Design Improvements of Upper Limb Prosthesis to Increase Acceptance Rate

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Motivation and Objective
Low acceptance rates of the upper limb prosthesis are an on-going challenge for users, medical device designers, and clinicians. Our goal is to better understand this low acceptance rate and explore solutions that may improve user satisfaction. We are prototyping a range of prosthetic devices that vary in anthropomorphic form, functionality, and cost. Our poster presents the current progress in device design and development as well as future testing goals.

Clinical Need
Amputees of low socio-economic status need access to more affordable prosthesis.

Current Solution: The Hook

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<thead>
<tr>
<th>Pro</th>
<th>Con</th>
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<tr>
<td>Affordable</td>
<td>Lacks cosmetic appeal</td>
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<tr>
<td>Grasping functionality</td>
<td>Limited dexterity</td>
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<td>High tolerance to harsh conditions</td>
<td>Self-repair is difficult</td>
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<td>Fast wear rate</td>
<td>Heavy</td>
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Key Mechanical Features
- Underactuated
- Two degrees-of-freedom
- Cable-driven
- Natural cascade
- Pinch grip
- Cylindrical grasp

Conclusions and Future Work
- In this research, we have demonstrated the feasibility of a low-cost prosthetic hand that may improve upon the classic hook design.
- We have explored the challenges associated with balancing anthropomorphism, affordability, function, and cosmetic appeal.
- We have also developed a novel two-stage underactuated grasping mechanism.
- In future work, we will refine our prototypes for user testing and investigate different methodologies for measuring emotional response.

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