# Tactile Images for 3D Shapes
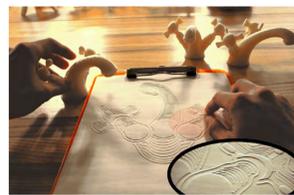
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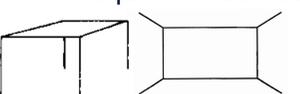## RELATED WORK

- Stylized Fabrication [2] [3]

- Non-Photorealistic Images [1] [4]

- Multi-Projection Rendering [5] [6]

## PROBLEM

**Tactile Images,** raised line drawings that are used by the blind for access to visual information and are ineffecient in conveying 3D shapes.

## BACKGROUND MATERIAL

- Non-Photoreqalistic Tactile Images [7] [8]

- Guidelines and Standards for tactile graphics Braille Authority of North America (BANA), 2010
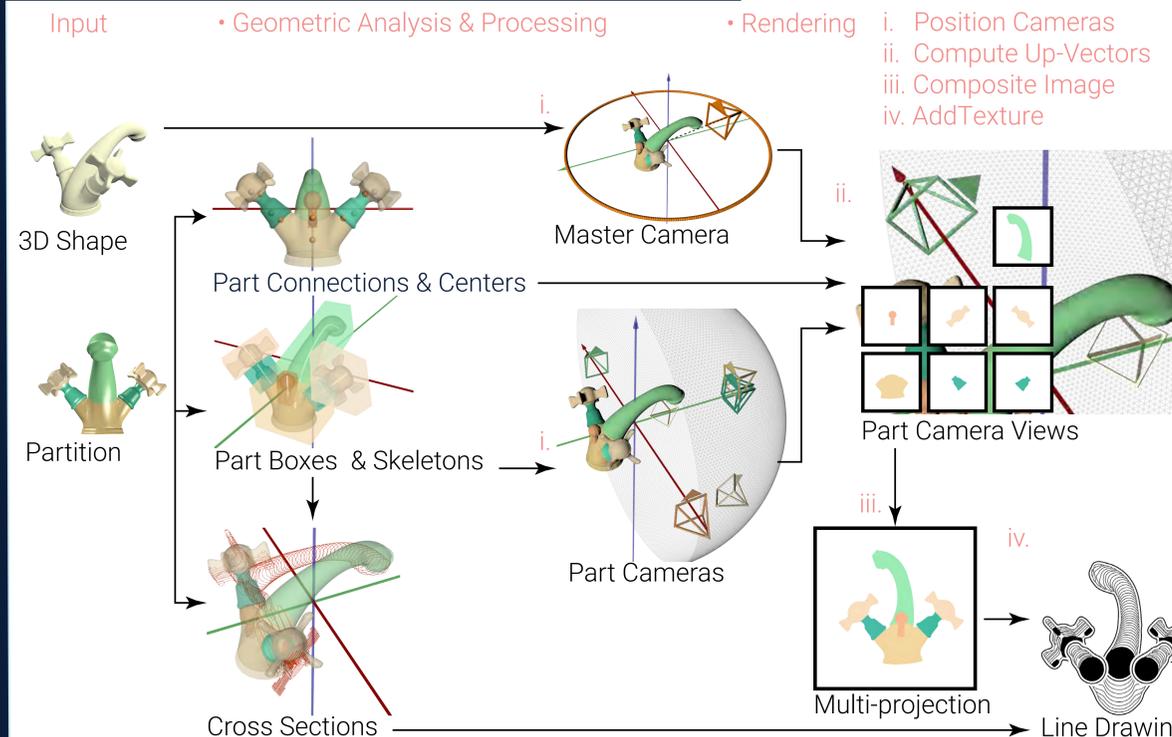
Input Image  |  Semantic Textures  |  Element Enlargement  |  Canonical Views

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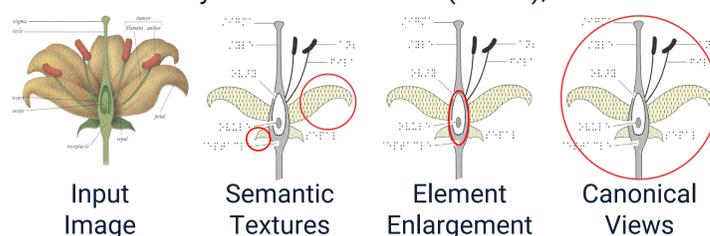
Tactile Images can be improved to convey shape information. Using our design, the mean success rate for our dataset was doubled.
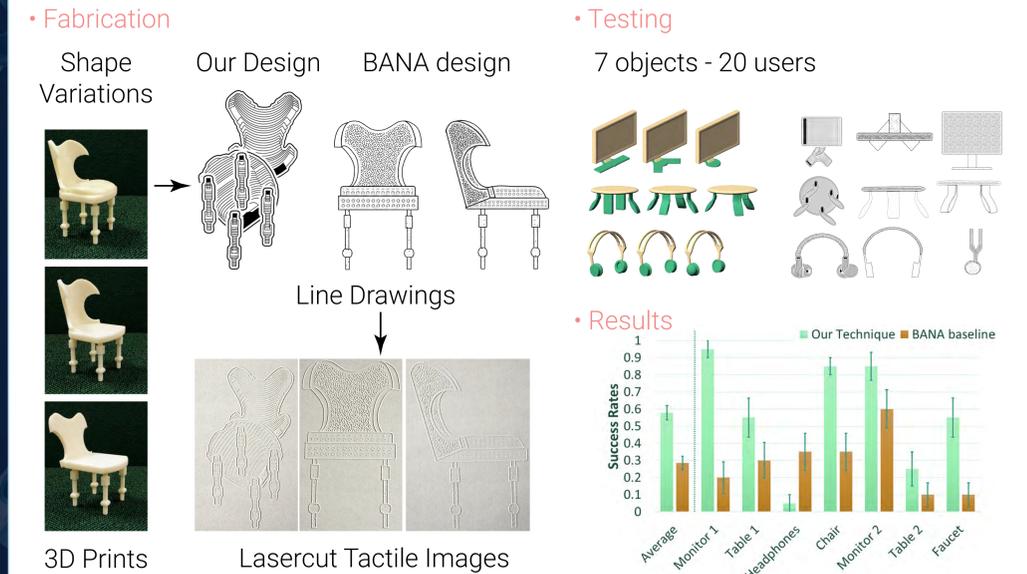
## OUR APPROACH

### (A) FORMATIVE STUDIES

- Clay building

  Key information:
  - Distinct Pieces
  - Topology
  - Flat Vs Curved
  - Cross Sections

- Tactile Image exploration

  Problems in design:
  - Multiple images
  - Non canonical part viewpoints
  - Occlusion of parts
  - No indication of curvature

### (B) MULTI-PROJECTION LINE RENDERING

Input · Geometric Analysis & Processing · Rendering

i. Position Cameras
ii. Compute Up-Vectors
iii. Composite Image
iv. AddTexture

3D Shape → Part Connections & Centers → Master Camera

Partition → Part Boxes & Skeletons → Part Cameras → Part Camera Views

Cross Sections → Multi-projection → Line Drawing

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### (C) Test Study "Which object best resembles the image?"

- Fabrication

Shape Variations → Our Design / BANA design

Line Drawings

3D Prints  |  Lasercut Tactile Images

- Testing

7 objects - 20 users

- Results

Our Technique | BANA baseline

(bar chart — Success Rates, categories: Average, Monitor 1, Table 1, Headphones, Chair, Monitor 2, Table 2, Faucet)

## REFERENCES

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Download the Full Paper: https://shape.bu.edu/tactile

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