# A Novel Approach for Sensing Seismic Events: Applications of Graphene Nanoflake Powder Composites

Jordan, Isaac

The goal of this project was to design a deformation sensor with optimal performance utilizing graphene nanoflake powder, having the potential to replace or rival current sensors on the market in a variety of fields such as heart rate sensors or seismic sensors. After testing many different designs, mixtures and techniques, it was found that the sensor with optimal performance was made by combining silicone rubber with graphene at a ratio of 3.3:1. The sensor required the additional step of applying voltage while in a semi-cured state to encourage proper orientation of the graphene nanoflakes. The sensor was tested by placing a piece of aluminum foil on a flat surface under the sensor. A steel ball bearing was placed on top of the sensor to act as an inertial mass. 5 volts DC was applied across the sensor via the steel ball and aluminum foil and voltage was measured with an Arduino Uno. Any movement of the steel ball relative to the flat surface causes the ball to deform the sensor which causes a change in conductivity, resulting in a voltage change that is sensed by the Arduino. The voltage data was displayed on a computer for analysis. Sensor characterization shows that the sensor would be effective at detecting seismic waves with a detection range from sub-hertz to over 300 hertz, and is very sensitive. The sensor system has the benefit of being easy to produce and very cost effective with each unit costing less than $20 including electronics.

**Awards Won:**

Society for Experimental Mechanics, Inc.: First Award of $2,500

NASA: Honorable Mention