

A Sketch-Based Interface for Clothing Virtual Characters

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Outline

- Problem Description
- Related Work
- Overview of System
- Algorithm Details
 - Five step process
- Results
- Conclusion

Problem: Clothing Characters

- Pen-based interfaces offer a new way of approaching problems
- A large variety of fields have been explored such as mathematical equations, graphic design, video games
- The area we are discussing is the manipulation of fabric and clothing on virtual characters

Problem: Clothing Characters

- This area can be divided into two real world problems which such a system could be applied:
 - Design of real clothing on a computer and translation to a real clothing pattern
 - Design of clothing for a virtual character for video games and animated movies

Clothing Design for Patterns

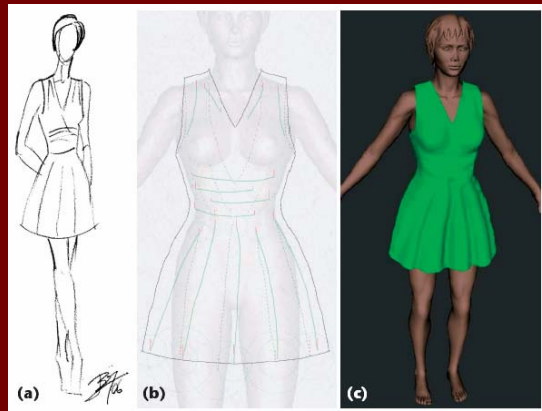
- Current software packages require vast knowledge of traditional pattern making
- Lots of mathematical knowledge required to correctly measure the pieces
- Requires knowledge of what the user is creating prior to work
- Incredibly expensive and inefficient

Clothing Design for 3D Graphics

- Requires knowledge of 3D design programs
- Can be difficult for artists to learn
- Often a body and clothes created as same object

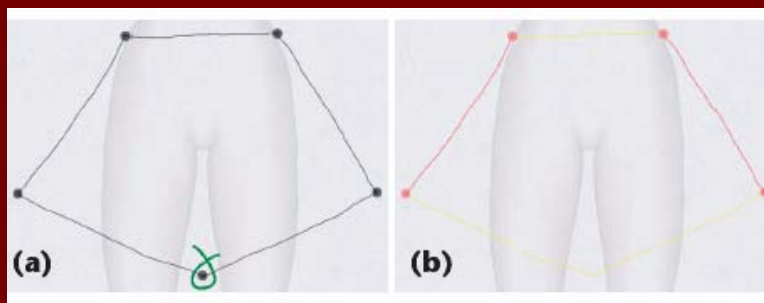
System Overview

- Translates user strokes and gestures from 2D to 3D



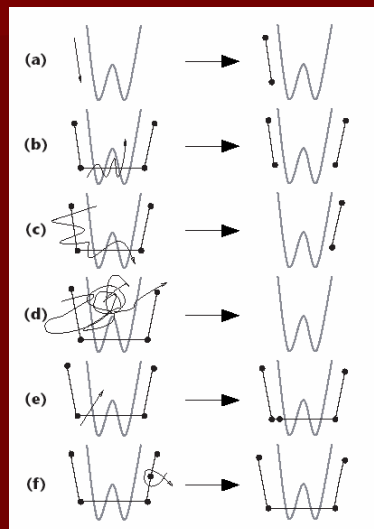
Contour Mode

- User strokes define a shape
- Divided into border and silhouette lines by break points



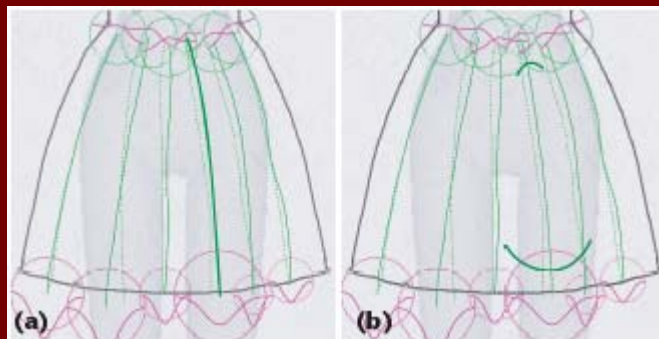
Contour Mode Gestures

- (a) Add Segment
- (b) Delete
- (c) Delete Several
- (d) Clear All
- (e) Add Breakpoint
- (f) Delete Breakpoint



Folding Mode

- User draws fold lines
- U-shaped gestures crossing each fold line determine fold width



