Design of arm:

- Servo motors for mobility, clean look
- Pros: light, easy to lift, touch, mobile
  - Cons: clean look

Air muscles:
- Provide a great weight-to-strength ratio

Pneumatic cylinders:
- Heavy, bulky but strong
Muscles

- Latex tubing
- Latex rubber tubing + flexocable sheathing
- Hose clamps
- Materials for muscles got from eBay

4-way muscle setup

- Compressor
- Adaptor
- Air release gun + pressure relief valve
- T-Splitters

Muscles
Materials
- Aluminium rectangle tube 25mm x 10mm
- Aluminium flat bar 25mm x 2mm
- Rivets
- Drill
- Drill bits
- T Piece hose connectors
- Clear hose
- Cable ties
- Flexo electronics cable managment sheathing
- Elastic silicone medical tubing
- Hose clamps
- Bolts + Nuts
- Air compressor
- Stop watch
- Weights

Materials sourced from eBay + Bunnings

Rules for testing
* Arm at 45°, not supported against body
* Weight is held at 45° until can't keep it at that angle (i.e. wants to lean)
* 30+ mins between each lift

* Not all available subjects could fit the mechanical arm + limited to the number of subjects
* More repetition
* Strongest arm is used

* Compare lower weights—everyday lifting + how mechanical arm could help
## Results

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>Unaided arm</th>
<th>Aided arm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time1 (min/sec)</td>
<td>Time2 (min/sec)</td>
</tr>
<tr>
<td>5 Kg</td>
<td>5:45</td>
<td>5:52</td>
</tr>
<tr>
<td>10 Kg</td>
<td>3:35</td>
<td>3:34</td>
</tr>
<tr>
<td>15 Kg</td>
<td>1:28</td>
<td>1:38</td>
</tr>
<tr>
<td>20 Kg</td>
<td>0:30</td>
<td>0:46</td>
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<tr>
<td>25 Kg</td>
<td>0:24</td>
<td>0:30</td>
</tr>
<tr>
<td>30 Kg</td>
<td>0:19</td>
<td>0:18</td>
</tr>
<tr>
<td>35 Kg</td>
<td>0:07</td>
<td>0:12</td>
</tr>
<tr>
<td>5 Kg</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>10 Kg</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>15 Kg</td>
<td>7:10</td>
<td>7:15</td>
</tr>
<tr>
<td>20 Kg</td>
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<td>2:30</td>
<td>2:18</td>
</tr>
<tr>
<td>30 Kg</td>
<td>1:32</td>
<td>1:50</td>
</tr>
<tr>
<td>35 Kg</td>
<td>0:24</td>
<td>0:27</td>
</tr>
</tbody>
</table>

Note: NS = No Strain