

# Virtual Draping with Fabric Mechanics and Body Scan Data

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## OBJECTIVE

- To develop methods for accurate virtual 3D draping of apparel on a digitized 3D human body considering variations in fabric mechanical properties
- Understand how variations in fabric mechanical properties can be incorporated into virtual simulations via examination of simple forms progressing to representation of apparel items on the body

## RESEARCH APPLICATIONS

- The ability to simulate apparel drape virtually would facilitate the design process & potentially result in;
- Enhanced communication ability, higher product success rates and
  - Reduced quantities of incorrect product produced

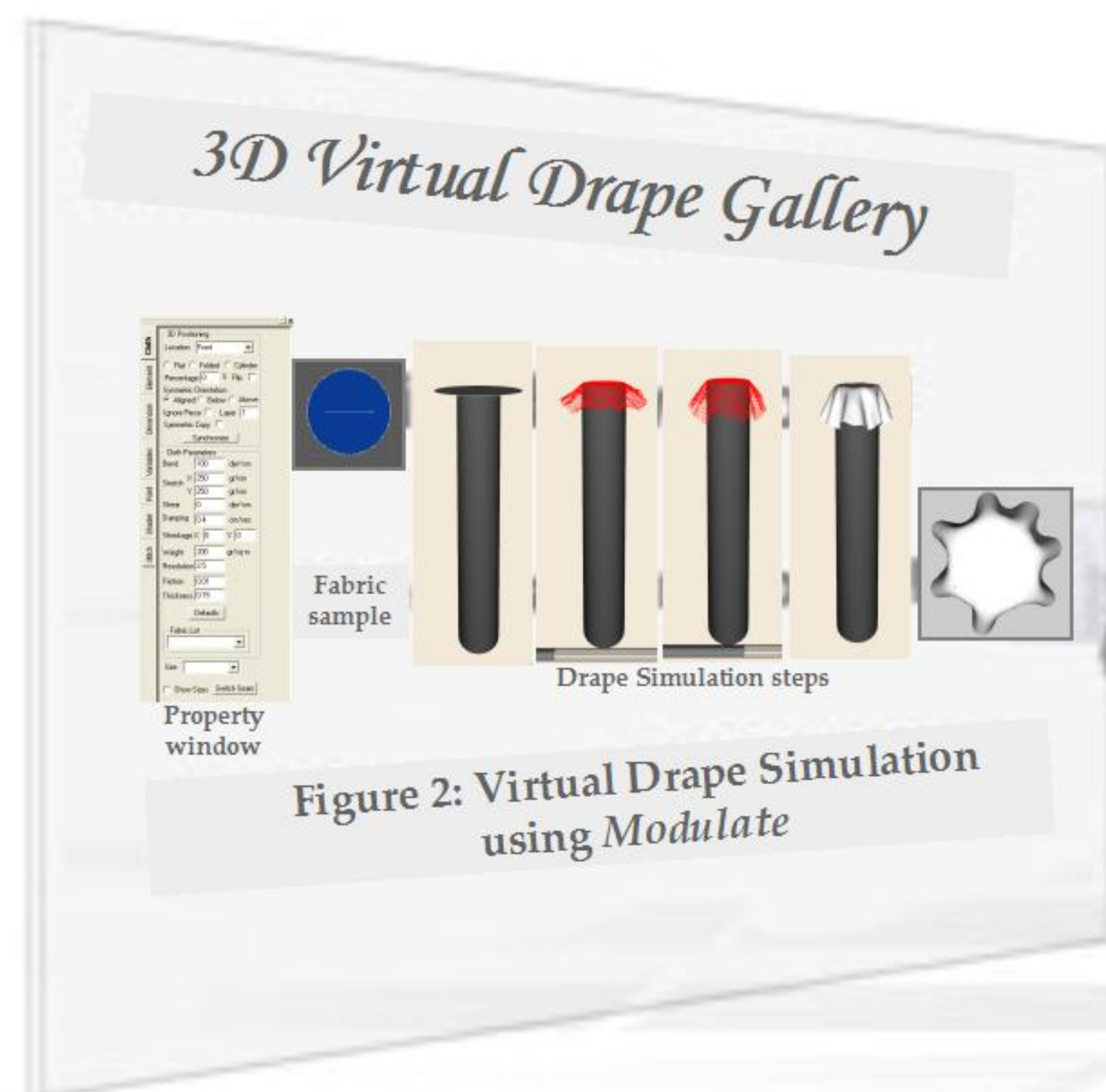


Figure 2: Virtual Drape Simulation using Modulate



Figure 3: Actual Drape Using Body Scanner

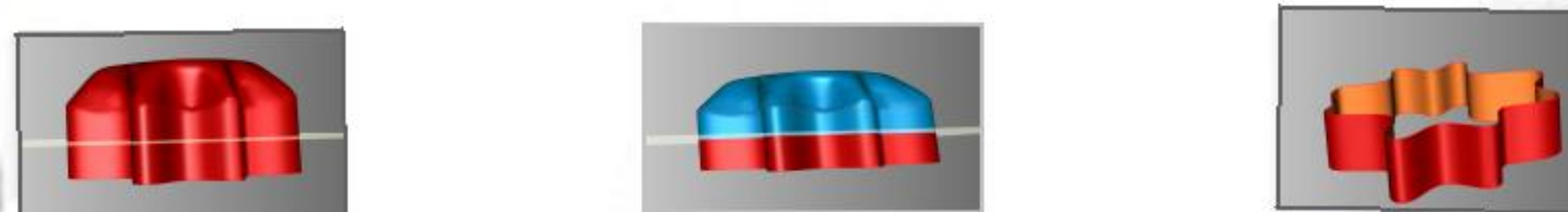


Figure 4: Processing Image Using Geomagic Software

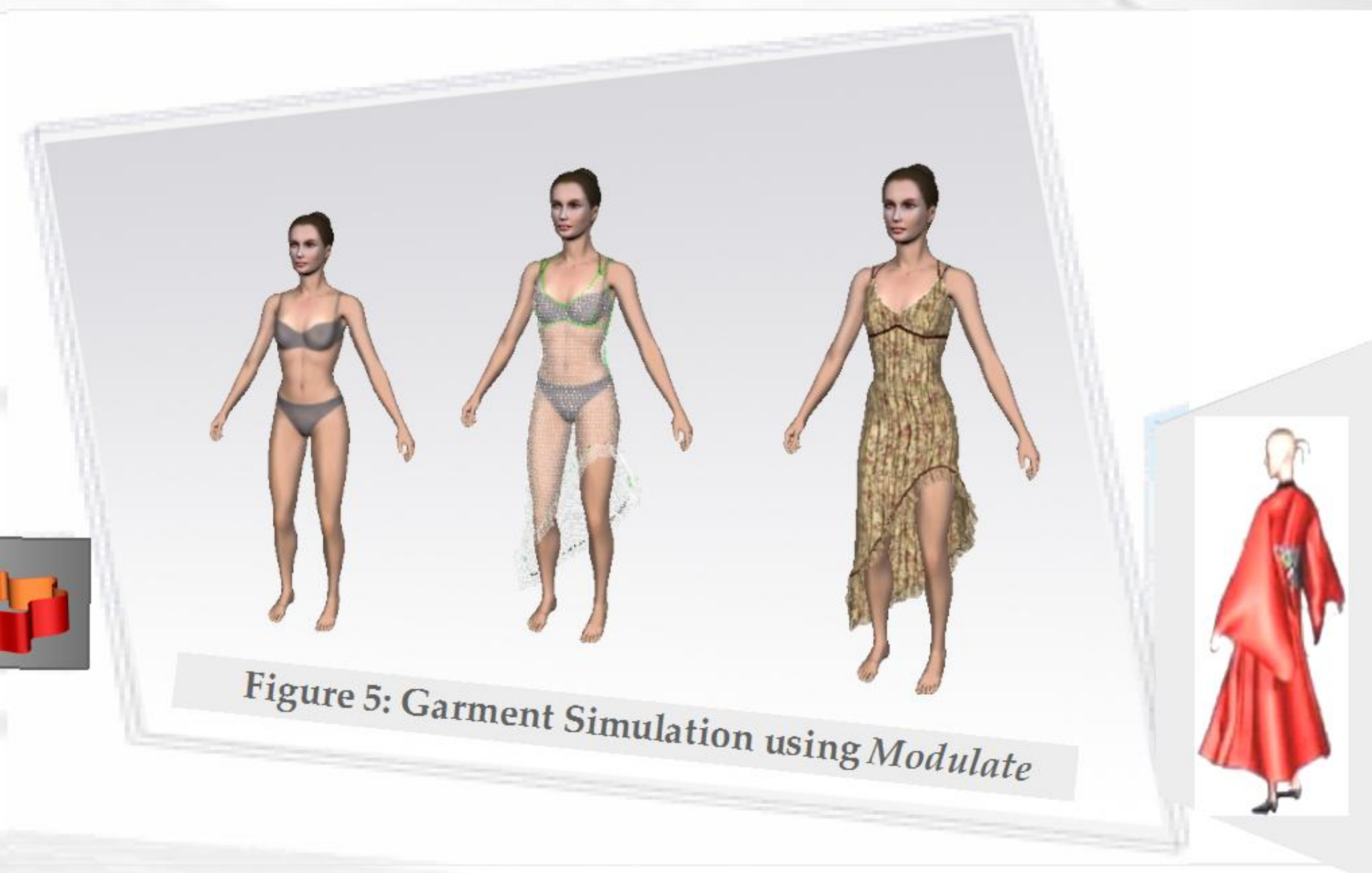


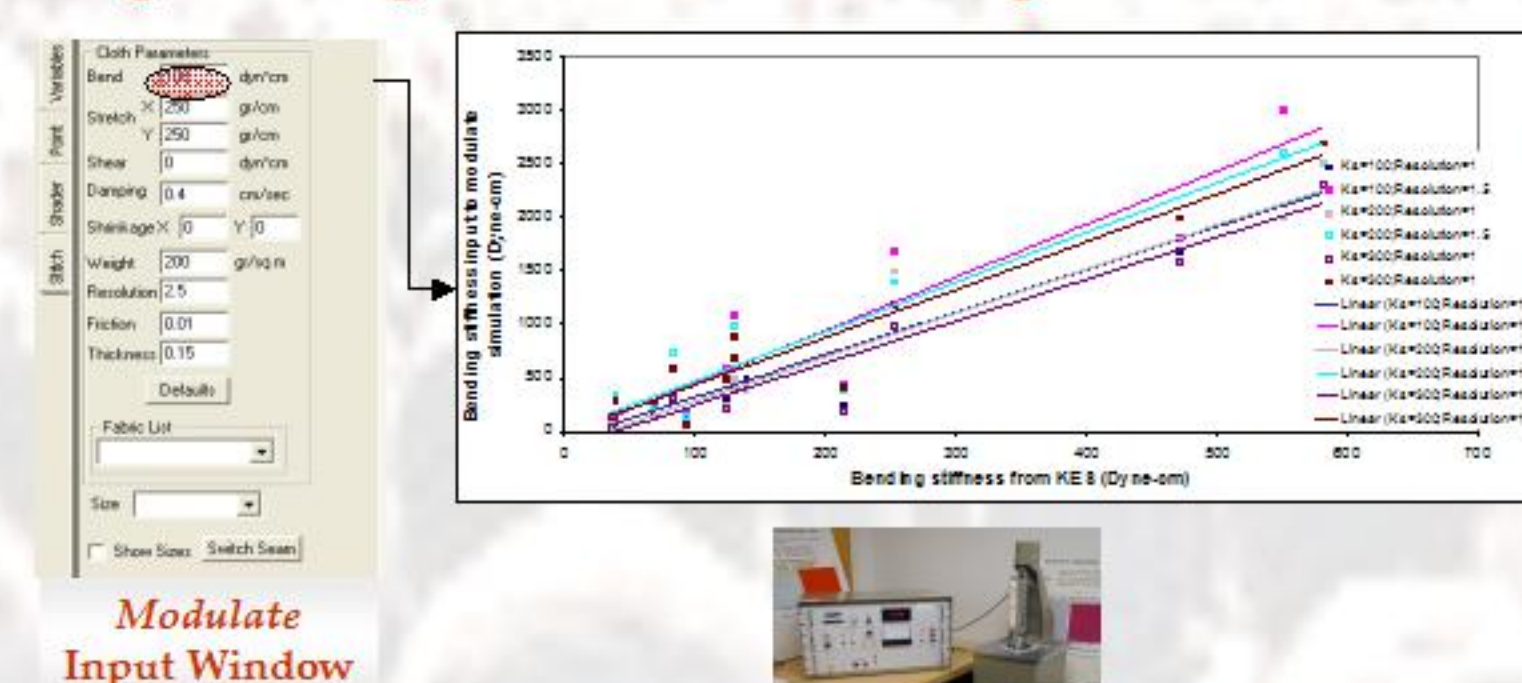
Figure 5: Garment Simulation using Modulate

