### OCE 496: Senior Design II -Outline-

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# Introduction

- 1.1 Objectives
- 1.1.1 Phase One
- 1.1.2 Phase Two
- 1.2 Layout

# Finite Element Model (FEM)

- 2.1 Introduction
- 2.1.1 Background of Claiborne Pell Bridge
- 2.1.2 Introduction of FEM
- 2.2 Abaqus FEM Verification
- 2.2.1 L Beam Analysis
- 2.3 Claiborne Pell Bridge Model
- 2.3.1 Modeling Large Suspension Bridges
- 2.3.2 Model Process
- 2.3.3 Limitations of Abaqus FEM

# Instrumentation Package

- 3.1 Introduction
- 3.2 Microprocessor
- 3.2.1 Necessary Specifications
- 3.2.2 Platform Options
- 3.2.3 Final Platform

### 3.3 Sensors

#### 3.3.1 Accelerometer

**Necessary Specifications** 

**Sensor Options** 

**Sensor Selection** 

3.3.2 Strain Gauge

**Necessary Specifications** 

**Sensor Options** 

**Sensor Selection** 

3.3.3 GPS Receiver

**Necessary Specifications** 

**Sensor Options** 

**Sensor Selection** 

3.3.4 CORS

3.3.5 Analog to Digital Converter

**Necessary Specifications** 

**Platform Options** 

### 3.4 Electronics Design

- 3.4.1 Circuitry
- 3.4.2 Printed Circuit Board
- 3.5 Software Design
- 3.6 Package Power
- 3.6.1 Power Budget
- 3.6.2 Energy Scavenging Potential

Wind Potential

**Solar Potential** 

3.6.3 Battery Selection

## **Data Collection**

- 4.1 Phase One Data Collection
- 4.1.1 6g Tri-Axial Accelerometer Data
- 4.2 Phase Two Data Collection
- 4.2.1 6g Tri-Axial Accelerometer Data
- 4.2.2 1.5g Tri-Axial Accelerometer Data
- 4.2.3 Cell Phone Accelerometer
- 4.2.4 Battery Discharge Curve
- 4.2.5 Experimental Observed Efficiency

# Data Analysis

- 5.1 Phase One Data Analysis
- 5.1.1 Comparison of Preliminary Abaqus Model and Preliminary Data
- 5.2 Phase Two Data Analysis
- 5.2.1 Comparison of Developed Abaqus Model with Literature
- 5.2.2 Comparison of Developed Abaqus Model with Developed Abaqus Model

# Future Development

- 6.1 Instrumentation
- 6.1.1 Integration of Strain Gauge
- 6.1.2 Wireless Transmission
- 6.1.3 GPS Time Synchronization
- 6.1.4 Package Assembly

Fabrication of Circuit Board

**Battery Integration** 

Package Enclosure

Power Management

**Package Location** 

- 6.2 FEM
- 6.2.1 Model Improvements
- 6.2.2 Dynamic Loading

# Conclusion