COMPUTER GRAPHICS AND THE FASHION INDUSTRY

Extended Summary

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Abstract

This paper examines the role of computer graphics and new media technologies in the fashion industry. The three phases of computer graphics application are:

(1) *Design/Visualization*,
(2) *Pattern Creation/Manufacturing*, and
(3) *Presentation/Promotion*.

This paper focuses on the third application, illustrating some of the new directions in computer graphics and fashion with examples of the author's work in fashion videos and interactive systems.

KEYWORDS: fashion design, pattern CAD/CAM, stereoscopic, fashion video.

Introduction

Computer graphics has made its impact on most fields which entail design and imaging: movie and television special effects, computer-aided design and manufacturing, computer-aided engineering, molecular design, medical imaging, seismic analysis for oil prospecting, as well as on video-games and flight simulators. One design field for which the assimilation and creative use of computer graphics still poses a challenge is the fashion industry. Computer imaging systems are being applied in three areas: *Design*, *Manufacturing*, and *Presentation*.

The fashion industry is built around a process of producing a new look. The fashion business is an unending visual modification of the definition of society and its image. Ironically, its link to one of the newest image making media is not implicit. The motivation for using computer graphics systems is clearly defined only in the manufacturing phase: to obtain the advantages of an automated system. In the design and presentation phases, it is not yet evident that the computer medium can enhance production and creativity. In these areas, traditional methods are neither easily simulated nor improved. This paper gives an overview of some applications of new media technology in the fashion industry. An emphasis is given to the final phase; examples from the author's work are included to demonstrate how computer graphics animations can generate an immediacy and capture the imagination in a way which is true to fashion.

Design / Visualization

The computer is a natural medium for the mass production of perspective images; this makes it an effective tool for engineering and architectural design. Garments however are characterized by neither rigid surfaces nor simple geometrical construction.

To accurately model a garment requires a data format that can represent flexible materials and the effects of physical forces such as gravity and surface tension. Hierarchical solid modeling operations are one technique for simulating twisting, bending, tapering and other such transformations of objects. "Deformations" [1], a form developed by Alan Barr, can be used to simulate flexible geometric objects made of fabric. This technique obtains a normal vector of an arbitrarily deformed smooth surface that can be calculated directly from the surface normal vector of the undeformed surface and a transformation matrix. The deformations are combined in a hierarchical structure.

Furthermore, from the level of detail of fiber and fur to a pattern on a fabric, modeling a garment requires sophisticated techniques such as texture synthesis and stochastic modeling [2]. Patterns on flat fabric can be texture mapped onto the curved surface of the constructed garment [3]. Also, methods are being created to warp the surface of an analytically defined object [4].

The jacket design for a computer generated character, *User Abuser*, demonstrates a method developed at the Computer Graphics Lab, NYIT, for creating a realistic three-dimensional model of a garment. The jacket was modeled as a non-closed surface defined by polygons in a mesh format. This format consists of a list of 3d vertex coordinates, with normals and texture coordinates, topologically connected into a grid with a certain number of rows and columns [5].

One of its most important features is flexible joints at the shoulders and elbows, modeled with flex software by Richard Lundin [6]. These are necessary to correctly deform the surface when rotations are