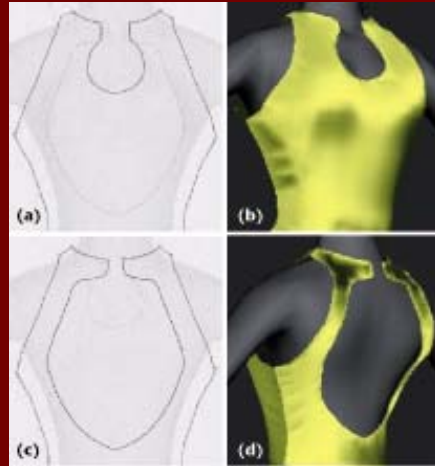
Other Modes

- Front and Back Mode

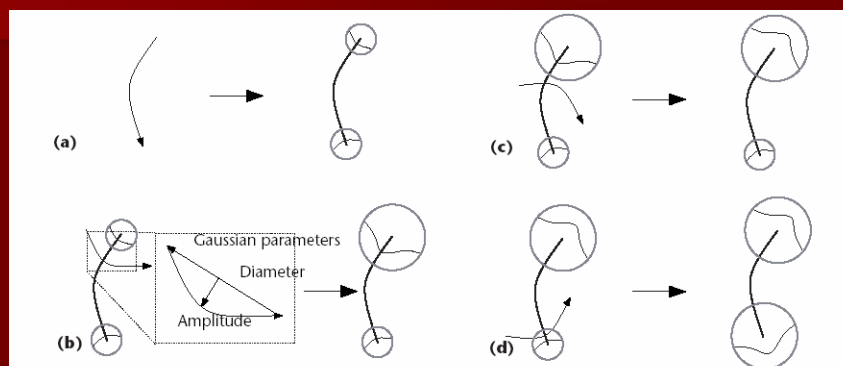
- Other view represented using dashed lines

- Vertical Symmetry Mode

- Mirrors strokes on opposite side



Folding Mode Gestures



7 Folding mode gestures. The system draws new strokes using arrows. (a) Adding a fold (by default, a valley). (b) Modifying the fold's profile at one end (the closest to the intersection). The shape of the user's stroke defines the fold's amplitude and width. A stroke that's convex with respect to the fold's endpoint results in a valley while (c) a concave stroke results in a ridge. (d) By changing the fold's other extremity, the user creates a pure ridge.

Finished Render

- System renders the sketch as a 3D object



Algorithm Overview

- Step 1: Process 2D Sketch
- Step 2: Create 3D Positions
- Step 3: Generate Interior Shape
- Step 4: Integrate Fold Gestures
- Step 5: Tessellate Grid with Triangles

Step 1

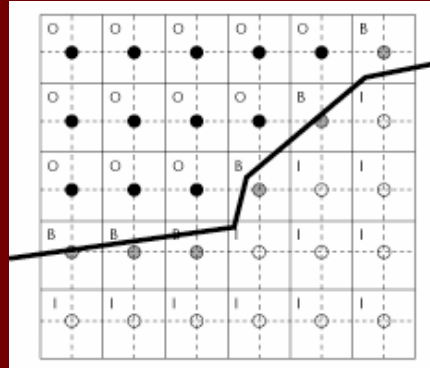
- Find breakpoints and split into segments
- User adds and/or deletes breakpoints
- Classify segments as borderlines or silhouette lines

Step 2

- For each breakpoint on a silhouette
 - Find closest distance d to the body
 - Set the point's depth z to d
- For each silhouette line
 - Interpolate z linearly over the line interior
 - Compute d values from z
- For each borderline
 - Linearly interpolate d
 - Set z from d

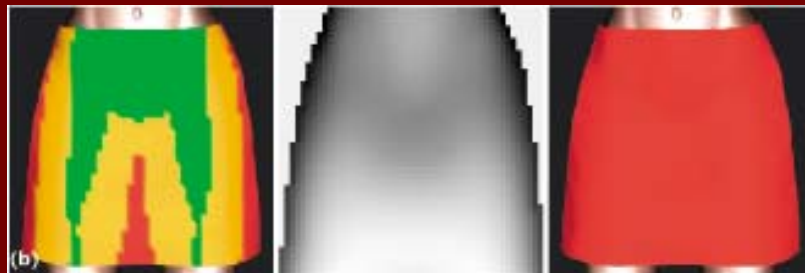
Step 3

- Create a mesh of points within 2D closed curve
- Extend d-values over interior
- For each interior grid point
 - Determine z value using d



Step 3

- Adjust for garment tension
 - Precomputed body mask
 - Bezier curves infer z-values



Step 4

- For each fold stroke
 - Determine grid points intersecting fold
- For each intersected point
 - Linearly interpolate radius and amplitude
- Evaluate Gaussian within pixel neighborhood
- Apply displacement map to z-values

Step 5

- Tessellate the grid with triangles
- Render



Conclusions (Positive)

- Intuitive design of gestures works well for users of any experience level
- Variety of additional functions that could be added
- First to try using a gesture system in this problem domain
- Paper claims each drawing takes less than five minutes

Conclusions (Negative)

- Final creation of garments is unrealistic
 - No gravity simulation
- Results section is weak
 - No concrete user testing
 - No statistics or feedback from users

Thank you!

Any questions?