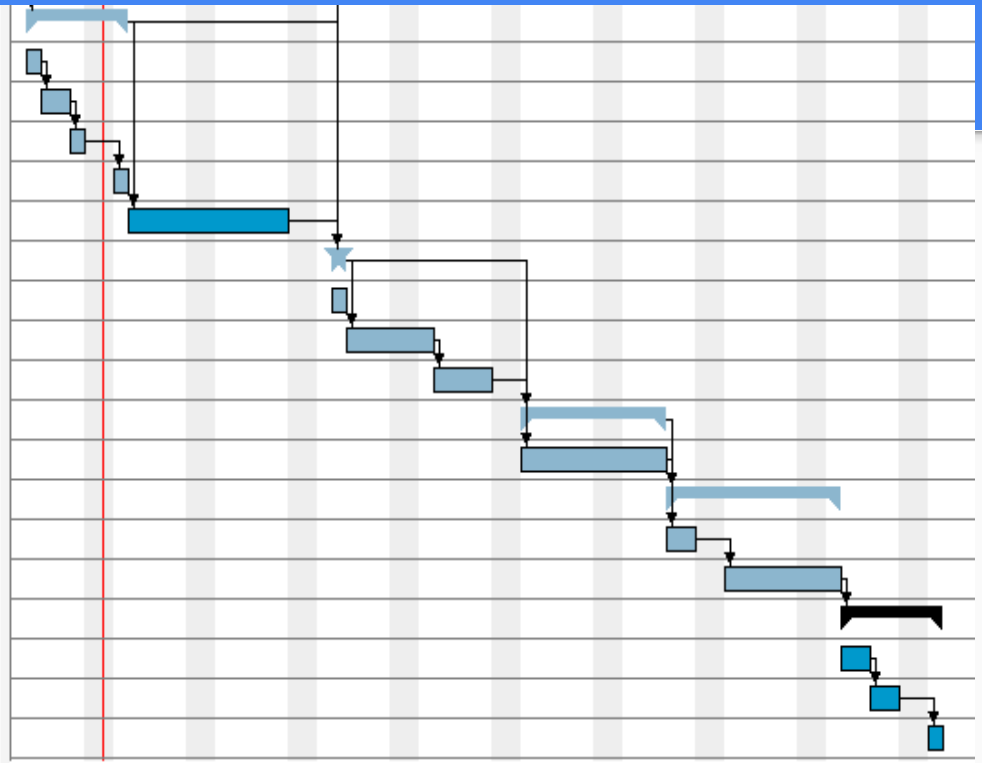
- Weight of the system
- Storage space of the system set up/broken down
- Safe weight range for user
- Comfort of supportive padding in the harness
- Finding pinch points and sharp edges on the system to prevent harm to the child
- Durability of the system
- Nontoxic materials

Contingencies

- Set aside $300 budget for redesigning the device
- Add one week on the schedule for any potential problems with a redesign

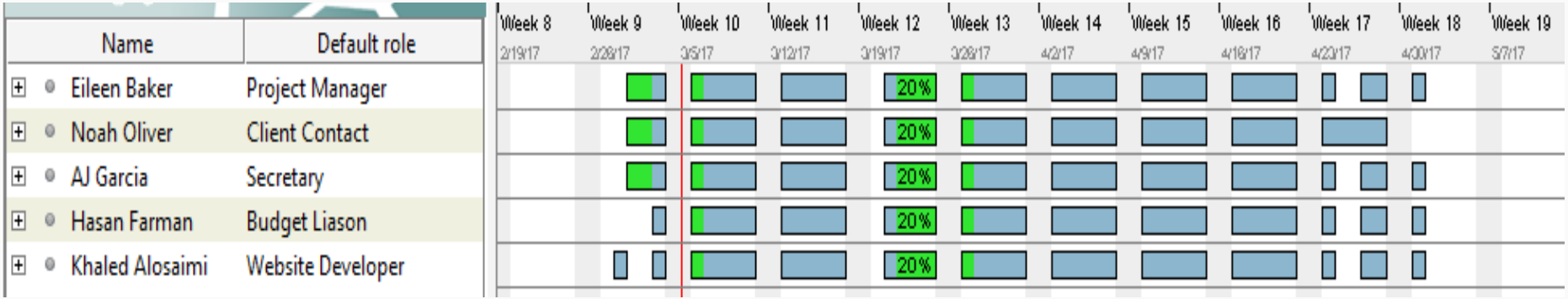
Schedule

14.0 Midpoint Review Presentation	2/28/17	3/6/17
14.1 Project Description	2/28/17	2/28/17
14.2 Updates	3/1/17	3/2/17
14.3 Construction	3/3/17	3/3/17
14.4 Final Construction Plans	3/6/17	3/6/17
15.0 Order Parts Based off Hardwa...	3/7/17	3/17/17
16.0 Hardware Review 2	3/21/17	3/21/17
16.1 Close to Final Assembly	3/21/17	3/21/17
17.0 Fourth ME486 Team Meeting	3/22/17	3/27/17
18.0 Third ME486 Staff Meeting	3/28/17	3/31/17
19.0 Final Product Testing Proof	4/3/17	4/12/17
19.1 Test every subsystem	4/3/17	4/12/17
20.0 UGRADS Presentation	4/13/17	4/24/17
20.1 Poster	4/13/17	4/14/17
20.2 Final Assembly	4/17/17	4/24/17
21.0 Final Deliverables	4/25/17	5/1/17
21.1 CAD Model	4/25/17	4/26/17
21.2 Final Report	4/27/17	4/28/17
21.3 Peer Review 3	5/1/17	5/1/17



Schedule

Resources Chart



Name	Default role
Eileen Baker	Project Manager
Noah Oliver	Client Contact
AJ Garcia	Secretary
Hasan Farman	Budget Liason
Khaled Alosaimi	Website Developer

The team is currently on task with all deliverables

Budget

	Cost
Metal Bar 	$12
Swivel 	$25
Ez-Up 	$219

	Cost
Ball Bushing Linear Motion Bearings(2) 	$20
Zinc-Plated Punched Angle 	$20
Garage Rollers 	$5
PVC Pipe 	$12

Budget

Total Amount Available: $1500

Actual Expenses to Date: $557.13

Resulting Balance: $942.87

Acknowledgements

We'd like to thank W.L. Gore and Associates for their funding of this project.

Questions or Comments