Rehabilitation Exercises for Environmental Control

Final Presentation
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Outline

- Introduction
- OKRs
- Progress
- Future
- Questions
Introduction

- The Problem
- The Solution
- How?
The Problem

- Rehabilitation for patients who don’t have access to constant therapy
- Repetitive exercises are challenging
- Expensive
The Solution

- Home-based rehabilitation system
How?

- **Focus on Patients Interests**

Table 11. Time spent in leisure and sports activities for the civilian population by selected characteristics, 2014 annual averages

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total, all days</th>
<th>Weekdays</th>
<th>Weekends and holidays</th>
<th>Participating in sports, exercise and recreation</th>
<th>Socializing and communicating</th>
<th>Watching TV</th>
<th>Reading</th>
<th>Relaxing/ thinking</th>
<th>Playing games and computer use for leisure</th>
<th>Other leisure and sports activities, including travel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>5.71</td>
<td>5.11</td>
<td>7.10</td>
<td>0.36</td>
<td>0.44</td>
<td>0.56</td>
<td>1.00</td>
<td>2.76</td>
<td>3.73</td>
<td>0.25 0.29 0.32 0.32 0.49 0.68 0.37 0.63</td>
</tr>
<tr>
<td>Women</td>
<td>4.93</td>
<td>4.50</td>
<td>5.93</td>
<td>0.20</td>
<td>0.23</td>
<td>0.60</td>
<td>1.04</td>
<td>2.45</td>
<td>2.99</td>
<td>0.35 0.41 0.23 0.26 0.35 0.38 0.32 0.61</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total, 15 years and over</td>
<td>5.30</td>
<td>4.79</td>
<td>6.05</td>
<td>0.28</td>
<td>0.33</td>
<td>0.58</td>
<td>1.02</td>
<td>2.60</td>
<td>3.35</td>
<td>0.31 0.35 0.27 0.31 0.42 0.52 0.34 0.62</td>
</tr>
<tr>
<td>15 to 19 years</td>
<td>5.74</td>
<td>5.26</td>
<td>6.85</td>
<td>0.60</td>
<td>0.64</td>
<td>0.73</td>
<td>0.90</td>
<td>2.13</td>
<td>2.94</td>
<td>0.09 0.14 0.18 0.18 0.16 0.75 1.24 0.71 0.81</td>
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<tr>
<td>20 to 34 years</td>
<td>5.45</td>
<td>5.07</td>
<td>6.38</td>
<td>0.35</td>
<td>0.47</td>
<td>0.77</td>
<td>1.24</td>
<td>2.35</td>
<td>2.77</td>
<td>0.25 0.17 0.13 0.15 0.62 0.92 0.40 0.68</td>
</tr>
<tr>
<td>25 to 34 years</td>
<td>4.34</td>
<td>3.70</td>
<td>5.83</td>
<td>0.25</td>
<td>0.39</td>
<td>0.63</td>
<td>1.15</td>
<td>1.81</td>
<td>2.63</td>
<td>0.13 0.12 0.24 0.26 0.33 0.54 0.31 0.72</td>
</tr>
<tr>
<td>35 to 44 years</td>
<td>4.10</td>
<td>3.50</td>
<td>5.52</td>
<td>0.23</td>
<td>0.35</td>
<td>0.47</td>
<td>1.06</td>
<td>1.89</td>
<td>2.80</td>
<td>0.14 0.19 0.19 0.22 0.28 0.30 0.29 0.59</td>
</tr>
<tr>
<td>45 to 54 years</td>
<td>4.75</td>
<td>4.13</td>
<td>6.19</td>
<td>0.22</td>
<td>0.28</td>
<td>0.50</td>
<td>1.04</td>
<td>2.40</td>
<td>3.33</td>
<td>0.21 0.28 0.28 0.32 0.25 0.40 0.27 0.54</td>
</tr>
<tr>
<td>55 to 64 years</td>
<td>5.45</td>
<td>4.93</td>
<td>6.70</td>
<td>0.24</td>
<td>0.23</td>
<td>0.46</td>
<td>0.87</td>
<td>3.00</td>
<td>3.85</td>
<td>0.33 0.46 0.30 0.32 0.35 0.39 0.26 0.58</td>
</tr>
<tr>
<td>65 to 74 years</td>
<td>6.94</td>
<td>6.60</td>
<td>7.72</td>
<td>0.28</td>
<td>0.24</td>
<td>0.64</td>
<td>0.96</td>
<td>3.88</td>
<td>4.38</td>
<td>0.59 0.72 0.33 0.36 0.49 0.42 0.38 0.62</td>
</tr>
<tr>
<td>75 years and over</td>
<td>8.02</td>
<td>7.89</td>
<td>8.31</td>
<td>0.19</td>
<td>0.14</td>
<td>0.62</td>
<td>0.89</td>
<td>4.41</td>
<td>4.76</td>
<td>1.12 1.02 0.70 0.60 0.51 0.40 0.24 0.42</td>
</tr>
</tbody>
</table>
How?

- Cost effective
- Flexible by patients needs
- Interactive and motivates patients to do exercises
Outline

- Introduction
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OKRs

1. Complete Game Mode
   - Use LED Board to display movements
   - Connect LED board and sensors
   - Feedback

2. Complete TV Mode
   - Sensors detect movements and control TV
   - Power, Channel Up/Down, Volume Up/Down
OKRs

3. Movement Recognition
   - Checking the correctness of movement

4. Finish GUI and Implement it
   - Complete TV mode and implement it
   - Complete Game mode and implement it

5. Use Kinect Sensor
   - Be able to use more challenging movements
Outline

- Introduction
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Progress
First Step

- Understand Arduino
- Understand IR sensors
Second Step

- Movement Recognition
Third Step

- Implementing TV remote with arduino
- Combining TV and Game mode
Fourth Step

- Implemented LED Board for Game Mode
- Complete Hardware Prototype
Final Step

- Making a Graphical User Interface (GUI)
Flow Charts

- TV Mode

```
Flow Diagram:

1. IR Sensors → Signal
2. Signal → Arduino #1
3. Signal → Arduino #2
4. Signal → T.V.
5. T.V. → Signal
6. Signal → Universal Remote
7. Signal → Relay Kit
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Flow Charts

- Game Mode
Flow Charts

- GUI
Outline

- Introduction
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Future

- Meet with Patients
- Fix memory issue and finish implementing GUI
- Use Kinect sensor
Questions?