Muscle Recorder

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Overview

- Introduction
- Project goals
- Design
- Budget
- Conclusion
Introduction

- Client:
  Dr. John D. Enderle, Program Director & Professor, Biomedical Engineering, University of Connecticut

- Need:
  Device to record the force-velocity and length-tension relationships for a variety of muscles at different levels of stimulation.
Project Goals

- Uses LabVIEW® software
- Small and portable
- Suitable for muscles that range between 3-5 mm and 20 cm
- Force-velocity & length-tension
- Performs the quick-release and lever experiments as well
Force-Velocity

- Based on the work of Hill, A.V.
- Velocity of muscle contraction is inversely proportional to the weight.
- A large force cannot be exerted in very rapid movements.
- The highest velocities are obtained under low loading conditions.
Length-Tension

- Based on the sliding filament theory
- Contractile filaments: highly ordered => alternate light and dark bands
- Muscle can generate greatest tension at its resting length
- Tension generated proportional to # of cross bridges that form
- Number of cross bridges available depends on overlap filaments
Design

- A metal stand is the foundation of the whole apparatus.
- An arm is attached perpendicularly to the stand - holds muscle & weight
- A force transducer is connected to the clamp of the arm
- Tray on the bottom collects saline solution
- A muscle stimulator provides electrical pulses
- Force transducer is connected to a computer having *LabVIEW®* software
- A *LabVIEW®* program is written to process the data
# Budget

## Table 1: Cost

<table>
<thead>
<tr>
<th>ITEMS</th>
<th>MARKET COST</th>
<th>ESTIMATED COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscle</td>
<td>$6.90 - $28.00</td>
<td>$6.90</td>
</tr>
<tr>
<td>Saline Solution</td>
<td>$3.89 - $10.99</td>
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<tr>
<td>Motor</td>
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<td>Muscle Stimulator</td>
<td>$49.00 - $2800.00</td>
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<tr>
<td>Weights</td>
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<td>Computer Software</td>
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<tr>
<td>Stand, clamp and bucket</td>
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<td>Electrodes</td>
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<td>Gloves</td>
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<td>Battery (9V)</td>
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<td><strong>Total</strong></td>
<td><strong>$2649.09 - $8214.98</strong></td>
<td><strong>$177.15</strong></td>
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Conclusion

Any Questions??