Console: Guest Editors’ Introduction: Sketch-Based Interaction
Takeo Igarashi and Bob Zeleznik

28 Sketch Interpretation Using Multiscale Models of Temporal Patterns
Tevfik Metin Sezgin and Randall Davis
The growing popularity of tablet PCs and intelligent pen-based interfaces have increased the importance of freehand sketch recognition algorithms as enabling technology. A recognition framework based on multiscale statistical models of temporal patterns significantly increases correct recognition rates, with no added computational penalties.

38 Advances in Mathematical Sketching: Moving Toward the Paradigm’s Full Potential
Joseph J. LaViola Jr.
MathPad2 is a Tablet PC-based application that lets users create and explore mathematical sketches, graph functions, evaluate expressions, and solve equations through an easy-to-use interface. This article describes the work done with MathPad2 thus far and presents recent advances toward realizing mathematical sketching’s full potential to aid in mathematical problem solving and visualization.

50 Free-Form Sketching of Self-Occluding Objects
Frederic Cordier and Hyewon Seo
When 3D objects occlude each other or self-occlude, their drawings typically consist of a set of contours that might partially overlap or self-overlap. The authors’ method infers the hidden parts of contours and creates a smooth 3D shape matching those contours by solving a set of optimization problems.

60 Sketch-Based 3D-Shape Creation for Industrial Styling Design
Levent Burak Kara and Kenji Shimada
This article describes a pen-based modeling system for the styling design of 3D objects. The authors tailored toward the rapid and intuitive design of styling features such as free-form curves and surfaces. Basic wireframe and surfaces are constructed and modified using the strategy of curve creation, curve modification, surface creation, and finally surface modification.

72 A Sketch-Based Interface for Clothing Virtual Characters
Emmanuel Turquin, Jamie Wither, Laurence Boissieux, Marie-Paule Cani, and John F. Hughes
This interactive system for garment creation determines a garment’s shape and how the character wears it based on a user-drawn sketch. The system then uses distances between the 2D garment silhouette and the character model to infer remaining distance variations in 3D.

Cover art: Michael Sussna
**Feature Article**

**82 Using a GPU to Accelerate Die and Mold Fabrication**
*Masatomo Inui and Atsushi Ohta*

The authors present a GPU-based method for generating and verifying cutter paths for numerically controlled milling. A CAM system based on this technology is now employed in production at Mazda Motor Corporation for manufacturing stamping dies. This system can compute cutter paths more than 20 times faster than previous methods.

**Departments**

4 **About the Cover**
Vamping on Ultrafractal

6 **Special Thanks to CG&A’s Reviewers**

9 **Applications**
FieldVis: A Tool for Visualizing Astrophysical Magnetohydrodynamic Flow

14 **Projects in VR**
Physically Based Sound Synthesis for Large-Scale Virtual Environments

20 **Visualization Viewpoints**
Dynamic Sharing of Large-Scale Visualization

90 **Graphically Speaking**
The Digital Chameleon Principle: Computing Invisibility by Rendering Transparency

97 **Tools and Products**

100 **Jim Blinn’s Corner**
How to Solve a Cubic Equation, Part 4: The 111 case

Computer Society Information, p. 49
Advertiser/Product Index, p. 89