

TISSUE MODELLING FOR BREAST CANCER SCREENING

Context

Early Warning Scan (EWS) is a non-profit project to develop a new screening method to detect early signs of breast cancer, purely using imaging and machine-learning analysis. This is non-invasive, fast, cheap, and self-improving, and would allow for screening a larger part of the population – including younger women for whom current mammography screening is less sensitive – more frequently. The underlying principle is that the presence of a tumor can be detected by distortions in the skin surface movement by analyzing the reconstructed images and video from a 52-camera setup.

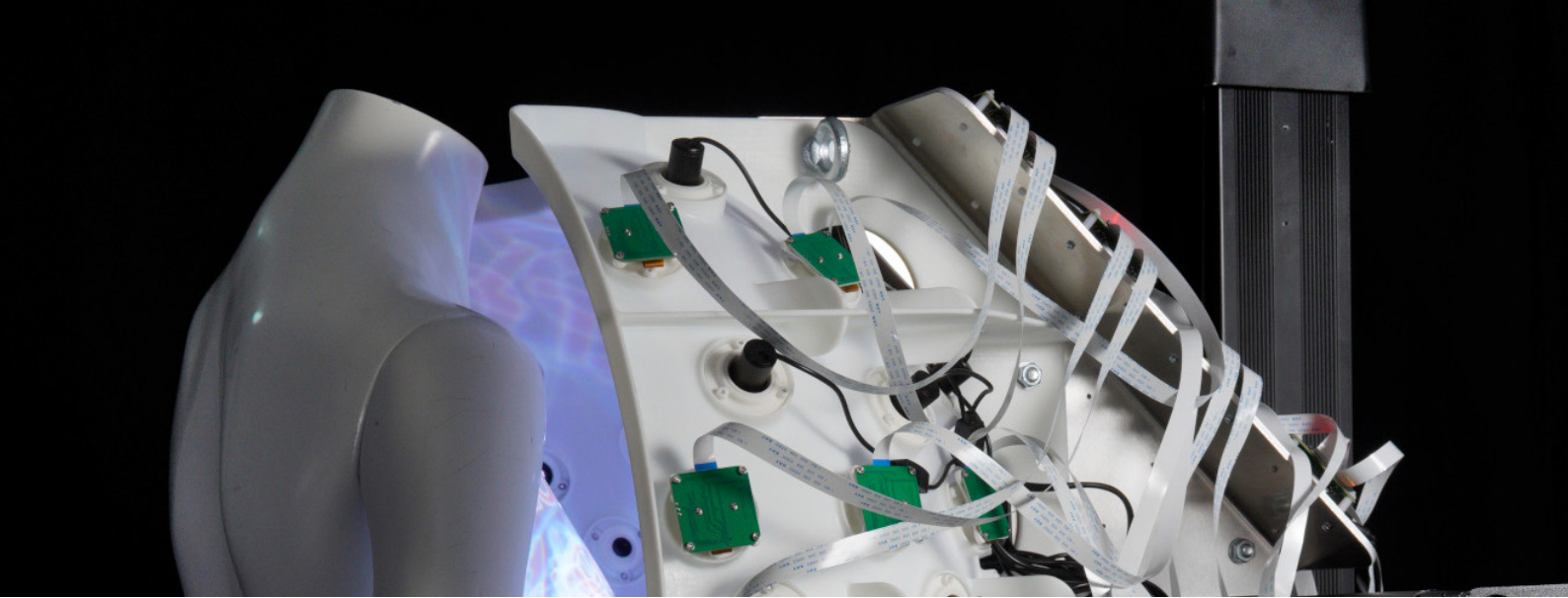
To validate this method and to support analysis, a Finite-Element Method (FEM) model of the breast is necessary to simulate the dynamic surface distortions. A first simple FEM model has been set up by Sioux Mathware, and needs to be extended towards a realistic model.

Internship overview

- Bachelor/ Master
- Internship/Graduation assignment
- Biomechanics/ Mechanics/ Physics
- Location: Eindhoven

Technologies

- Finite-Element Method Modelling
- Soft-Tissue modelling
- Biomechanics
- 3D - Imaging



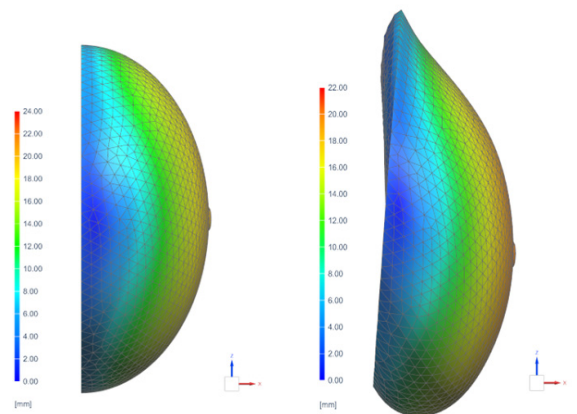
Assignment

The student is to improve the existing FEM model up to the point that a sound order-of-magnitude estimation can be made of the magnitude of surface distortions. Planned improvements include for instance using realistic tissue parameters and adding ligament tissue. The problem of computing a more realistic load-free geometry is particularly relevant and challenging. Static deformations can be compared to a library of breast shapes.

An analysis pipeline needs to be set up, where FEM simulation results will be directly fed to the existing imaging simulation. This allows for the generation of plentiful artificial data with which the EWS concept can be validated, tested, and improved. We will work in close collaboration with EWS, which is located not far from the Sioux campus. The student is encouraged to also suggest improvements on other parts of the EWS system, including imaging and signal analysis.

Activities

- Improve existing FEM model
- Set up analysis pipeline
- Generate artificial data for deep learning model



Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great career opportunities
- Contributing to a safe, healthy and sustainable society

Get in touch!

Would you like to know more about this student assignment?

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