The Tetra Fisher is an assistive fishing device designed for individuals with tetraplegia or limited mobility who experience acute impairment of motor functionality. The Tetra Fisher strives to maximize patient independence and encourages outdoor recreation to promote health and wellness.

**Problem Statement**

Limited mobility prevents patients from operating a normal fishing rod. The assistive fishing device must be customized to their specific needs to reduce the amount of outside assistance required to operate the device. An interface must be developed that is easy to use and facilitates maximum autonomy of the user. Portability and setup of the device are constant concerns for patients, therefore, a compact simplistic design compatible with a user in a wheelchair is required.

**Design & Manufacturing**

- **Casting**: Casting is accomplished via a pneumatic chamber through which a fishing bobber is propelled into the water. When the casting is triggered, a solenoid is actuated which releases air into the acrylic barrel.
- **Reeling**: Reeling is achieved with a 131:1 gear ratio motor directly connected to a close-faced fishing reel.
- **Aiming**: Aiming is managed by a motor controller that rotates the device on the x-axis.

**User Interface Logic**

- **Turret Aiming Menu**
  - Hold Sp: Turn Left
  - Hold Puff: Turn Right
  - Double Sp: Go to Set Power
  - Double Puff: Cast Now
- **Power Menu**
  - Hold Sp: Decrease Power
  - Hold Puff: Decrease Power
  - Double Sp: Go to Turret Aiming
  - Double Puff: Cast Now
- **Reel Menu**
  - Hold Sp: Increase Speed
  - Hold Puff: Decrease Speed
  - Double Puff: Stop

**Project Scope**

**In Scope Objectives:**
- User safety
- Universal control system
- Aim/cast/reel fishing line
- Versatile for various fishing techniques

**Out of scope:**
- Multi-input methods
- Wheelchair mount
- Bait hook
- Remove fish

**Testing & Results**

- **Variable Valve Actuation Test**
  - The variable valve actuation test illustrates a direct correlation between valve actuation time and casting distance. There were diminishing returns at higher actuation times. The ideal valve actuation time lies between 80 and 100 milliseconds.

- **Variable Pressure Test**
  - The variable pressure test demonstrated a direct correlation between pressure and casting distance. There were diminishing returns at higher pressures. The maximum distance recorded was 64.5 ft.

**Design Specifications**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Units</th>
<th>Marginal</th>
<th>Ideal Value</th>
<th>Actual Value</th>
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</thead>
<tbody>
<tr>
<td>Reeling Speed</td>
<td>ft/s</td>
<td>0-13.12</td>
<td>&gt;9.84</td>
<td>2.29-3.28</td>
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<tr>
<td>Cast Distance</td>
<td>ft</td>
<td>Max Cast</td>
<td>60.0</td>
<td>64.5</td>
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<tr>
<td>Setup Time</td>
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<td>&lt;5.0</td>
<td>5.0</td>
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<tr>
<td>Mount Rotation</td>
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<td>±90˚</td>
<td>360˚</td>
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<tr>
<td>Cast Deviation</td>
<td>ft</td>
<td>±1.0</td>
<td>±0.5</td>
<td>±0.91</td>
</tr>
</tbody>
</table>

**Introduction**

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