DEPARTMENT OF BIOMEDICAL, CHEMICAL, AND ENVIRONMENTAL ENGINEERING
COLLEGE OF ENGINEERING AND APPLIED SCIENCE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE WOMEN

APPLICATION DEADLINE: 03/01/2017

PROJECT TITLE: **3D multimodal image registration for therapy guidance**

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**Project Description**

Thermal ablation is an important treatment for liver cancer, providing the best chance for many patients whose tumors cannot be surgically removed. However, improved methods for image guidance are needed. We are developing a novel ultrasound method, echo decorrelation imaging, which is capable of predicting thermal ablation effects (heat-induced death of cancer cells) in real time. To further validate echo decorrelation imaging, accurate methods for 3D image registration (i.e., transforming 3D images so they align pixel-by-pixel) are needed.

In this project, the student will learn and adapt existing registration methods to register 3D ultrasound and x-ray computed tomography (CT) images. The student will also handle medical imaging instrumentation to acquire 3D ultrasound images of ex-vivo liver tissue in our laboratory and corresponding 3D CT images in the Vontz Core Imaging Laboratory. Methods for registering these 3D images will be tested and optimized for accuracy.

The student will thus gain research experience including biomedical image acquisition, modern methods of image processing, and scientific computer programming. Previous experience with MATLAB programming is required.