

# Integration into 3D Printing for Image Processing using AI ML

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**Abstract:** *The challenges of physical measurement for prosthetic development and highlight how our integrated tool offers a remote solution to address these challenges, promoting accessibility, convenience, and active participation in the prosthetic design process. Our Measurement Module for Prosthetic Hand Dimensions is a comparison of Image Processing and Distance Measurement Methods The creation of a module to precisely measure finger dimensions for the creation of prosthetic hands is the main goal of this research project. The module provides distance measurement and image-based input as two different ways to get dimensions. Users place their hands at predetermined distances from a screen in the distance measurement option, while users submit photographs of their hands with reference objects for scale in the image based input option. In order To provide a proper fit and functionality, the collected dimensions are an essential component of the prosthetic hand construction process. The study contrasts the efficiency of distance measurement methods employing cameras or other cameras with image processing techniques like edge recognition and contour analysis. Accuracy, usability, and efficiency are among the factors that are assessed to identify the best method for acquiring dimensions. OpenCV for image processing, TensorFlow for machine learning-based analysis, Tkinter for UI design, Mediapipe for landmark identification and hand tracking, and NumPy for numerical operations are just a few of the open-source libraries that are used in this module. The module's possible influence on improving the creation and customization of prosthetic hands is also covered. By offering insights into effective and precise dimension measurement methodologies for customized prosthetic hand design, the study's findings advance the area of prosthetics.*

**Keywords:** Image processing, Prosthetic development, OpenCV, TensorFlow, Mediapipe, NumPy, Precision dimension measurement, Tkinter

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