# 3D design of ancient garments

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**Duration:** 6 months

## Context

This internship proposal is part of e-Roma (a joint project with Univ Lyon 1 and the Lugdunum, a former Gallo-Roman museum) whose goal is to increase the attractiveness of antique history for the general audience by bringing to life antique statues and engravings. More specifically, we are interested here in modeling draped garments such as togas that are often seen on Roman characters in order to create realistic animation of antique scenes.



Figure 1: ancient statues and bas reliefs with draped garments

Dressing up a virtual character is not an easy task, and usually involves a combined handling of 2D patterns, 3D modeling and sketch-based reconstruction techniques. Cloth simulation, which computes the deformed state of a piece of cloth when subject to gravitational and contact forces, may further improve physical realism.

3D garment design [5] is an important research area in computer graphics with many applications in fashion design and manufacturing, virtual dressing rooms (try-on) or clothing and animation of virtual characters, and it is now common practice to design and dress a character with common garments, such as t-shirts, pants, dresses and jackets. However, it is still a challenge to deal with draped garments with complex wrinkles and folds [1,2]. Indeed, using physical simulation to model folds requires appropriate 2D patterns and initial drape, neither of which can be easily provided by the user. Recent fold sketching systems [3,4] and cloth simulation with fine wrinkles generation made considerable progress.

## Research goal

In this internship we want to develop a method for dressing a virtual character with draped garments, but which are not worn as a t-shirt or dress. Instead, we will focus on ancient Roman togas, as shown in Figure 2, which are not trivially warped around the body and exhibits complex fold patterns. One possible approach, that we plan to investigate, is to combine procedural modeling and cloth simulation.
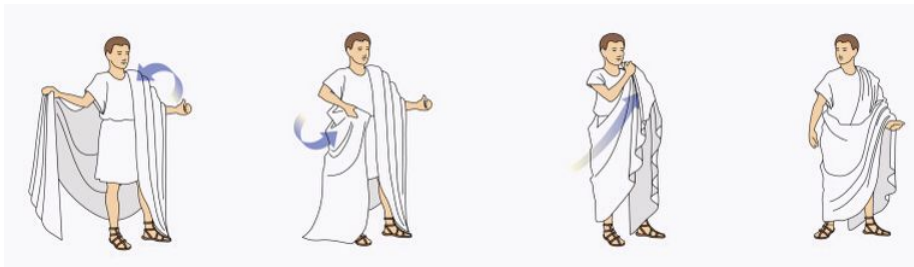


Figure 1: The **toga**, a distinctive garment of Ancient Rome, was a roughly semicircular cloth, between 3.7 and 6.1 m in length, draped over the shoulders and around the body.

## Keywords

Garment design, 3D geometric modeling, folded surfaces, cloth simulation.

## Information for applicants

The internship will take place in the IMAGINE team at INRIA Grenoble (Montbonnot).

Please send your complete CV to Mélina Skouras (melina.skouras@inria.fr) and Stefanie Hahmann (stefanie.hahmann@inria.fr). Feel free to contact Mélina Skouras and Stefanie Hahmann for any further information about the internship.

## References

[1] ARCSim: Adaptive Refining and Coarsening Simulator
http://graphics.berkeley.edu/resources/ARCSim/

[2] Jie Li, Gilles Daviet, Rahul Narain, Florence Bertails-Descoubes, Matthew Overby, George Brown, Laurence Boissieux. An Implicit Frictional Contact Solver for Adaptive Cloth Simulation, ACM SIGGRAPH 2018. http://www-users.cselabs.umn.edu/%7Elixx4611/contact_friction.html

[3] M. Li, A. Sheffer, E. Grinspun, N. Vining, FoldSketch: Enriching Garments with Physically Reproducible Folds, ACM Transactions on Graphics (Proc SIGGRAPH), 2018.

[4] Amaury Jung, Stefanie Hahmann, Damien Rohmer, Marie-Paule Cani, Antoine Bégault, Laurence Boissieu, Sketching Folds: Developable Surfaces from Non-Planar Silhouettes.  ACM Transaction on Graphics (TOG) 34 (5), p.155:1–155:12, (2015).

[5] Liu, Zhang, Yuen, A survey on CAD methods in 3D garment design, Computers in Industry 61 (2010) https://www.researchgate.net/publication/222526158_A_survey_on_CAD_methods_in_3D_garment_design