

HIGH SPEED (4D) BODY SCANNING FOR LOWER EXTREMITIES – ADVANTAGES OF SCANNING AND DATA PROCESSING DIFFICULTIES

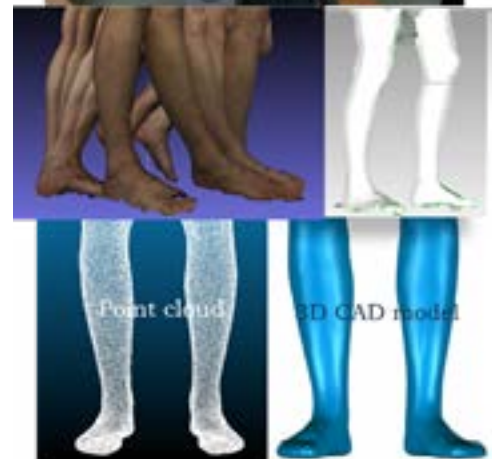
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Introduction

The foot's geometry is in continuous change due to movement. These dynamic changes must be considered during product development such as footwear products. Lack dynamic dimensions can lead to problems related with fit and comfort. From a long time capturing the 3D shape of human body is realized through 3D scanning technology. But nowadays, the availability of 4D scanning systems includes capturing the human body in motion as MOVE4D high speed 3D (4D) scanning system allows the geometry of the human body to be captured in motion at high frequency. The work tries to present the use of 4D scanning system to capture human body in motion focused on legs part. Generated 3D models are analysed to evaluate the changes of foot and legs geometry to support the de-signing process of footwear products. Dynamic dimensions are an important requirement to develop footwear products that improve footwear fit and comfort, especially for people encountering these problems. The work demonstrates the advantages of the using of high speed and high accuracy device and at the same time reports on various technical, methodical and algorithmic tasks, which have to be solved in the future.



Experimental part

Lower extremities of humans are scanned with the MOVE4D system with 10 Frames per Second. The data is processed with the build in software and exported to PLY format as point clouds. The sport to homologues mesh as OBJ required scanning of the face in the current software, so meshing of the point cloud is performed with open source software.

Results

The very short scanning time (under 4ms) per frame eliminates errors from the motion of the human body and increase the accuracy of the scans. From other side the 12 cameras of the Move4D system have good visibility for the upper part of the body, but are not designed to obtain points from the bottom part of the foot when it is in contact with the floor. Nevertheless, the option to have different geometries during walking provides important information about the geometry changes of the legs during walking.

Keywords: *high speed, body scanning, 4D, foot, lower extremities, data processing.*