Master internship subject

Garment Factory: Some tasks involving the garment-pattern manipulation

Hosting institute

ICube Laboratory (The Engineering science, computer science and imaging laboratory) at the University of Strasbourg is a leading research center in Computer Science, with more than 300 permanent researchers, with the recently opened AI graduate school supported by the French government.

Work place and salary

The internship will take place in the MLMS (Machine Learning, Modeling & Simulation) research team of the ICube laboratory (The Engineering science, computer science and imaging laboratory) of the University of Strasbourg, a leading research center with more than 300 permanent researchers. The workplace is located on the hospital site of the laboratory, a 10-minute walk from the heart of downtown Strasbourg, listed as a UNESCO World Heritage Site.

650 euros net monthly

Supervisors

– director: Hyewon Seo (CNRS Research director, ICube laboratory, Univ. Strasbourg)

– co-supervisor(s): Boyang Yu (Postdoctoral researcher, ICube laboratory, Univ. Strasbourg)

Staring date

January 2025 – March 2025 (depending on the nationality of the candidate).

Description

The ability to generate simulation-ready garment digital twins from 3D shapes of dressed people has a wide range of applications in virtual try-on, garment reverse engineering, and social AR/VR. It will allow, from the retrieved garment models, to obtain new animation, or to better capture and interpret subsequent garment geometry undergoing deformation. Recent years have witnessed the significant progress, particularly in learning-based techniques [1, 2] and differentiable simulations [3, 4].

We observe that an increasing number of methods utilize 2D patterns as intrinsic representations of 3D garments, independent of extrinsic factors such as forces, collisions, and fabric properties. Additionally, this approach is parameterizable, and conforms to the standard garment modeling processes used in both the fashion industry and cloth simulation software. It has also been adopted in our recently developed inverse garment and pattern recovery system [3], which is capable of faithfully replicating a given 3D geometry and recovering 2D patterns from a target 3D scan of a dressed person.

In this internship, we will develop certain functions related to 3D garment manipulation and its associated 2D patterns, adding new features to our previously developed garment modelling software. The focus will be on developing dedicated functions to ensure coherent interactions between 2D panels and their corresponding 3D garment meshes. This includes task such as estimating 2D patterns via flattening 3D

patches, parameterization of 2D panels through remeshing and curve fitting, and adjusting 3D garment meshes based on the modification of their 2D panel counterparts, etc. The results produced by this software will serve as input to our inverse garment and pattern modeler and vice versa, creating a synergistic workflow.

Candidate profile

- Master degree in Computer Science
- Solid programming skills: Python/C++
- Background in Computer Graphics and Geometric Modeling
- Experience with CG softwares (Blender)
- Working communication skills

Application

Send your CV and academic records (Master) to seo@unistra.fr, for (a) possible interview(s).

Bibliography

1. Korosteleva, M. et Lee, S.-H. (2022). Neuraltailor: reconstructing sewing pattern structures from3d point clouds of garments. ACMTransactions on Graphics (TOG), 41(4):1–16.
2. Liu, L., Xu, X., Lin, Z., Liang, J., et Yan, S. (2023). Towards garment sewing pattern reconstruction from a single image. ACM Transactions on Graphics (TOG), 42(6):1–15.
3. Yu, B., Cordier, F. and Seo, H. (2024), Inverse Garment and Pattern Modeling with a Differentiable Simulator. Computer Graphics Forum, 43: e15249. https://doi.org/10.1111/cgf.15249
4. Li, Y., Chen, H.-y., Larionov, E., Sarafianos, N., Matusik, W., et Stuyck, T. (2024c). DiffAvatar: Simulation-ready garment optimization with differentiable simulation. In Proc. IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR).