



# CALIFORNIA SCIENCE & ENGINEERING FAIR

## 2018 PROJECT SUMMARY

<b>Name(s)</b> <b>Johnny Wang; Lizhi Yang</b>	<b>Project Number</b> <b>S1019</b>
<b>Project Title</b> <b>Flexible Capacitive Graphene-Based Touch Panel with USB HID Support</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our project goal is to design a flexible capacitive touch panel for traditional displays by taking the advantages of graphene properties.</p> <p><b>Methods/Materials</b> The graphene conductive sheet is developed using multi-layer graphene, which is produced from pure graphite by meshing graphite flakes onto the surface of a plastic film and reducing the graphite to few layers of graphene. We employ four sensors at each corner of the touchscreen, where we take the ratios of the capacitance values from each sensor as parameters and convert them to mouse coordinates using a mathematical model. We used the Arduino framework and Mathematica to develop our coordinate calculation system written in C++. The coordinates are then communicated to the host computer via USB HID protocol.</p> <p><b>Results</b> The touch sensor yields high success rate when detecting the presence and movement of a finger. The device can detect the presence of a human finger with a 99% success rate. When a finger translates on the screen, the sensors detect its moving direction and speed with an average accuracy of 90%. The mouse coordinates are then computed with those data and transmitted to the host computer. The device takes less than 5 seconds to boot and automatically calibrate the touchscreen. Additionally, the delay is consistently below 10ms.</p> <p><b>Conclusions/Discussion</b> This project showed the potential of graphene as a more robust, environmentally-friendly, and cost-efficient material for replacing conventional technological devices such as the capacitive touchscreen. Further experiments will optimize the graphene production technique and investigate the cause of instability in the capacitance readings.</p>	
<b>Summary Statement</b> We designed a graphene capacitive touch panel for all USB HID supporting devices.	
<b>Help Received</b> We designed, built, and performed the experiments ourselves, with some guidance from our school mentor.	