

A Smart CAD Program for Custom Hand Orthosis Generation Based on Anthropometric Relationships

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Abstract : Producing custom orthotic devices is a time-consuming and iterative process. Efficiency could be increased with a smart CAD program to rapidly generate custom part files for 3D printing, reducing the need for a skilled orthosis technician as well as the hands-on time required. Anthropometric data for the hand was analyzed in order to determine dimensional relationships and reduce the number of measurements needed to parameterize the hand. Using these relationships, a smart CAD package was developed to produce custom sized hand orthosis parts downloadable for 3D printing. Results showed that the number of anatomical parameters required could be reduced from 8 to 3, and the relationships hold for 5th to 95th percentile male hands. CAD parts regenerate correctly for the same range. This package could significantly impact the orthotics industry in terms of expedited production and reduction of required human resources and patient contact.

Keywords : CAD, hand, orthosis, orthotic, rehabilitation robotics, upper limb

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