

## **2019 Research Week Abstract**

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**Title** – Development of Exfoliated Graphite-Based Human Breast Probe Sensor

**Program of Study** – Mechanical/Electrical Engineering

**Presentation Type** - Physical Poster

**Subtype** – Applied

**Mentor and Mentor Email** – Dr. Ephraim Zegeye (ezegeye@liberty.edu)

**Student name and email** – Cody Clarke (cjclarke2@liberty.edu)

**Abstract:** The main goal and purpose of the research is to study and develop a sensing probe to detect abnormalities in human breasts. This is done to solve the problem of locating cancerous (and non-cancerous) lumps in human breasts. Locating such protuberant masses is important for doctors to diagnose abnormalities, cancer, and diseases in patients. It is important to locate the masses accurately and precisely so that the medical issue may be properly diagnosed. The probe that will be used to locate the problematic masses incorporates the use of an electrode sensor. The sensor is constructed from an exfoliated graphite (EG) solution that, when its shape is altered, experiences a change in electrical resistance. It is this material property of EG sensors that is used to detect the location of masses within human breasts. The probe is constructed from ABS-3D-printed parts and other student-manufactured components that integrate the EG solution. The goal and result will be a handheld probe that can detect the location, depth, and size of potentially-cancerous masses in a breast by palpation. The project sets out to aid in a very serious problem in today's world: breast cancer and other breast related diseases. Clear detection brings a better chance at resolving the issue. A probe of this nature can be a less expensive alternative to ultrasound probes and other breast examination methods. An electrode-based sensing probe can also give different data such as a tangible depth and size of a mass which may lead to a more accurate diagnosis. The probe may also be easier to operate than other technologies used today rendering it more attractive to smaller medical operations and lesser experienced technicians. In the future, this probe may be refined and marketed in the medical

field to serve as a breast examination alternative.

**Christian worldview integration:** The project blends academic knowledge and a Christian Worldview by striving to benefit the lives of others in aiding the resolution of diseases. Caring and sacrificing for others is at the core of a Biblical Worldview. Much of Jesus' time on Earth was used healing people who were sick, injured, and/or lame. Striving to reflect Christ in this way is an objective of this project. Through the impact that such a medical device will have, the light of Christ may be seen and shared. The sensing probe will provide healing and serving opportunities, which as a result, offer avenues to share the gospel to the patients that are being tested. In addition, because the sensing probe is a less expensive alternative to other modern breast sensing methods, it offers a financial relief to the audience of users. All of this is done to be consistent with a Biblical Worldview through acts of service that reflect the nature of Christ. The research design also aims to provide a sense of hope and provide useful information. The research design provides a sense of hope to potential patients as it can give them an alternative source of diagnosis. Perhaps a diagnosis through this medical sensor will offer a more promising result compared to other breast diagnosing tools. The research design provides useful information through the research results. The reported results of this research may give knowledgeable insight to other researchers who seek answers in a related field. Offering such information is of a generous nature which the Lord can use to influence or bless the lives of others. The Lord may be present, revealed, or introduced in many different fashions; and this research is a testament to that truth.