Fall 2019 ME459 Final Project Report

University of Wisconsin-Madison

Implementation of Shear Wave Tensiometry Processing Algorithm in C

Jonathon Blank

Dylan Schmitz

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**Abstract**

Shear wave tensiometry utilizes two miniature accelerometers to compute the shear wave speed in a soft tissue, which can, in turn, be used to compute the axial soft tissue stress. The Neuromuscular Biomechanics Lab uses a variety of algorithms to process outputs from these two accelerometers to compute wave speed. Some of these include speckle tracking of B-mode ultrasound images, interpretation of radiofrequency (RF) ultrasound data, fast Fourier transformations, and, for the purpose of this project, correlations between the two accelerometer signals. However, all are written in MATLAB, which is an interpreted language, thus making the algorithms timely to execute and infeasible to use in real-time. The purpose of this project is to translate the post processing algorithms used to compute wave speed to C. By doing so, we can enhance the speed of the real-time computing of shear wave speed.

The text of the abstract comes here. Use font size 12 throughout the document.   
IMPORTANT NOTE: The name of the file for your Final Project report should be ME459FirstnameLastname.pdf. Like ME459DanNegrut.pdf. Drop this Final Project report in Canvas in the folder “FinalProject751” by Tuesday, December 14, at 2:45 PM. Do not go beyond 10 pages unless you really feel like you have to (page count doesn’t include TOC, abstract, etc.). Feel free to use a LaTeX source as long as you follow this format; in the end, you will be uploading a PDF anyway.

Please make sure that you include in this \*abstract\* a link to the git repo for your project. Using this link (i) we will fork the project code (particularly important for multi-student teams); (ii) we will look at the progress history for your project as documented by git.   
To verify that you provided the *right* git link, click on it. It should take you to your git repo.

[If this link to your repo is missing, your score can not be higher than 98%]

Contents

[1. Problem statement 4](#_Toc531620937)

[2. Solution description 4](#_Toc531620938)

[3. Overview of results. Demonstration of your project 4](#_Toc531620939)

[4. Deliverables: 4](#_Toc531620940)

[5. Conclusions and Future Work 4](#_Toc531620941)

[References 4](#_Toc531620942)

# General information

In this important section, please provide only the following information, in bulleted form (four bullets) and in this order:

1. Your home department:
2. Current status: undergrad/MS/PhD student (choose one)
3. Individuals working on the Final Project (include yourself)
   * One person per line
   * Indicate the team leader such as, for instance, Joe Doe (Team Leader)
4. Choose one of the following two statements (there should be only one statement here):
   * I release the ME459 Final Project code as open source and under a BSD3 license for unfettered use of it by any interested party.
   * I am not interested in releasing my code as open source code.

IMPORTANT NOTE: For bullet 4 above, your choice does not affect in any way the score for your Final Project. It will only tell me that sharing your code in the future is ok.

# Problem statement

Explain in clear terms what you wanted to accomplish. If you go w/ a default project, simply indicate so. Please use here the material that you provided in your Final Project proposal.

As part of this section, touch on the motivation/rationale for your project selection. Explain why you chose to work on this project. For instance, if it’s work related, explain in rough terms what the big process is, and what part you’re trying to take care of.

# Solution description

Indicate how you went about implementing your solution. Explain data structures, algorithms used, code structure, function you implemented, etc. Provide a panoramic snapshot of your Final Project effort.

# Overview of results. Demonstration of your project

Explain here what you obtained, explained why the results are good/bad. This is the place where you talk about the outcomes of your Final Project effort. It is not the end of the world if your code doesn’t work as anticipated. Explain here how far you have made it.

Most often, you have a comparison against sequential code, perhaps via a scaling analysis. Make sure you include plots and/or tables to show your results.

# Deliverables:

Discuss what is delivered for this Final Project. Important points:

* This report should be in Canvas.
  + On multi-student teams, each team member should submit a final report; i.e., this document. However, the code should be in one repo
* Tell us what is in your git repo and explain how we can run your code
  + If we cannot run your code, explain why that is the case

# Conclusions and Future Work

# References

[1] Make sure to give credit where it’s due.