

Good Morning,
You are invited to attend our weekly ECE Graduate Seminar.

Old Dominion University
College of Engineering and Technology
Department of Electrical and Computer Engineering

All lectures to be held at 3:00pm on Fridays online at [ODU DL: ECE 731 831 Grad Seminar](#)

For more information, contact Dr. Chung Hao Chen at (757) 683-3475 or email cxchen@odu.edu.

Friday, December 10, 2021 Seminar Topic:

FABRICATION AND APPLICATION FOR GEOMETRICALLY SCOLIOTIC SYNTHETIC COMPUTED TOMOGRAPHY VOLUMES by Austin Tapp, PhD Candidate in Biomedical Engineering at Old Dominion University

Abstract:

Scoliosis, an abnormal curvature of the spine, is treated with bracing or surgical procedures. These correction strategies are limited by current medical imaging, which fails to elucidate the soft tissue anatomy known to play a critical role in spinal stiffness. Soft tissues must be localized on a patient-specific basis to determine ideal treatments for individuals with scoliosis. Fortunately, recent studies have proposed top-down segmentation methods that surmise soft tissues from routine, pre-operative computed tomography (CT) volumes. However, there is no standard to evaluate these soft tissue segmentations and ensure their clinical utility. Therefore, this study presents methods for the production of synthetic CT (sCT) volumes, which are geometrically scoliotic and contain ground truth information for both hard and soft tissues. The sCTs are used to assess the accuracy of surmised soft tissues and establish a standard for localized soft tissue evaluation. The proposed validation method is achieved fully in silico and is employed to evaluate several existing segmentation approaches. Further, generated sCTs supplement a sparse dataset landscape and can support neural network fine tuning, ultimately improving deep learning-based segmentation performance during outlier testing.



Bio:

Austin Tapp obtained a B.S. in Neuroscience from the College of William & Mary in May 2017. In October 2021, he successfully defended his dissertation titled, “Generation, Analysis, and Evaluation of Patient-Specific, Osteoligamentous, Spine Meshes”. Austin will graduate this December with a Ph.D. in Biomedical Engineering from the Department of Electrical and Computer Engineering. He has published in journals such as *Computer Methods in Biomechanics and Biomedical Engineering* and *Lecture Notes in Computer Science*. Recently, his work was awarded Best Paper for the 10th MICCAI Clinical Image-Based Procedures workshop at the annual MICCAI conference in Strasbourg, France. Austin was ODU’s 4th Annual 3-Minute Thesis winner and went on to win the People’s Choice Award and place second at the National 3-Minute Thesis Competition held by the

Conference of Southern Graduate Schools. He was awarded Virginia Space Grant Consortium Graduate Research Fellowships in 2019 and 2020, named ODU’s Biomedical Engineering Ph.D. Researcher of the Year in 2020, and is a member of Tau Beta Pi. After graduation, Austin hopes to continue developing novel modeling and simulation methods for patient-specific, surgical planning and he is currently seeking employment.