

# Grip Meter

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# Overview

- Problem Statement
- Background Information
- Motivation
- Client Requirements
- Design Alternatives/Matrices
- Final Design
- Future Work
- Acknowledgements

# Problem Statement

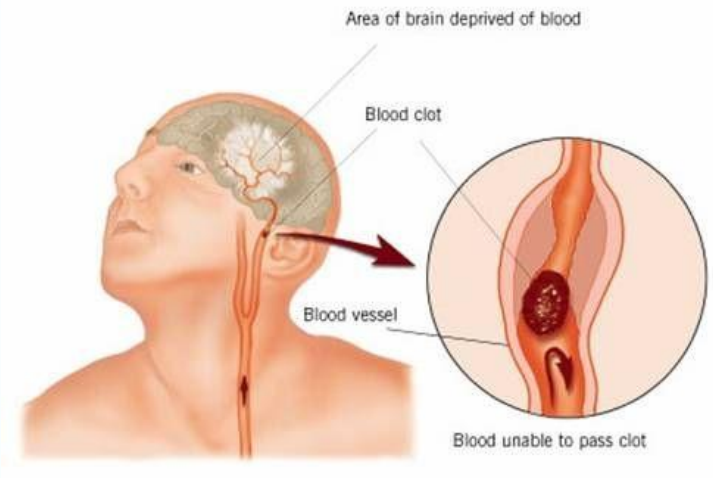
- Current grip meters are expensive
- Cannot measure small forces accurately
- Grip meter for weak patients
- Needs to measure 0-20 lbs accurately in 1 lb increments



Figure x. Jamar 200 lb grip meter.  
Photo from  
<http://www.thehumansolution.com/jahady.html>

# Basics of a Stroke

- Disruption of blood flow to brain
- Due to:
  - Blood clots-Ischemic
  - Blood vessel burst-Hemorrhagic
- Results in:
  - Neurophysiological damage
- Variety of risk factors
  - e.g. Diabetes, high cholesterol
- Variety of Symptoms
  - Most common-headache



<http://www.healthmango.com/stroke/treatment-for-stroke/>



<http://bekamabawi.com/terapi-stroke/>

# Stroke Treatment

- In hospital:
  - Depends on type and severity
  - e.g. Clot-breaking drugs
- Long-Term
  - Individual basis
- Our Project
  - Nerve and muscular damage
  - Recovery measure using grip strength
    - Dynamometer

