

Stationary Balance Training Bicycle - P08001

Team Members:

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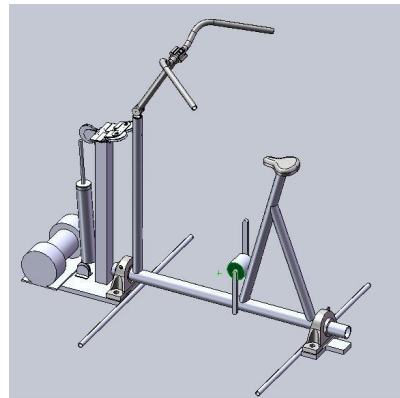
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Project Description

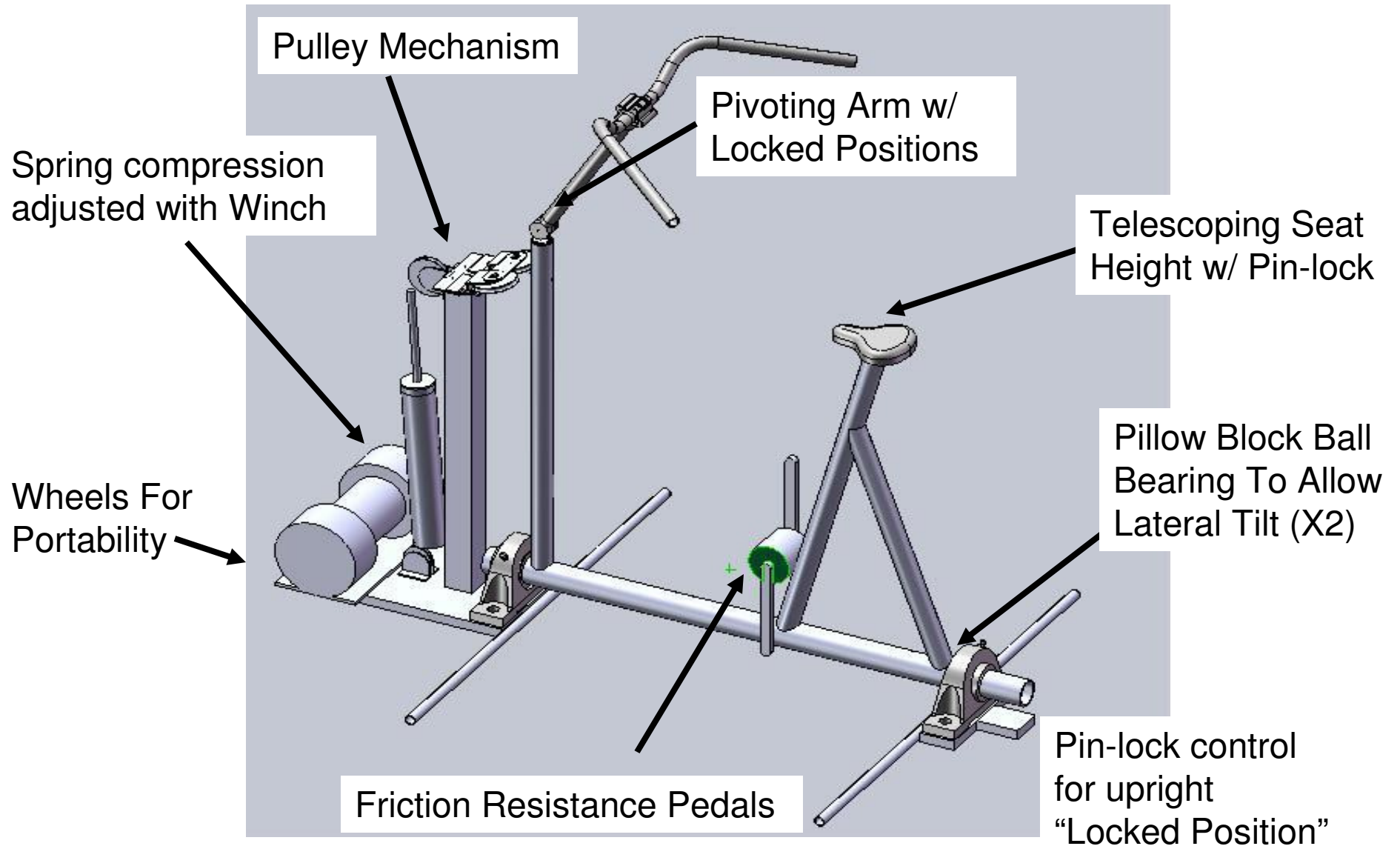
- Customer: Nazareth College Physical Therapy Clinic
- Safe intermediate step between a stationary and traditional bicycle
- Balance training for recovering physical therapy patients
 - Stroke
 - Neurological disorders



