Realistic 3D Simulation of Garments (Abstract)

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The target of the presented work is to allow a future client to buy a garment directly by INTERNET. He/she will have the possibility to choose the garment, its material and to see himself/herself in 3D, wearing the garment he/she will have not yet bought on a simple PC screen.

The presentation will be restricted to the case of Warp/Weft materials.

Our target is to produce realistic 3D simulations; it is a necessary condition for their commercial use. Garments have to correspond exactly to the style that a future client will have chosen and the rendering of textile material, which is strongly influenced by its mechanical property, has to be realistic as well.

We will first concentrate on the mechanical properties of warp/weft materials and describe Kawabata's results on the characterization of such textile. Kawabata's results are summarized by his famous K.E. S that will also be discussed. The most important outcome of his work is that he proved that textile material has a non linear hysteretic behaviour. It is fundamental to incorporate those properties to a realistic material model.

We will first describe the overall technique used to produce a 3D mannequin wearing a specific garment constructed from a set of 2D patterns of the type of the 2D patterns employed to create the real garments.

We will then describe the mass/spring model used to model realistically the mechanical behaviour of textile and how it is mapped on each 2D pattern.

We will then discuss a technique allowing the automatic pre-positioning of the 2D patterns around the body and how these 2D patterns are sewed

We will finally present the procedure used to animate the global mass/spring system in order to produce the garment evolution around the body. The results of the validation of our choice of non linear mass spring system will be shown.

Some details will be given regarding collision detection and the response of the system in case of collision as well as regarding our technique implementation. In conclusion, we will discuss the remaining problems and our envisioned extensions.

Some videos showing various garment simulations on a numerical mannequin of a real person (obtained by a 3D scanner) will close the presentation.

About the author

André Gagalowicz is a scientific leader of the MIRAGES team, Rocquencourt research unit of INRIA.

http://www.inria.fr/recherche/equipes/mirages.en.html