

PhD Research | School of Design | The Hong Kong Polytechnic University

PhD Researcher:
Ms Zhang Jun

Qualification[s]:
BSc – The Tianjin Polytechnic University
MA – The Hong Kong Polytechnic University

Email:
17903426r@connect.polyu.hk

Supervisor[s]:
Dr. LAU Man Lung (Chief)
Dr. YIP Yiu Wan (Co)
Prof. YU Wing Man (Co)

Specialization / Interests:
Product Design

Date of Completion:
8 Jan 2022.

Last Updated:
11 August 2018.

Profile Image: [black and white]



Project Image: [1 image only]



PhD Title:
Study on the Effect of Sports Bra on Yoga Practitioners Exercise Behaviour based on the Biomechanical Analysis of Bra-breast Interaction

Keywords:
Finite element method, breast deformation, elderly, yoga bra, motion capture

Research Abstract:

Lacks of motivation and breast pain during exercises are the two main barriers for elderly women to participate in exercises. Coupled with the aging process influencing their body parameters, the material properties of breast tissue are significantly different from those of younger women. The breast deformation of older women should be studied. Zhang's PhD research focuses on analysing biomechanical behaviours of elderly women's breast tissues by motion capture system and finite element method from physical factors. Besides, the psychological demands to reinforce exercise motivation should be explored. By the study, not only the material coefficients of muscle tissues and soft tissues can be determined, but also the displacement and stress inside the breast can be visualized. The quantitative analysis of breast biomechanical behavior is essential for analysis and prevention of breast pain and injuries resulting from the excessive breast displacements during less intensive exercises and thereby provide the basis to design yoga bra fitting for elderly ergonomically will be achieved.

Research Methodology:

This research is based on the empirically experimental data through the questionnaire, interview, focus group, and also acquired by motion capture system to validate the accuracy and reliability of the developed complex finite element model of the musculoskeletal system to simulate the deformation of soft breast tissue, contraction of muscles during body movements.

- 1. To investigate the exercise motivation of elderly women by interview and questionnaire in order to learn what their demands are**
- 2. To acquire the motion data of elderly women during yoga exercises by motion capture system**
- 3. To develop the geometric models of body soft tissues and musculoskeletal system and to construct the finite element models to predict the deformation of the breast during yoga exercises**

Results / outcomes:

The psychological demands reinforcing exercise motivation of elderly exercise behaviour will be analysed. The deformation of the breast during arm abduction during yoga exercises will be analysed through various yoga postures. The finite element model comprising the musculoskeletal system will be constructed. An elderly-friendly yoga bra will be ergonomically designed which can fulfil the physical and psychological demands of elderly women.