Customer Key Needs / Specs

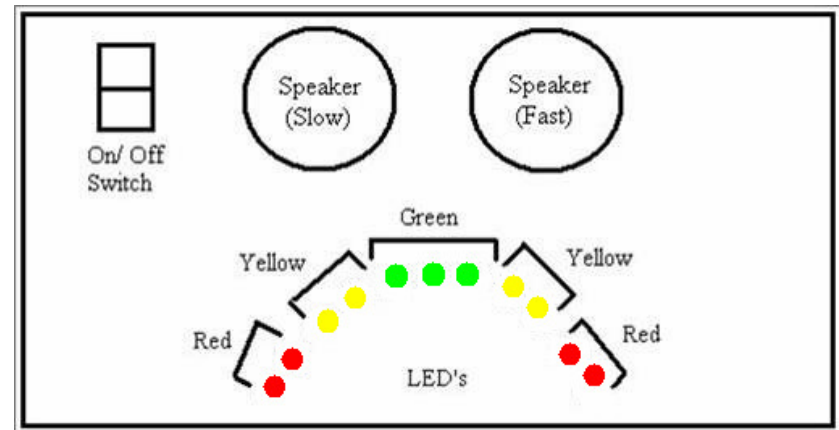
<ul style="list-style-type: none">• Adjustable levels of tilt resistance• Provide meaningful feedback on patient's ability to balance• Safe design• Accommodating weight capacity	<p>Tilt Range: 0°-15° Tilt Levels: Infinite Tilt Resistance Range: 0-150 lbs</p> <p>Auditory Feedback: 2 Buzzers slow/fast pulsed Visual Feedback: LED Arrays – Red, Yellow, and Green Indicators</p> <p>Upright, locked position Ergonomic adjustments for seat height and handlebar positions.</p> <p>Patient weight in the range of 90lbs – 300lbs</p>
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Concept Overview

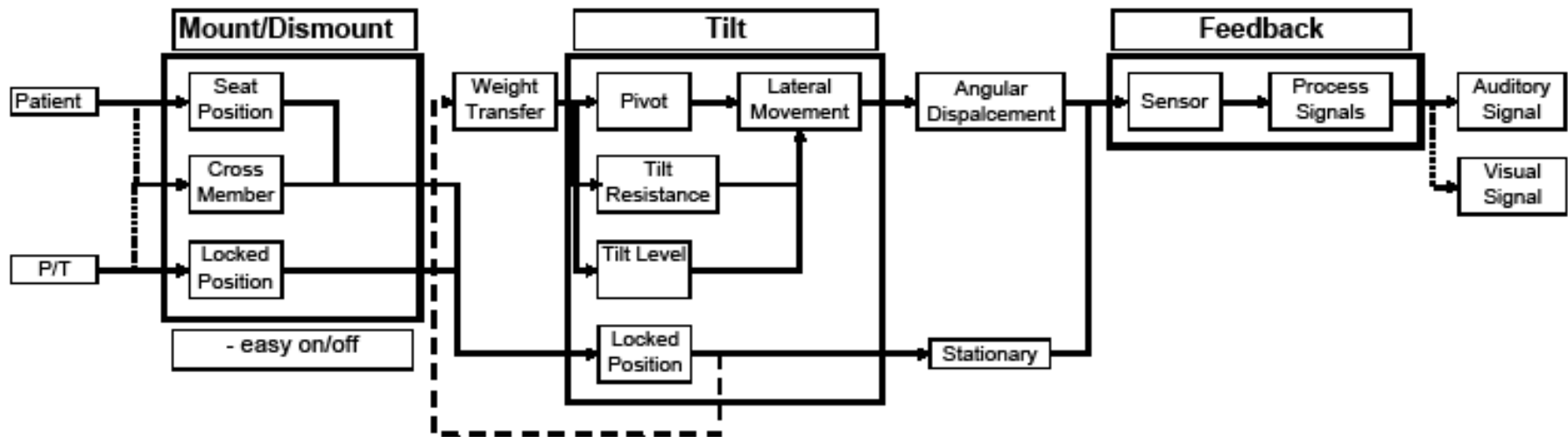


Concept Overview - Feedback

- Audio / Visual Display Concept
 - Visual Feedback
 - LED Bank – indicating direction and level of tilt
 - Color Code
 - Green – normal tilt range
 - Yellow – region to correct balance
 - Red – Tip-over condition imminent
 - Audio Feedback
 - 2 Buzzers provides audio feedback
 - Auditory indication occur at yellow and red warning levels
 - Two tones
 - Slow Pulsed tone for “yellow” level
 - Fast pulse tone for “Red” Level



System Architecture



Risk Assessment

- Risk: Spring Oscillation
 - If patient has no trunk control, possible flopping side to side
- Reviewed details with appropriate subject matter experts (detailed design review)
- Mitigations:
 - Possible use of a damper combined with the spring assembly

Current State of Design

- Design meets all customer needs
- Analysis of design meets engineering specifications for full system and subsystems
 - However, execution of our current test plan may reveal unforeseeable complications
 - Tilt range specification is overestimated, final calibration will refine final tilt range
- Budget Considerations:
 - On target to meet project budget of **\$2000**
 - Current Total Cost of Parts = **\$1,717.14**
 - **\$282.86** left for shipping and small miscellaneous items
- Schedule: on target
 - All key components are in stock with our selected suppliers with short lead times.
 - Items that require additional testing will be ordered week 11. (Inclinometer)

Milestone Schedule SDII

- Week 3: Initial Assembly of Bike and Feedback System
- Week 5: Finalize Verification Testing, fine-tune design if necessary, begin user manual documentation
- Week 6: Integrate Feedback system onto bike
- Week 8: Present to customer, final calibration, finish tech paper, poster, and Design History File
- Week 10: Final Project Review, Demonstrations