



Hand-held Device to Reduce Spasticity

Advisor: Tracy Puccinelli

Client: Carol Rohl & Bonnie Tompkins

Clara Chow - Leader

Sara Schmitz - BSAC

Emily Florence - BWIG

Devon Moloney - Communicator

Background

- ▶ Hemiparesis - partial weakening usually by stroke¹
- ▶ Spasticity (Tone) - tightening muscle²
- ▶ Spasticity reducing treatments:
 - ▶ Electrical Stimulation
 - ▶ Injections such as Botox
 - ▶ Stretching³



Introduction

- ▶ Client: Carol
- ▶ Suffers from hemiparesis due to stroke
- ▶ Current device:
 - ▶ Joggers strap and small tennis ball
 - ▶ Opens and relaxes hand
- ▶ No commercially available products

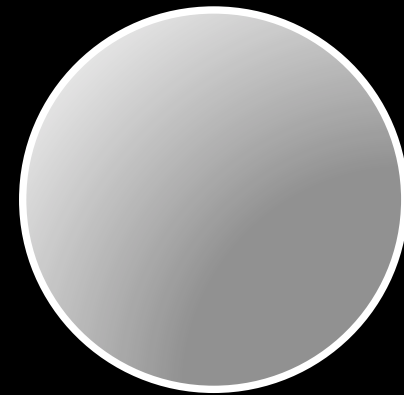
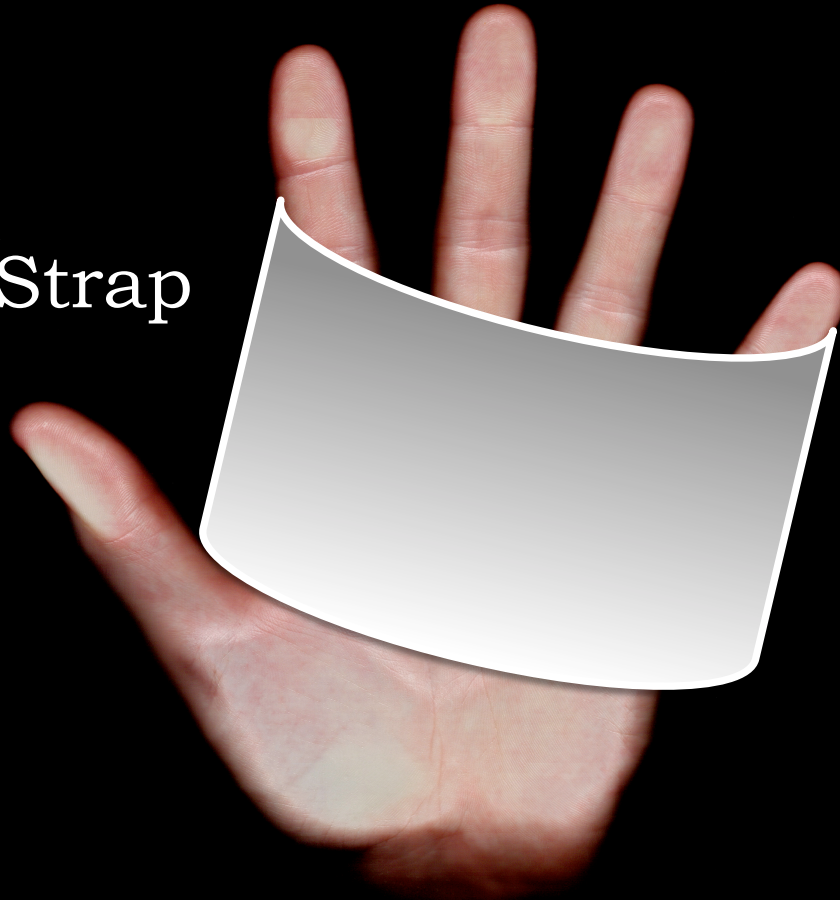


Design Criteria

- ▶ Single compact design
- ▶ Effectively relax her hand
- ▶ Easily moveable
- ▶ Breathable material
- ▶ Washable
- ▶ Department budget under \$100
- ▶ Colorful

Overview of Designs

Strap



Shape

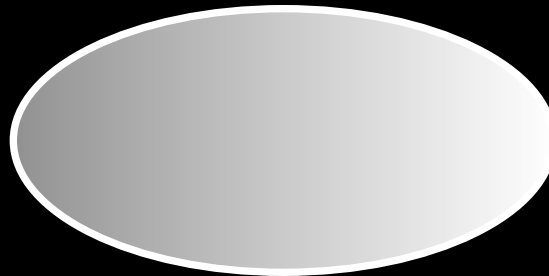
Method of Connection

Proposed Shapes – Side View



2 in.

