INTRODUCTION

• What is temporomandibular joint disorder (TMJD)?

• What are the problems with the current diagnosis methods?

• How will the proposed device work?

• How much will the proposed device cost?

• Questions?
WHAT IS TMJD?

• Temporomandibular joint disorder
• Bruxing (grinding) and clenching of the jaw leads to wear of fibrocartilage discs, headaches, and muscle tension
• Effects 35 million people in the U.S.
• Can cause problems with eating, drinking, swallowing, talking, making facial expressions and even breathing
THE FOUR MUSCLES OF MASTICATION

- Left and right Masseter
- Left and right Temporalis

http://students.clinicalbodyworkers.com/students/frame_page/muscle_chapter_2.htm
CURRENT DIAGNOSIS METHODS
OUR TMJD DIAGNOSTICS DEVICE

- Hat design
- Electrodes
- EMG circuitry
- Bluetooth
- LabView Program
- Computer
EMG CIRCUIT FLOWCHART

Electrode -> Bandpass Filter 25 Hz – 500 Hz, RC Lowpass & RC Highpass -> Protection Circuitry -> Instrumentation Amplifier -> Bandpass Filter 25 Hz – 500 Hz, Active Filter

Analysis, Storage & Display <-> LabVIEW Code <-> Notebook PC <-> Bluetooth / Serial <-> 60 Hz Notch Filter Twin T, High Q
LABVIEW PROGRAM

Bluetooth → 2D Vector

- Waveform graph
- Number of bruxing events
- Total bruxism time
- Time interval with most number of bruxism events
- Conversion of units from Volts to Newtons and Pascal
- Maximum force and Pressure
- Save data to file
# BUDGET

<table>
<thead>
<tr>
<th>Component</th>
<th>Maximum estimated price</th>
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<tbody>
<tr>
<td>Electrodes</td>
<td>$50</td>
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<tr>
<td>Electrode leads</td>
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<tr>
<td>Integrated circuits</td>
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<tr>
<td>Resistors, capacitors and diodes</td>
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<td>9 V batteries</td>
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<td>Bluetooth module</td>
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<td>Hat</td>
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<tr>
<td>Laptop</td>
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<td>Clinical trials</td>
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<td><strong>Total</strong></td>
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OVERVIEW

• TMJD effects millions of people in the U.S.
• Current diagnostic methods are inconvenient for either the clinician or patient
• Proposed device will be wireless, comfortable, and portable
• Will consist of a wearable device and computer
• Should cost approximately $3770 to create, including the cost of clinical trials
QUESTIONS?