Project Plan

Discrete Morse Theory, Vector Fields, and Materials Science
Sprint 2016

Faculty Mentors: Ruth Davidson, Rosemary Guzman
Project Leader: Nima Rasekh
IGL Scholars: Chuan Du, Tyler Liam Graham, Adarsh Manawa, Christopher Szul

Feb 1, 2016

Project goals:

The main project goal is to design a program which compares properties of different materials. To achieve this goal we will

- Apply concepts from electrical engineering and aerospace engineering to determine which materials to study
- Use ideas from engineering to determine applicabe properties of those materials, in particular
  - ⧫ properties like conductivity, ability to absorb or emit temperature, density, malleability from electrical engineering
  - ⧫ properties like the co-optimization of strength, airflow and density from aerospace engineering
- Understand some parts of discrete Morse theory and persistent homology
- Study given source code and understand how to make desired modifications using the github repository

Timeline:

In order to achieve these goals we will follow the following timeline

- *Feb 28th*: Obtaining good understanding as well as ability to modify source code
- *Mar 28th*: Finalizing the code and starting to run experiments with chosen materials and properties

- *Apr 19th*: Ending the process of data collection from the experiments
- *May 2nd*: Finishing poster for the IGL poster session

Responsibilities:

- The whole group has to study mathematical basics with Nima's help
- *Chuan*: Study background electrical engineering to determine which materials to study and which properties to compare
- *Tyler*: Manage github and help the group in computer related issues
- *Adarsh*: Research aerospace engineering to determine which materials to study and which properties to compare
- *Christopher*: Understand and comment on the source code
- *Nima*: Facilitate discussion, attend weekly meeting and help with the mathematical aspects of the project

Meeting Times:

- Regular meeting time with faculty mentors: *Fridays 3-4 pm*
- Additional meeting time with project leader (if necessary): *Mondays 7-8 pm*