Design #1: Sphere



2 in.

Design #2: M&M



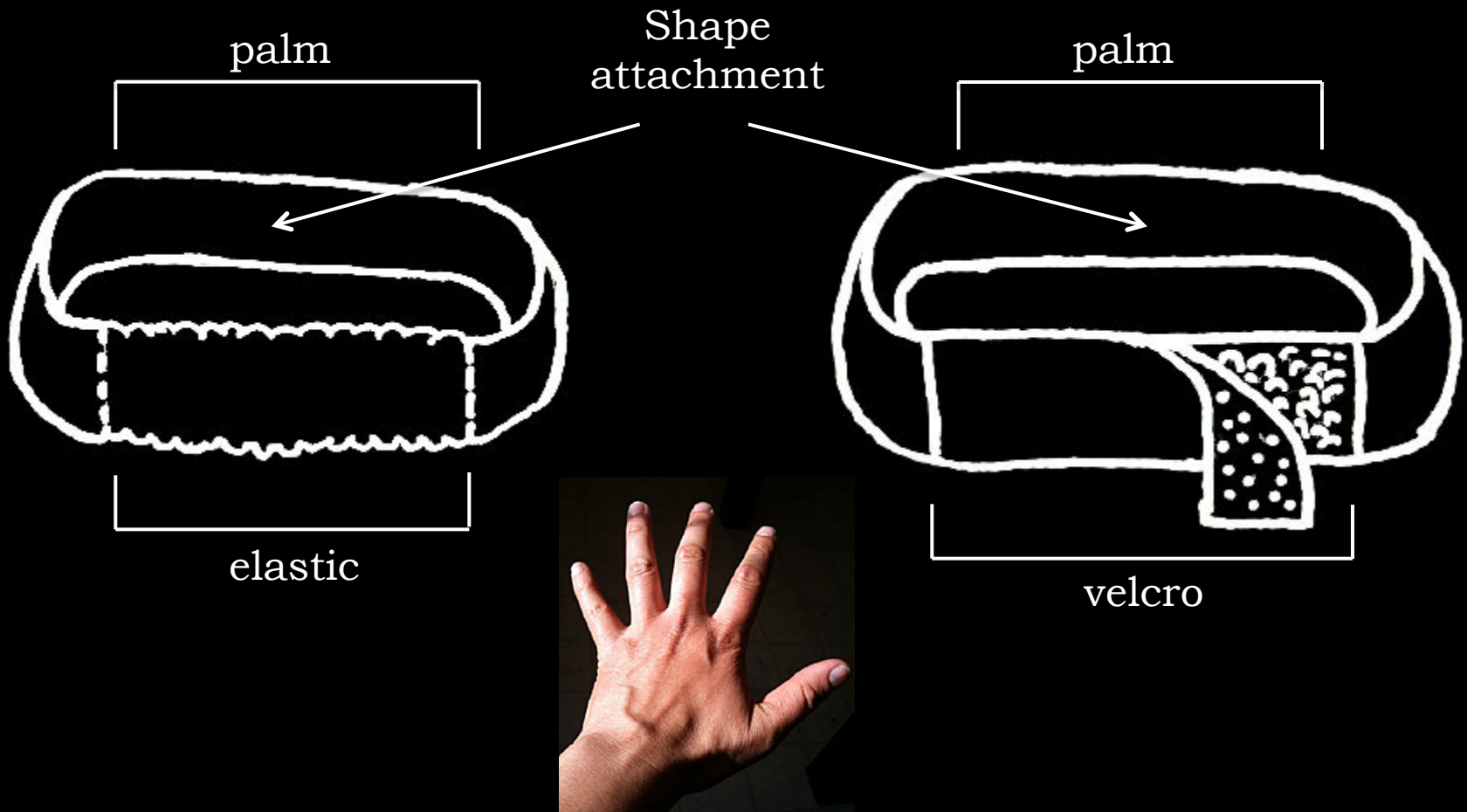
2 in.

