Pediatric Applications and Usefulness of 3D Printed Prosthetic Arms

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Children with congenital limb deficiencies or limb amputations need to use prostheses from an early age to meet crucial developmental needs. For example, acquiring and refining motor skills through errors, as well as generalization and adaptation to changing environments occur in this time period. Hence, when a child missing a limb undergoes these motor and brain development stages without a prosthesis, they will acquire compensatory movements that are different from those of children growing up intact. Unfortunately, the majority of young amputees considers daily use of their prosthesis difficult, and they abandon it. There are many reasons for this including the typically rudimentary prostheses available for a growing child and their utilitarian aesthetic appearance. A three-dimensionally printed prosthetic that is customized to the patient in both fit and aesthetic could improve functionality and alleviate both the unpleasantness experienced in donning the prosthesis and the costs surrounding periodic replacement of the device. The goal of this project is to create an inexpensive, customized upper extremity, myoelectrically controlled or mechanical prosthetic arm/wrist/hand that is aesthetically pleasing to the patient using 3D printed parts and inexpensive, non-3D printed components. Once the protheses are fabricated and fitted to the patients, they will be evaluated for usefulness/effectiveness to the user using a battery of manual dexterity tests administered by a certified prosthetist.