Dynamic Arm

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Overview:

- Project Description
- Problem Statement
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Project Description

Client : Mr. Dan Dorszynski

Adaptive Athlete

Advisor: Professor Willis J. Tompkins, PhD

Department of Biomedical Engineering

Problem Statement

- Mr. Dan Dorszynski has Becker muscular dystrophy
- Competes in the USTA wheelchair tennis
- Difficulty with backhand and forehand
- The team will building a device to support his arm for a better tennis swing.

Background:

- Becker's Muscular Dystrophy
  - Progressive loss of skeletal muscle
  - Genetic disease
  - Area of muscle loss varies between patients
- Adaptive tennis
  - Participants can be para or quad impaired
  - Roughly same rules as regular tennis
- Fall 2016 BME design team

Figures 40 and 41: The racket grip prototype

Alden, Walker, Franczek, Bacon, Lahm, 2016

PDS

- Provide enough support to the arm so that minimal fatigue is experienced by the end of the game.
- Conform to the motions of the client.
- Must be able to be used for at least 5 years
- Lightweight and durable materials
- Suit a fore and backhand stroke

Designs Considered

- Track
  - An attachment to our client's wheelchair which will serve to guide his motion
- Bands
  - A series of bands which would elevate his arm in a sling-like manner
- Name-tag
  - A set of retractable cables which would maneuver the wearer's arm in a similar manner as a retractable name-tag

Design Matrix

Design Criteria (weight)	Track Design		Band Design		Name-tag Design	
Comfort (20)	3/5	12	2/5	8	4/5	16
Effectiveness (25)	5/5	25	3/5	15	2/5	10
Ease of Use/installation (20)	3/5	12	5/5	20	4/5	16
Cost (10)	2.5/5	5	5/5	10	3/5	6
Adjustability (15)	5/5	15	4/5	12	4/5	12
Safety (10)	4/5	8	4/5	8	4/5	8
Total	**77**		**73**		**68**	

Future Work

- Refine Design
- Fabricate
- Test
- Modify

Future Future

- Possibly support both arms
- Sensorization of mechanical support

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