

**AN UNDER-ACTUATED MECHANISM FOR AN
ANTHROPOMORPHIC PROSTHETIC HAND**

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DECLARATION

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ABSTRACT

Upper limbs are very important to the functionality of the human body that enables us to execute activities of daily life (ADL). The human upper limb is complex and difficult to mimic from a robotic manipulator. Over the years the evolution of robotic prosthetic hand development is evident, which brings robotic prosthetic hands closer to the human hand performance. The challenge is to develop a robotic prosthesis with fewer actuators, human-like appearance and convenient interaction for the amputee. This research focuses on developing an under-actuated mechanism for a robotic prosthetic hand while maintaining the anthropometry of the human hand. This under-actuated mechanism primarily generate three grip patterns, namely index finger extended, pinch grip, and power grip. The under-actuated mechanism consists of a clutch mechanism that uses two actuators for controlling flexion and extension of fingers excluding thumb. This reduces control hardware whilst enabling to build a functional under-actuated mechanism incorporating 3D printing for creating lightweight prosthesis. Initial CAD models enabled to check the feasibility of under-actuated robotic hand design and various simulations helped to verify the design. For developed prosthesis hand, the mathematical kinematic model was constructed which was fed into the Matlab software to evaluate effectiveness of motion generation of fingers.

DEDICATION

To the most courageous three individuals who guided me to great achievements: My beloved
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