## METHOD

- Tensile, shearing, bending and surface property measurements from FAST & KES effect drape of fabrics and are used in the Modulate simulation
- Fabric images from the Modulate software (Figure 2), The Cusick Drapemeter & Three-dimensional body scanning (Figure 3) were used to evaluate the simulations by measuring & comparing the accuracy based on devised metrics
- The simulated images were characterized using Geomagic software to allow comparison with the experimental drape shape (Figure 4)
- Modulate and 3D scanning results were used to optimize the fabric property input to produce the best simulation
- Representation of fabric mechanics in 3D virtual draped forms fit to a digitized form is evaluated on simple form and then proceed to garment stage (Figure 1)

## RESULTS & DISCUSSION

### Curves relating bending stiffness of cloth to particle model bending stiffness



Plots relating bending stiffness of the cloth derived from Kawabata Tests and bending stiffness input to the Modulate software were developed by comparison of drape of circular fabrics with the simulation based on criterion derived from repeatability tests.

The criterion for comparison are ;

- Simulated drape coefficient within  $\pm 10\%$  of the mean experimental drape value
- Simulated number of nodes equal to the number of nodes obtained in any one of the six repeatability trials done on the real fabric
- Simulated nodal dimensions ( $d_1, d_2, d_3$ ) within  $\pm 20\%$  of the mean experimental drape values

- Simulated fabric drape with simple shapes such as; circular & Square for both actual method
- Validated virtual method of measuring drape with the plots from the circular form with the square samples
- Measured 18 fabrics for fabric properties, performance parameters from actual drape & virtual drape
- Examined repeatability of fabric drape using Cusick Drapemeter (BS 5058, 1973)
- Demonstrated ability to optimize simulation based on selected Modulate parameters

## FUTURE RESEARCH

- The garment is draped on mannequin for evaluation of virtual drape characteristics using Modulate Software (Figure 5)
- The parameter input derived from the 'input curve of simple forms' and fabric properties will be used in simulation of garments
- The method for accurately quantifying the virtual drape will be developed

## ACKNOWLEDGEMENT

- The author acknowledges National Textile Center for funding the research and Optitex Inc. for donating the Modulate software
- Special thanks to Dr. Jeffery Eischen, Associate Professor, North Carolina State University (NCSU). Mr. Pradeep Pandurangan, Graduate Student, NCSU. Mr. Mike King, Systems Engineer, [IC], Cary, and Dr. Trevor Little, Professor & Head, Department of Textile & Apparel Technology & Management, NCSU, Raleigh.

