Nicholas Pittman

Davis Award
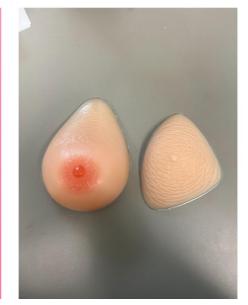*Biology Major*
First Year ARCS Scholar

MOREHOUSE COLLEGE

New Methods for External Breast Prosthetics

Our goal is to improve the external appearance and the internal self-confidence of breast cancer survivors. Using additive manufacturing and 3D body scanning software, external breast prosthetics are being manufactured at the Beekley Lab for Biosymmetrix at the University of Connecticut Health Center.

Background & Significance

1. One in 8 women will develop breast cancer in their lives.
2. Annually, 100,000 women receive either a double or single mastectomy.
3. Internal implants are risky, external prosthetics are a safer alternative although they have several downsides: poor fit, hot and sweaty.

1 IN 8 WOMEN
in the United States will develop breast cancer in her lifetime.

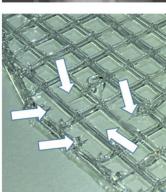## Procedure and Common Issues

1. Scans of volunteer are taken.
   (One with bra on, one without bra)
2. Scans are combined to create a computer model of the prosthetic using CAD software.
3. Models are converted into readable files for printer.
4. BAB200 is used to print breast forms.
5. Weights added if needed for large prosthetics.
6. Prosthetic(s) given to volunteer.

Laminar Flow Extrusion *(LFE)*, gel extrusion vs Fused Deposition Modeling *(FDM)*, a heated nozzle.

Manipulate variables while overcoming issues like skipping, snowballing and tip clogging.

Results and Reviews

"They feel natural, light, and contour to my body"

"Shape is very natural in appearance"

"Approximately the same size as my own remaining breast"

(Figure shows a pair of breast prosthetics and a set printed by FDM technique for checking the fit).

Conclusion

Pros:

Printing parameters were optimized to emulate a realistic feel and aesthetic.

Volunteers like them.

FDM forms are great for visualizing shape on body.

Cons:

BAB400 run times.

Common errors- skipping, clogging, snowballing.

Thank You!

Scholar Awards Celebration
November 13, 2024

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