

## Design Matrix Criteria

Designs Criteria (*weight)	<u>Design One</u>		<u>Design Two</u>		<u>Design Three</u>	
	Phalange Extension		Thumb Relocation		Bar Thumb	
Grip Versatility (30)	5/5	30	4/5	24	3/5	18
Safety (15)	4/5	12	5/5	15	3/5	9
Cost (15)	4/5	12	3/5	9	3/5	9
Ease of Fabrication (15)	4/5	12	3/5	9	3/5	9
Product Weight (15)	4/5	12	5/5	15	4/5	12
Aesthetics (10)	4/5	8	3/5	6	3/5	6
<b>Total (100)</b>	<b>86</b>		<b>78</b>		<b>63</b>	

\*Note: When referring to weight it is always  $x/100$

### Design Specifications

Phalange Extension: This design will feature an added phalange to the existing model, creating an extra degree of freedom for the finger as well as lengthening it.

Thumb Relocation: This design will relocate the thumb to a location that is in greater opposition to the phalanges. Testing will be done to find an optimal positioning, but current ideas include thumb reposition on the anterior side of the wrist, or in the same location as current with a different angle towards the palmar side of the hand. The thumb may also be lengthened during the design process.

Bar Thumb: This design would solely focus on a relocation of the thumb to the anterior side of the wrist and replace the thumb with a flat bar piece attached to a curved rod piece. Essentially, a piece that follows the path of the thumb and looks like an upside down brake pedal in a car will be used to grasp over the top of the fingers so that they will have an increased crushing strength and thus an improved grip strength when picking items up.

## **Design Criteria**

**Grip Versatility** - The ability of the design to pick up multiple different types of objects to complete tasks of daily living.

**Safety** - The design must be able to operate with an equivalent safety rating of the existing models. While this is difficult to test directly in a cost effective manner for this project, the anticipated ability of the design to not experience a failure that would have the potential to harm the user will be used.

**Cost** - The total cost that would be anticipated to fabricate and test the design.

**Ease of Fabrication** - Takes into consideration the physical fabrication of the design for the team as well as the user. Also taken into consideration is the 3D modelling that would have to be completed to print the prototype by the team and any special instructions that would need to be accounted for when a user wants to print this design.

**Weight** - The design should remain as similar in weight to the current model as possible without compromising function and durability.

**Aesthetics** - The physical appearance of the design should account for most user's wants of the prosthetic to feel like an extension of themselves and thus not deviate too far from the appearance of a sound hand.