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Structured white light scanning of rabbit Achilles tendon

Alex Hayes^{1*}, Katrina Easton², Pavan Teja Devanaboyina³, Jian-Ping Wu¹, Thomas Brett Kirk^{1,4}, David Lloyd³

1 Department of Mechanical Engineering, Curtin University of Technology, Western Australia

2 Hillside Veterinary Hospital, Utah, USA

3 Centre for Musculoskeletal Research, Menzies Health Institute Queensland, Griffith University, Queensland, Australia

4 Office of Research and Development, Curtin University of Technology, Western Australia

Alex Hayes
Department of Mechanical Engineering
Curtin University of Technology
GPO Box U1987 Perth
Western Australia 6845
Phone: +61 410 733 879
Fax: +61 8 9266 4188
E-mail: alex.hayes@outlook.com.au

Key words: tendon; cross-sectional area; structured light; 3D model; soft tissue

Abstract

Background

The cross-sectional area (CSA) of a material is used to calculate stress under load. The mechanical behaviour of soft tissue is of clinical interest in the management of injury; however, measuring CSA of soft tissue is challenging as samples are geometrically irregular and may deform during measurement. This study presents a simple method, using structured light scanning (SLS), to acquire a 3D model of rabbit Achilles tendon *in vitro* for measuring CSA of a tendon.

Method

The Artec Spider™ 3D scanner uses structured light and stereophotogrammetry technologies to acquire shape data and reconstruct a 3D model of an object. In this study, the 3D scanner was integrated with a custom mechanical rig, permitting 360-degree acquisition of the morphology of six New Zealand White rabbit Achilles tendons. The reconstructed 3D model was then used to measure CSA of the tendon. SLS, together with callipers and micro-CT, was used to measure CSA of objects with a regular or complex shape, such as a drill flute and human cervical vertebra, for validating the accuracy and repeatability of the technique.

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