



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Paul R. Gauvreau	Project Number S0305
Project Title Novel Methods of Augmenting Plant Pollination	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment is to provide artificial mechanisms by which one can augment plant pollination. This was done by spurring the release of pollen and providing a mechanism to transfer it from one plant to the next. More specifically, I created a mechanical system that can mimic specific bee behaviors that cause pollen to be released and assist the transfer of pollen from one plant to another. No one has created a device that has the ability to autonomously augment plant pollination. More specifically this experiment is a vital step towards a mechanical system that can autonomously pollination all types of plants.</p> <p>Methods/Materials There are three parts to this experiment, the first and most important part of this experiment is the pollination through vibration, I have developed a bee like device that clips to the stalk of plant and vibrates for a couple minutes every day, mimicking frequencies generated when bees beat their wings. Over time this causes the flowers on the plants to release pollen, which in return, self pollinates the flower, causing a tomato bud to form. The second two parts of the experiments are extensions of the original concept enabled by the utilization of autonomous drones. The first was the use of autonomous drones to cross pollinate plants. This was carried out by pods from one plant to another: the pods are vibrating motors enclosed in a 3d printed housing, and covered in horsehair or filament. The second extension is the novel modulation of motor rotational speed to produce thrust changing at a frequency of 200hz. This was completed by using an Arduino to change the speed 400 times a second. This resulted in a downwards thrust that mimics vibrations created by bees. More specifically this is intended to augment pollination of all plants by causing higher amounts of pollen to be released.</p> <p>Conclusions/Discussion In conclusion, using the beelike devices, autonomous drones, and thrust of 200hz, I can augment the pollination process. Compared a control with an absence of bees, the bee like device increase pollination on average by almost 2,000%, the automated drone provide a mechanism to cross pollinate plants, and the thrust of 200hz allows for a large scale implementation and automation of the pollination through vibration.</p>	
Summary Statement The use of mechanical devices to pollinate plants	
Help Received no one	