



# CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

<b>Name(s)</b> Noah M. Cain	<b>Project Number</b> <b>J1205</b>
<b>Project Title</b> <b>Kids Still at Risk: Particulate Matter and Flammable Gas Exposed</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine if there was a positive or negative correlation between relative humidity and particulate matter (PM-10) and flammable/combustible gasses.</p> <p><b>Methods/Materials</b> I built a sensor to measure PM-10, combustible/flammable gasses, and humidity/temperature and conducted my experiment at my school's parent pick-up lane. I built an Arduino microcontroller-based sensor with a Shinyei PM-10 particle sensor, MQ-2 gas sensor, a DHT11 humidity/temperature sensor, and assembled the components on a breadboard in a repurposed Dell computer power supply with fan. I wrote the code, and modified some of the code from a previous version I built, to control the sensors and monitored the serial output on a laptop computer. I copied the data points (over 2000) into a google sheet for analysis and graphing.</p> <p><b>Results</b> My results showed that when there is more humidity, there is less PM-10; and more combustible gas. When there is less humidity, there is more PM-10; and less combustible gas.</p> <p>The average level of PM-10; at 52% humidity was 0.792. The average level of PM-10; at 33% humidity was 1.076. That is an increase of 136%. The average level of combustible gas at 52% humidity was 247.178. The average level of combustible gas at 33% humidity was 185.852. That is a decrease of 75%.</p> <p><b>Conclusions/Discussion</b> My hypothesis was partially correct because although PM-10 decreased with higher humidity levels, the amount of flammable gasses increased. When the humidity level decreased, the PM-10 levels increased, while the combustible gas levels decreased.</p> <p>My hypothesis was that both flammable gasses and PM-10 would decrease on a humid day.</p> <p>This suggests that on dry days, children at Krystal School of Science, Math, and Technology are exposed to higher levels of PM-10 than they are on days with higher humidity.</p>	
<b>Summary Statement</b> I measured an inverse correlation between PM-10 levels and relative humidity, but combustible/flammable gas levels were not affected by humidity.	
<b>Help Received</b> My parents funded the purchase of my materials and drove me to various locations for testing. I selected my project, materials, designed and built my prototype and final sensor, wrote and tested the microcontroller/Arduino code, and conducted the experiment myself.	