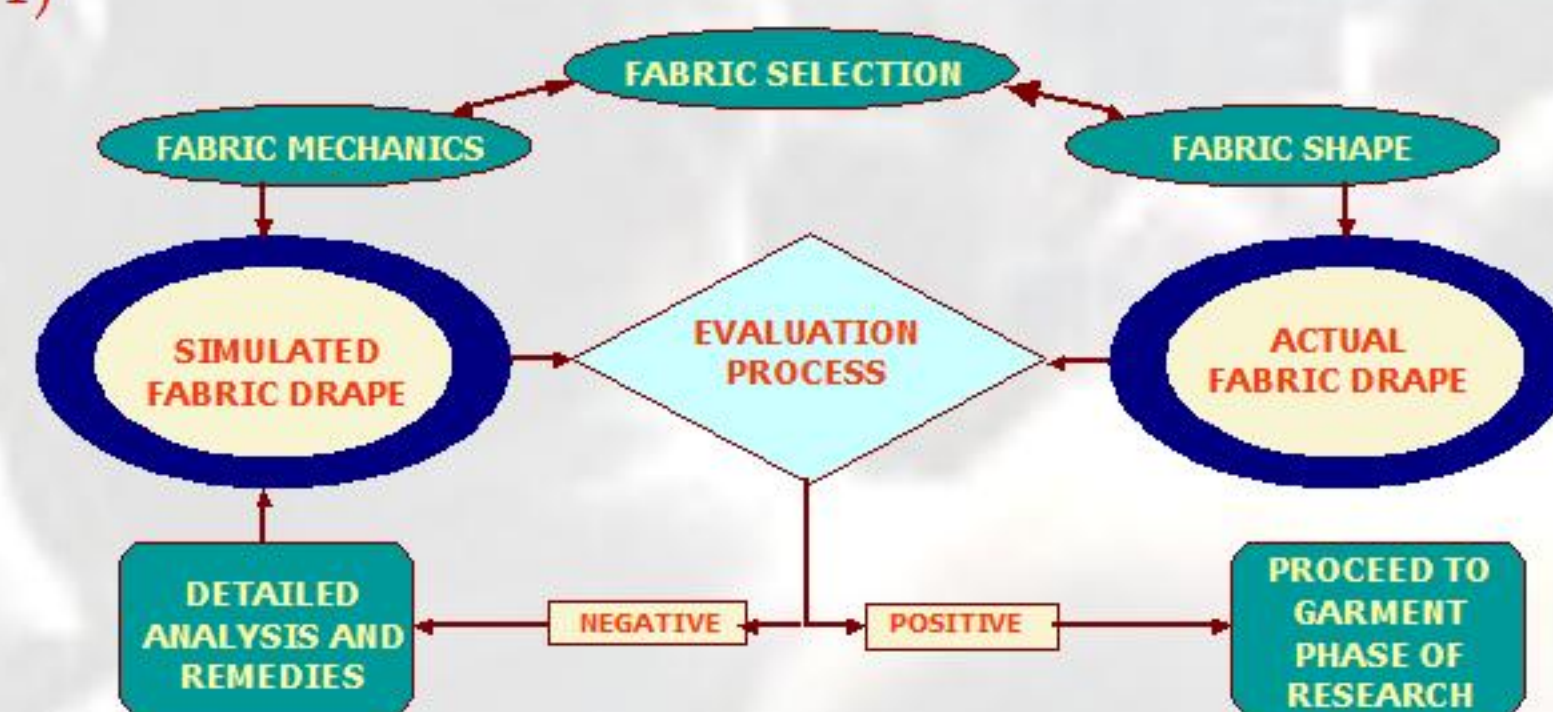


Figure 1: Research Approach

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