

EE 491 Weekly Report DEC15-17 Week 7 (3/1/15-3/8/15)

Advisors: Dr. Ravi Hadimani and Neelam Prahbu **Client: Iowa State University**
Members (roles): Marion Okoth (Team Leader), Elizabeth Clarkin (Website) and Matthew Mulloy (Weekly Reports)
Project Title: Magnetic Sensor Design.

Weekly Summary

The main goals this week was to prepare to create the core, understand FFT (Fast Fourier Transforms), and continue with simulations in COMSOL.

Meeting notes:

3/1 Group Meeting

Duration: 60 min **Members Present:** All

- Discussed MATLAB and FFT
- Discussed Fourier Transforms mathematically

3/5 Group Meeting with Advisors

Duration: 60 min **Members Present:** All

Purpose and Goals:

Discussed FFT, material creation, COMSOL, and shielding

- FFT understanding
 - Code verification
 - Shifting
- Binding verse centering for material creation
- Annealing
 - Reduces stress to create anisotropy
 - Isotropic materials
 - Effects of magnetization and coercivity
 - Time concerns
 - Supplementary option
 - Variability in sophistication
 - Virtue of process in regards to project
 - Thin films from silicon to reduce stress from crystallization
 - Decreases dislocations
 - Research into ferrite annealing
- Benefits of crystalline structure and randomness of anisotropy
- Nanocrystalline structure

- Remove centering
 - Heating temperatures
 - Increasing coercivity
- Restriction of materials, sample preparation a major variable
- COMSOL simulations
- Shielding requirements
 - Permeability verses saturation
 - Solving for field in simulation
- Design Document

Pending issues

1. GUI (Fast Fourier Transforms, frequency peaks, spectrums)
2. Material creation
3. COMSOL simulation

Plans for next week

1. Matt: Will continue simulating in COMSOL
2. Elizabeth: Will continue working on the website and continue working with MATLAB on the GUI for the software interface with the machine
3. Marion: Will continue creating the core materials
4. All will work on design document

Individual Contributions (this week)

Matthew Mulloy: Attended the meetings, reading, weekly reports, COMSOL simulation (11 hrs.)

Elizabeth Clarkin: Attended the meetings, FFT research, MATLAB (10 hrs.)

Marion Okoth: Attended meetings, sample preparation, reading (4 hrs.)

Total contributions for the project

Matthew Mulloy (55 hrs.)

Elizabeth Clarkin (58 hrs.)

Marion Okoth (50.5 hrs.)