Conclusion

Utilizing 3D simulation software to assess garment fit accurate avatars of the target group are the foundation. Current default system avatars still show limitation. Therefore, a new method to generate rigged avatars was developed. The movement generated by the rig, extended by the scans results in a more precise surface representation than that generated in the current state in the simulation programs. The cause of fitting problems can be investigated and repaired more easily. Another problem of fitting in motion is the self-intersecting of the surface in certain poses. The adjacent geometries around the joints overlap so much that a qualitative statement about the fit is not possible. Unfortunately, the interpolation of the targets is still linear now, this can lead to the motion path passing close to another bone. In upcoming studies, it will be investigating how the motion paths of the targets can be manipulated in a way that a self-penetration is not allowed. The created poses and changes on the surface caused by the angles of the bones to each other are collected in a library. The movements and poses can be freely combined with each other and adapted for every situation of a fit.

The data sets can, for example, be structured according to age or occupational group. In this way it is possible to influence which person performs each movement and how the speed and motion path of the movement changes as a result.

The circumference values measured in the method are an important part of the investigation of the change in body shape during movement. In future investigations the length differences will be measured and compared. These data can support the design of functional clothing and lead to better results. These can be tested immediately in the digital environment on the generated movement.

References

[1] S. Jevšnik, Z. Stjepanovič, A. Rudolf, "3D Virtual Prototyping of Garments: Approaches, Developments and Challenges", Journal of Fiber Bioengineering & Informatics **2017**, 10, 51-63.

[2] E. Lapkovska, I. Dabolina, "An investigation on the virtual prototyping validity - simulation of garment drape ", 4, **2018**.

[3] J. Lee, Y. Nam, M. H. Cui, *et al.*, in Secondary "Fit Evaluation of 3D Virtual Garment", (Ed.:^(Eds.: Springer Berlin Heidelberg, Berlin, Heidelberg, **2007**, 550-558.

[4] H. K. Song, S. P. Ashdown, "Investigation of the Validity of 3-D Virtual Fitting for Pants", Clothing and Textiles Research Journal **2015**, 33, 4, 314-330.

[5] https://www.linkedin.com/posts/clo-virtual-fashion-inc-_clo-clo3d-itsclo3d-activity-6688790000223436801-c7ud, 10.09.2020.

[6] S. Morlock, J. Keinath, "Virtual Designing and Fitting – 3D Simulation in Clothing Development", Performance Days, München (D), **2019**.

[7] A. S. M. Sayem, " Virtual fashion ID: a reality check", IFFTI Conference, 8 -11 April 2019, Manchester Fashion Institute, Manchester (GB), **2019**.

[8] S. Krzywinski, E. Wendt, A. Leipner, *et al.*, "Kinematische Menschmodelle zur Produktentwicklung von Bekleidung (Kinematische Menschmodelle)", IGF 17355 BG/1, Dresden, Hohenstein, **2014**.

[9] S. Morlock, "Entwicklung einer neuen HAKA-Grundschnittkonstruktion zur Umsetzung der Funktionsmaße in bewegungsoptimierte Bekleidungsprodukte (unpublished Project Proposal)", IGF Nr. 19912N, Hohenstein Institut für Textilinnovation gGmbH, Hohenstein, **2017**.

[10] A. Klepser, "Grundlagenuntersuchung zur Erschließung der 4D-BodyScanner-Technologie für die Analyse bekleidungsbedingter Mobilitätsrestriktionen (unpublished Project Proposal)", IGF Nr. 20163N, Hohenstein Institut für Textilinnovation gGmbH, Hohenstein, **2017**.

[11] I. Baran, J. Popovic, "Automatic rigging and animation of 3D characters", ACM Transactions on Graphics (SIGGRAPH 2006),25(3) **2007**, 26, 3,

[12] S. Morlock, C. Lörcher, A. Schenk, "Entwicklung eines ergonomisch- und bewegungsorientierten Größensystems für Funktionsmaße zur optimierten Gestaltung von Berufs- und Schutzbekleidung. Laufzeit 1.1.16 bis 30.06.18", IGF Nr. 18993N, Hohenstein Institut für Textilinnovation gGmbH, **2018**.