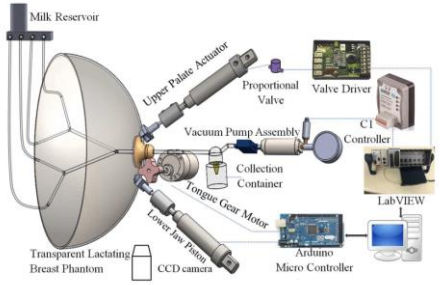
Publications

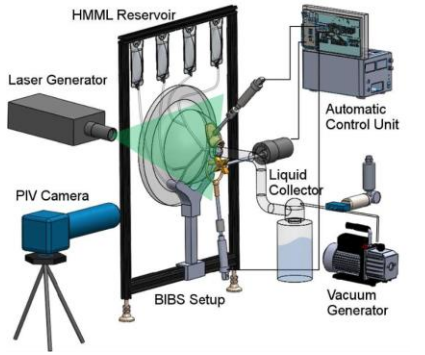
Bio-Inspired Breastfeeding Simulator (BIBS): A Tool for Studying the Infant Feeding Mechanism.

An experimental apparatus that mimics infant oral behavior and milk extraction, with the application of studying the breastfeeding mechanism in vitro.



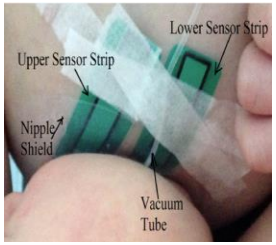
In Vitro Flow Visualization in a Lactating Human Breast Model

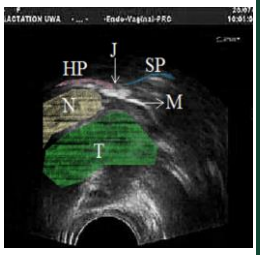
We investigated the flow field in a lactating breast model considering bifurcated milk ducts and multiphase breast-infant interactions.



A Clinical Experiment on Infant Applied Pressures During Breastfeeding

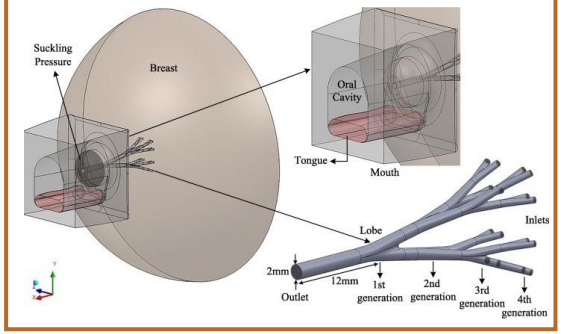
A clinical experimental work was carried on to understand the biomechanics of breastfeeding by capturing both positive and negative pressures exerted by infants on the breast.





Fluid-structure interaction modeling of lactating breast

In this study, 3-D two-way Fluid-Structure Interaction (FSI) simulations are conducted to investigate the factors that play the primary role in expressing milk from the nipple.



THE UNIVERSITY OF TEXAS AT DALLAS

Advanced Research on Thermofluid Systems (ARTS) Laboratory

The Advanced Research on Thermal-Fluids (ARTS) lab conducts cutting-edge research in the field of biomechanics, focusing specifically on the **biomechanics of breastfeeding**. Through the integration of **materials science, fluid mechanics, heat transfer, computational and mathematical modeling**, as well as clinical and experimental studies, we aim to gain a comprehensive understanding of the complex mechanics involved in breastfeeding.

Dr. Fatemeh Hassanipour

PROFESSOR OF MECHANICAL ENGINEERING

ASSISTANT DEAN FOR DIVERSITY AND STRATEGIC INITIATIVES

Profile & Contact information

Education

PhD, Mechanical Engineering, Southern Methodist University, 2009

Research Interests

heat transfer and fluid mechanics, and their applications in biomechanical engineering related to women's health.

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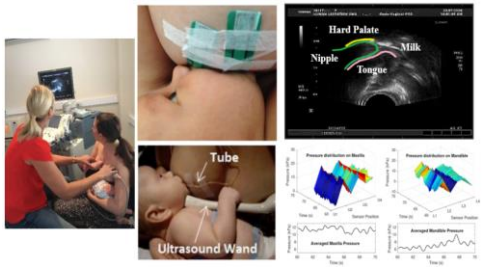
Advanced Research on Thermofluid Systems (ARTS) Laboratory web page:

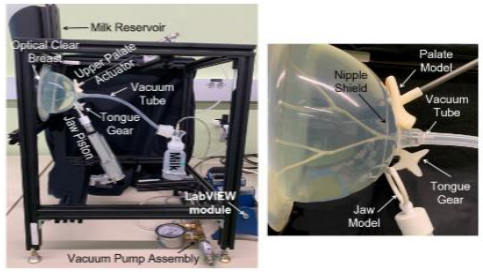
Multifaceted Research on the Human Breast

Clinical data



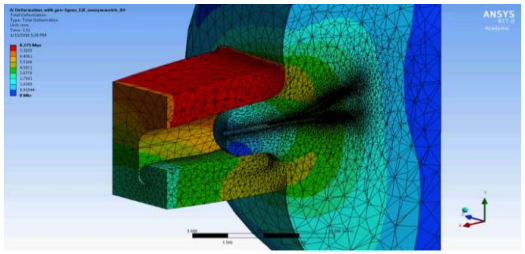
Our unique lactation data collection techniques involve a combination of thin pressure sensors, ultrasound imaging, and a sophisticated data acquisition and synchronization methodology that results in a uniquely precise data set involving various forces applied by the infant on the breast, the displacement of different parts of infant oral cavity and the breast tissue, and milk flow.

Experimental Study



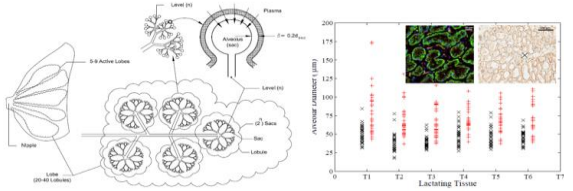
We have developed a programmable mechanical model for both the infant suckling (including motions of the palate, tongue, and jaw, and sucking pressure), as well as a model of human breast with milk-mimicking liquid (in term of flow properties) that allows external observations of flow.

Computational Modeling



Visualization techniques made possible with computational models allows the varying of time scales as well as multiple vantage points that can be invaluable in the understanding of complex phenomena involving lactation and the human breast.

Mathematical Modeling



Mathematical modeling of the breast, and the geometry of alveoli and the ducts that produce milk, provides a vehicle for a deeper, more fundamental understanding of the underlying phenomena. It can open doors to a better understanding of the relationship of various physical and geometric parameters in the human breast and their correlation with milk production as well as the specific symptoms observed in various breastfeeding anomalies.