# Motivation

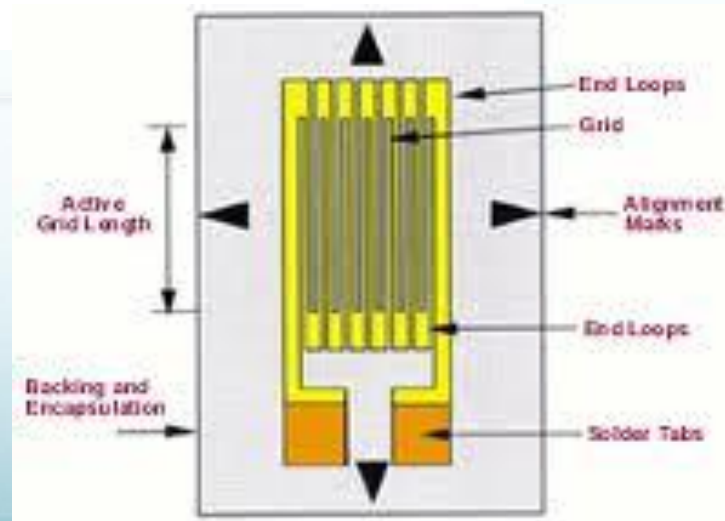
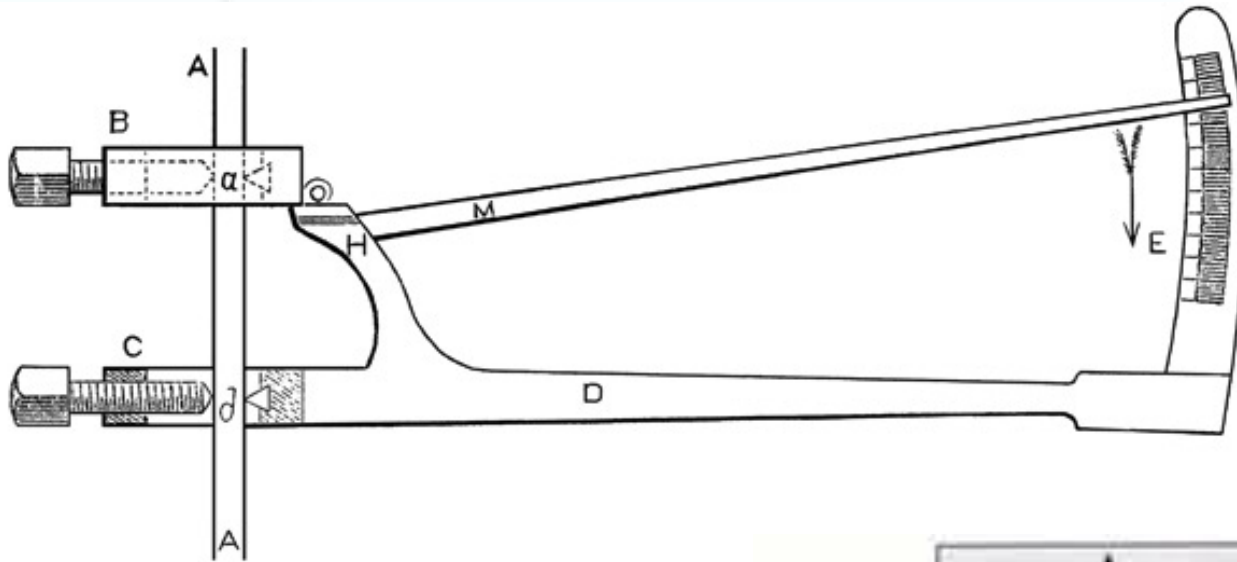
- Need
- \$\$\$



# Client Requirements/Design Specifications

- Measure from 0-20 lbs, in 1 lb increments
- LCD screen for read-out
- Able to be recalibrated if necessary
- No latex or foam
- Highest priority on functionality/consistency
- Preferably portable (~same size as current)
- Aesthetics of design not important

# Alternative Designs- Measurements





# Strength/Force Test Matrix

	Spring	Extensometer	Strain Gauge
Functionality (30)	23	23	30
Reliability (30)	23	23	30
Durability (20)	18	5	15
Portability (15)	15	15	15
Safety (5)	5	5	5
Total (100)	84	71	95

# Alternative Designs



# Final Design Matrix

	Squeeze Ball	2-Bar
Functionality (30)	20	30
Reliability (30)	20	30
Durability (20)	16	18
Portability (15)	15	15
Safety (5)	5	5
Total (100)	76	98

\*Appearance does not matter

# Final Design

- Dynamometer style grip with strain gauge and external instrumentation unit.

# Final Design

## Advantages:

- Ergonomic, accurate grip
- Optimized grip diameter
- Cost effective
- Compact instrumentation unit
- Easier fabrication process
- Easy sanitation
- Semiconductor strain gauge

# Future Work

- Designing circuit
- Ordering parts
- Building circuit
- Fabricating and assembling prototype
- Product testing

# Acknowledgements

- Client, Elizabeth Bourne
- Amit Nimunkar
- Advisor, Chris Brace

# References

- Zieve, MD, David. "Stroke" PubMed. U.S. National Library of Medicine, 24 June 2011. Web. 20 Oct. 2011. <<http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0001740/>>.
- Northern Tool
- Omega
- [www.activeforever.com](http://www.activeforever.com)



Questions?