

# Wearable Technology and Functional Garment Design

## What is Wearable Technology?

Wearable technology is an interdisciplinary field that encompasses electronics, apparel design, textile sciences, chemical engineering, kinesiology, and medicine. This innovative technology extends the possibilities of apparel and textiles with its embedded electronics and smart materials.



## Projects & Applications

### Health Monitoring Clothing

- Chronic disease-monitoring garments for patients
- Reactive garments for treatment using vital signal sensors and actuators

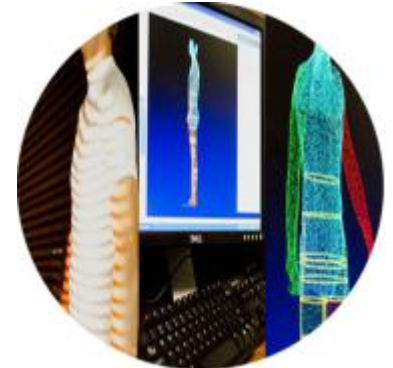
### Body Protection Clothing

- Clothing for extreme work environments
- High-performance sportswear
- Protective gear

## Research with Design Technologies



Department of Consumer and Design Sciences  
College of Human Sciences  
Auburn University



# 3D Body Scanning

Three-dimensional (3D) body scanning is an innovative technology that uses a laser or white light to capture a 3D image of the body. In less than 8 seconds, a true-to-scale image is produced from which thousands of body measurements can be extracted. The CADS researchers have been working with this technology longer than any other academic institution in the US.

## Populations Scanned

- Female and Male Consumers
- Tween Boys and Girls (9–14 yrs)
- Overweight and Obese Females
- African-American Business Women
- College Students (18–20 yrs)

## Funding

- Alabama Agricultural Experiment Station Hatch Project
- The Coca-Cola Foundation
- Alabama Agricultural Experiment Station Competitive Grant
- Auburn University Internal Mentoring Grant
- National Textile Center

## Selected Publications

- Chattaraman, V., Simmons, K.P. & Ulrich, P.V. (In review). Linkages between ages, body size, body image, and fit preferences of male consumers. *Clothing and Textiles Research Journal*.
- Gropper, S.S., Simmons, K.P., Connell, L.J. & Ulrich, P.V. (2012, September 17). Changes in body weight, composition, and shape: A 4-year study of college students. *Journal of Applied Physiology, Nutrition and Metabolism*, 37, 1118-1123.
- Gropper, S.S., Simmons, K.P., Connell, L.J. & Ulrich, P.V. (2012). Weight and body composition changes during the first three years of college. *Journal of Obesity*, 2012, 6 pages. Available online at <http://www.hindawi.com/journals/jobes/2012/634048/cta/>
- Gropper, S.S., Newell, F.H., Zaremba-Morgan, A., Keiley, M., White, B.D., Huggins, K.W., Simmons, K.P., Connell, L.J. & Ulrich, P.V. (In Print). The impact of physical activity on body weight and fat gains during the first three years of college. *International Journal of Health Promotion and Education*.
- Zaremba-Morgan, A., Keiley, M.K., Ryan, A.E., Radomski, J.G., Gropper, S.S., Connell, L.J., Simmons, K.P. & Ulrich, P.V. (2012, March). Eating regulation styles, appearance schemas, and body satisfaction predict changes in body fat for emerging adults. *Journal of Youth and Adolescence*. Available online.
- Gropper, S.S., \*Clary, K., \*Gaines, A., Wanders, D., & Simmons, K.P. (2011, December 3). Summer doesn't reverse freshman year body weight and fat gains in female college students. *The Open Nutrition Journal*, 24-31.
- Simmons, K.P., Connell, L.J., Ulrich, P., \*Skinner, H., \*Balasubramanian, M. & Gropper, S. Body image and body satisfaction for college freshmen: Investigation into the fabled "Freshman 15". (2011). *The International Journal of Health, Wellness and Society*, 1(1), 117-126.
- Gropper, S.S., \*Newton, A., \*Harrington, P., Simmons, K.P., Connell, L.J., & Ulrich, P.V. (2011). Body composition changes during the first two years of university. *Preventative Medicine*, 52, 20-22.
- Gropper, S.S., Simmons, K.P., \*Gaines, A., \*Drawdy, K., \*Saunders, D., Ulrich, P.V., & Connell, L.J. (2009, Nov/Dec). The Freshman 15—A closer look. *Journal of American College Health*, 58(3), 223-231.
- Gropper, S.S., \*Gaines, A., \*Saunders, D., \*Clary, K., Connell, L.J., Simmons, K.P., & Ulrich P.V. (2009). Summer doesn't reverse freshman weight gain. *Federation of American Societies for Experimental Biology Journal (FASEB)*, 23: A735.2.

## Projects & Applications

- 3D Body image scale and avatar development to impact assessment obesity.
- Avatars to motivate children to improve diet and increase physical activity.
- Longitudinal collegiate study of body composition/size, and related environmental, behavioral and psychological factors: Obesity implications.
- Analysis of body shape and apparel fit preferences of male consumers.
- Apparel product development for the plus-sized teen and tween boys AND girl markets.



## Body Shape Analysis/ Scale Development/Consumer Profiling

- Fit Models Based on Body Shape and Posture Analysis
- Body Type Classification for Women's Ready-To-Wear Clothing
- Body Shape Assessment Scale (BSAS®)
- Female Figure Identification Technique (FFIT®) for apparel
- Body shape change through weight gain using planer slices

## Technology

- Comparison of 3D body scanners
- Comparison of 3D body scanning and physical anthropometric techniques

