



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Gregory R. Levesque	Project Number J0611
Project Title Simulated Artificial Pancreas Model	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to construct and calibrate an electronic circuit that effectively simulates the functionality of an actual artificial pancreas</p> <p>Methods/Materials Utilized electronic circuit components, a conductivity sensor and a pump that I calibrated using a neutral solution to automatically pump vinegar (mock insulin) into a test solution when the pH level of the test solution measured high (mock high blood glucose), thus neutralizing the test solution.</p> <p>Results My first attempts at neutralizing the pH level of the test solution failed. The model was redesigned to correct errors in the circuit and also improve the mounting and calibration of the conductivity sensor. After the redesign, the pump successfully defended the hypothesis by turning off the pump when a neutral pH level of the test solution was achieved. Multiple retests were conducted to ensure the accuracy of the results.</p> <p>Conclusions/Discussion My project used a simple electronic circuit model to mimic the functionality of an artificial pancreas. It demonstrated how a carefully calibrated sensor could be used to start or stop a liquid pump based on a measurement taken from the liquid. My test gave me confidence that a real life artificial pancreas could be created using electronics and software algorithms, this would revolutionize the treatment of Type one diabetes by helping to regulate blood glucose levels for up to 3 million Americans.</p>	
Summary Statement I created a simulated artificial pancreas model that neutralized the pH of a basic solution (mock high blood glucose) by pumping in vinegar (mock insulin) until the solution was pH neutral.	
Help Received I built the model and conducted the experiments myself. My father helped me to identify an error within the circuitry.	