

Internship – Philips Research North America, Briarcliff Manor, NY

Philips Research North America (PRNA) is one of Philips' six worldwide research laboratories where innovations and discoveries help drive Philips products and opportunities. PRNA contributes to the global research programs in the fields of Healthcare and Lighting and in the areas of Controls, Communication, & Healthcare Informatics (CCHI), Clinical Informatics, Interventional, & Translational Solutions (CIITS), and Ultrasound, Photonics and Bioinformatics (UPB).

Philips Research NA is located on a 100-acre campus overlooking the Hudson River, about an hour north of New York City.



Department: CIITS, **Length of Internship:** 3 months

Position Description:

Finite Element Analysis for lung deformation due to breathing motion

Background:

Modeling and simulation of organ deformation due to e.g. respiratory motion. For example in radiotherapy, detailed knowledge of respiratory dynamics is important for accurate determination of tumor location and impact on corresponding dose distributions.

FEA can be used for biophysical modeling of the lung motion due to respiration. The modeling can be made patient specific by using additional imaging and/or sensor data, which lies in the interest of the proposed project.

Work packages:

- Review current literature / familiarization with software. (0.5 months)
- Implement an initial FEM of the chest (image/mesh data is provided). Includes assignment of elastic properties, set up of equations and boundary conditions. Implementation should take place within Solidworks or SOFA-framework (<http://www.sofa-framework.org/home>). (1.5 months)
- Simulation of deformation given a motion pattern of the diaphragm and relating the internal deformation to outside reference markers e.g. on the skin (0.75 months)
- Final report (0.25 months)

Desired outcome:

First attempt of implementing a working prototype FEM as a basis for future work on simulating tumor motion detection driven by sensor surrogates.

Position Requirements:

An individual with finite element analysis (FEA) experience. Candidate should be familiar with FEA of organ deformation. The assignment will comprise creating deformation models for the chest including breathing motion (lungs, rib-cage, diaphragm) and the brain/head with deformation due to traumatic injury. A background in (biomedical) image processing is of benefit. Experience with Solidworks or other open source FEA/FEM environments such as SOFA are highly desired.

EE, BME, ME or Computer Science M.Sc. required, ideally Ph.D. candidate.

For Interns:

- If relocating to our area is necessary for this position, PRNA reimburses travel expenses to our area at the start and end of the internship.
- If housing is necessary, PRNA supports home-finding services for short-term housing.
- PRNA offers competitive pay.

Internship contact:

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