Design #3: Rod

Shape Design Matrix

Criteria (Weight)	Sphere	M&M	Rod
Performance (30)	28	25	20
Comfort (20)	16	18	17
Convenience (15)	13	14	10
Size (15)	10	14	13
Versatility (10)	8	9	5
Ease of fabrication (5)	5	5	3
Aesthetics (5)	3	4	3
Total (100)	83	89	71

Proposed Strap Designs



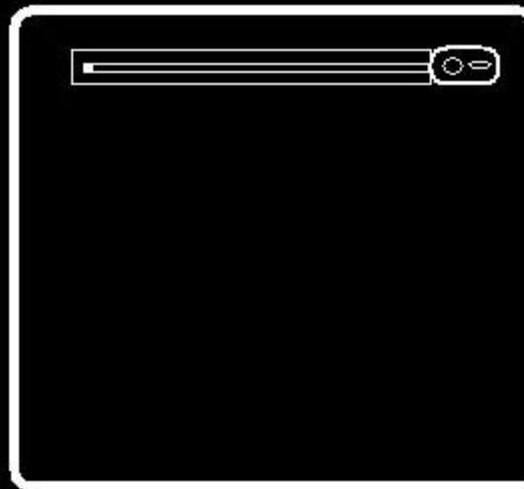
Proposed Attachment Designs



magnet



screw



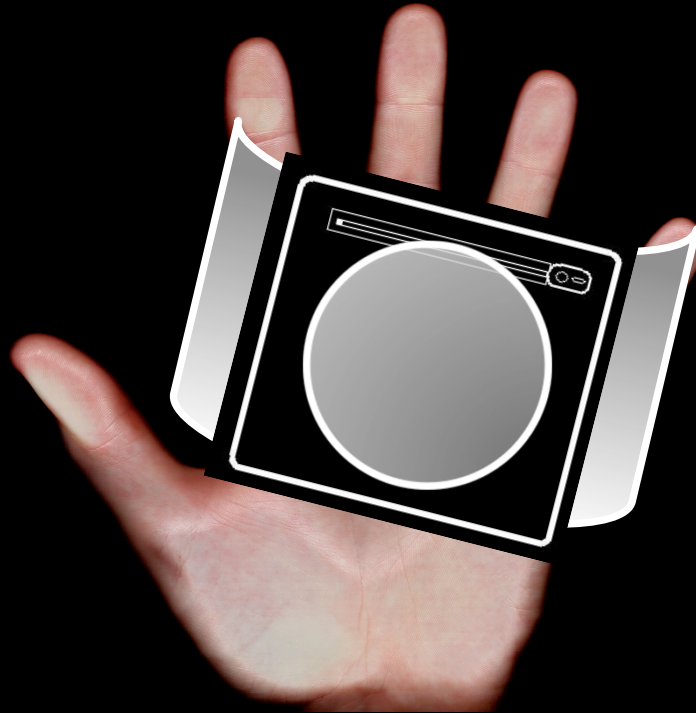
pocket

Attachment Design Matrix

Criteria	Pocket	Screw	Magnet
Security (25)	23	18	15
Ease of use (20)	15	10	18
Comfort (20)	18	15	15
Ease of fabrication (15)	10	11	14
Safety (10)	9	5	8
Weight (5)	4	4	3
Cost (5)	3	4	3
Total (100)	82	67	76

Conclusion

- ▶ Prototype will consist of pocket attachment with M&M shape.



Future Work

- ▶ Construct prototypes
- ▶ Ship prototypes to client
- ▶ Receive feedback from physical therapists
- ▶ Test the products
- ▶ Conduct surveys
- ▶ Fabricate a final product

References

- ▶ <http://www.stroke.org>
- ▶ <http://www.wemove.org>
- ▶ http://www.sciencedirect.com/science?_ob=MiamiImageURL&cid=273260&user=443835&pii=S1071909104000099&check=y&origin=&coverDate=31-Mar-2004&view=c&wchp=dGLbVIS-zSkWb&md5=87d4a50a95f0511bf6dc05008bc8e212/1-s2.0-S1071909104000099-main.pdf
- ▶ <http://www.google.com/imgres?q=hand+black+background&num=10&um=1&hl=en&biw=853&bih=381&tbm=isch&tbnid=cwAfD-sQkE8WUM:&imgrefurl=http://creativity103.com/collections/Interference/slides/handscanner.html&docid=v0SLNhPD5EbC9M&imgurl=http://creativity103.com/collections/Interference/handscanner.jpg&w=3487&h=4000&ei=tgGbToSFJcaNsQKlz5yrBA&zoom=1>
- ▶ http://brainrub.com/thestoob/wp-content/uploads/2009/07/my_hand.jpg