

Michigan State University
College of Engineering; Dept. of Electrical and Computer Eng.
ECE 480 Capstone Design Course Project Charter

Team 1: Eddy current conductivity meter App

Sponsoring Company/ Organization: Non-Destructive Evaluation Laboratory

Contact Information:

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Phone and Best Time of Day to Call: (prefers email)

Background Information:

Eddy Current testing (ECT) is a commonly used technique for detecting cracks in structures such as aircrafts, submarine, buried pipes, and wind turbine blades, etc, in a noninvasive manner. An eddy current instrument uses a coil that generates a time varying magnetic field to noninvasively evaluate a test material. The measured signals correspond to electromagnetic properties and can indirectly be linked to mechanical parameters and flaws/discontinuities in a component.

Business Case:

Smartphones can be turned into eddy current instruments. The audio interface of a Smartphone can transmit and receive alternating signals up to 20 kHz and can therefore be used together with an eddy current probe. This provides a low cost, simple measurement instrument available to anyone with a Smartphone.

Project Intellectual Property Considerations: None

Opportunity Statement:

This project will be focused firstly on how to design and build an eddy current probe that can be directly connected to the audio jack of a Smartphone. Secondly how to develop an App for eddy current evaluation with all necessary components including signal presentation in impedance plane, frequency, gain, phase and filter setting and a recorder with post processing capabilities. The specific application of the project will be to use the eddy current signal and the App interface to create a conductivity meter. The measured impedance measurements will be interpreted in terms of the conductivity of the sample on which the probe is placed. Samples of known conductivity will be used for calibration, demonstration and testing the final prototype.

The students will gain experience in software development for Smartphone applications, electromagnetics as well as nondestructive evaluation. The challenge is to create a user friendly interface with all necessary control systems and signal processing to allow a user

to do a simple and fast measurement of electrical conductivity. The project will involve theoretical parts in circuit design and electromagnetics as well as software development and design of the eddy current probe which works as an external passive Smartphone device.

Deliverables:

Eddy current probe and application software.

Goals:

Working eddy current probe with calibrated measurements against samples of known conductivity using the application software on a smartphone.

Project Team: (Completed once semester begins)

Name	Responsibility

Faculty Advisor: (Assigned by ECE Dept . based on project requirements)
