IEEE SA Industry Connections 3D Body Processing Working Group and IEEE P3141 Standard for 3D Body Processing - Part 1

MCDONALD, C., RANNOW, R.K., PAI, D., BULLAS, Alice <http://orcid.org/0000-0003-2857-4236> and BALLESTER, A.

Standards Corner

IEEE SA Industry Connections 3D Body Processing Working Group and IEEE P3141 Standard for 3D Body Processing - Part 1

Carol McDonald
Gneiss Concept

Randy K Rannow
Silverdraft Supercomputing

Dinesh Pai
Vital Mechanics

Alice Bullas
Sheffield Hallam University

Alfredo Ballester
Universistat Politècnica de València

The IEEE 3D Body Processing Industry Connections Working Group (3DBP IC) brings together a diverse group of stakeholders including computer scientists, research and development personnel, three-dimensional (3D) body scanner vendors, retailers and thought leaders around 3D body processing technologies (3D capture, processing, storage, sharing, and virtualization) [1].

The group is focused on identifying the gaps in existing standards and recommended practices, identifying new

Source: IEEE 3DBP website [1]

potentially useful standards, identifying potential best practices for 3D body processing and adjacent related technologies, guides and recommendations for using body measurements, and identifying benefits/ limitations for this data.

3D body scanning technologies commonly utilize structured light, laser triangulation or photogrammetry. Structured light measures the deformation of a light pattern on a surface; laser triangulation projects a laser beam on a surface and measures the deformation of the laser ray; and photogrammetry reconstructs a 3D image from 2D captures with computer vision and computational geometry algorithms. The point clouds obtained from 3D body scanners can be processed to obtain representations of the outer body surface of a person as 3D meshes and virtual (digital) human models (also known as avatars). Data models derived from large 3D scan databases can be used to reconstruct 3D body models from photographs taken with a smartphone.

Personal 3D avatars can be used to create customized apparel and footwear, create AR/VR experiences, and monitor body changes over time for either medical or fitness purposes. Simulation technologies enable digital human models to be virtually dressed in digital attire to provide a realistic visualization of garment fit. However, improvements in digital fabrics/materials have resulted in the proliferation of modeling algorithms across industries that do not necessarily share common terminology and technical standards.

3D body scanning also provides advantages over manual measurement; being quick, direct and contactless measurement, making it particularly suitable large sample sizes and atypical populations studies. Thus, allowing for the retrospective or immediate analysis of data, the ability to produce a digital representation over time, and for human shape analysis that is unattainable manually.

If human body models are to be used successfully in the apparel and footwear industries, several opportunities must be realized. Privacy and security must be implemented at the consumer level and be assured. The interchange of digital information through different digital formats must be done at the programming level and be supported by standard APIs. Thus far, the complex non-linear geometry of pose-dependent clothing shapes, details of material properties and how material interacts with the model is not fully understood and must be further refined.

The 3DBP IC has six subgroups: File Formats and Metadata; Quality; Communication, Security and Privacy (CSP); Footwear; Mega Technology Trends; and Fit. Part 2 of this column will have more details on the subgroups' work. The 3DBP IC works in conjunction with the IEEE P3141 Standard for 3D Body Processing as part of the IEEE Consumer Electronics Society (CES). This standard addresses the fundamental attributes that contribute to 3D body processing quality of experiences as well as identifying and analyzing existing metrics and other useful information relating to these attributes.

REFERENCES

[1] IEEE 3DBP IC Working Group, https://standards.ieee.org/industry-connections/3d/bodyprocessing.html, Last accessed on 03 May 2020.

Carol McDonald is co-owner of Gneiss Concept, consultancy in USA. Contact her at carol@gneissconcept.com

Randy K Rannow is Director of Engineering at Silverdraft Super Computing in USA. Contact him at randy@silverdraft.com

Dinesh Pai is Founder and CEO of Vital Mechanics and a Professor and Research Chair at University of British Columbia, Canada. Contact him at pai@vitalmechanics.com

Alice Bullas is a Research Follow with the Sports Engineering Research Centre, Sheffield Hallam University, UK. Contact her at a.bullas@shu.ac.uk

Alfredo Ballester is Product Manager & Researcher at Instituto de Biomecánica, Universistat Politècnica de València, Spain. Contact him at alfredo.ballester@ibv.org