MEDSense: An Accessible Pill Cap Dispensing/Cutting Device

Final Presentation
BME 291
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Outline

- Introduction
- Current Market
- Clients
- Design
- Budget
- Conclusion
Introduction

The MEDSense Pill Cap…

- keeps track of doses and medication times
- automatically cuts and dispenses the correct dose
- uses multi-modal alerts that are ideal for all patients
- communicates wirelessly with a third party member
Current Market

- E-pill Med-Time
- MD2 Monitored Automatic Pill Dispenser

- Neither product has all the capabilities of MEDSense
Clients

- 8 clients with a wide range of disabilities including:
  - Diminished hand strength and control
  - Hearing loss
  - Vision loss
  - Memory loss
  - Hand tremors
- All clients connected by desire to remain independent
Subunits

- Design
- Cutting Mechanism
- Multi-Modal Alert System
- Offsite Alert
Design
Design
Operation

1. Alarms go off
Operation

2. Invert device
3. Switch on device
Operation

4. Pill is dispensed
Cutting Mechanism

- Funnel guides pill into system
- Pill is stabilized by two rotating discs
- Blade is driven by servo motor
- Two springs retract blade
- Gravity is used to move pill through system
Force Analysis

- Torque produced by motor must overcome force produced by springs and force of pill to cut
- Lever arm must be long enough to produce enough force
- Maximum force needed to cut pill is 3.9 lbs
- Force provided by motor is 6.7 lbs

$$\sum F : F_m \geq F_s + F_p$$
Multi-Modal Alert System

- Visual and auditory alerts
- Alarms sound at pre-programmed times
- User initiates cutting sequence
- Alert system if pills get jammed, which is sensed by photo detectors
Text-to-Speech Module

- Manufactured by Devantech
- Alert designed for persons who are vision impaired
- 4 phrases to alert user during operation
Offsite Alert

- Bluetooth module sends alert if medication is missed.
- If button is not pushed within a certain amount of time, device communicates wirelessly with third party member.
Bluetooth Device

- Used to send data from device to computer wirelessly
- From computer an alert could be sent to a family member or medical professional
### Budget

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<th>Product</th>
<th>Subtotal</th>
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<td>Devantech Text-to-Speech Module</td>
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Conclusion

- Easy-to-use design for patients with disabilities
  - Automatic cutting, multi-modal alerts, offsite alert
- Simple design reduces risk of error
- Safe and environmentally friendly
- Relieves patient’s stress in daily medication regimen
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Questions?