



**CALIFORNIA STATE SCIENCE FAIR  
2015 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Hao Yang He</b>   | <b>Project Number</b><br><b>S0307</b> |
| <b>Project Title</b><br><b>Factors of Thrust from Directed Airflow</b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>The purpose of this experiment was to determine differences in airflow propulsion by changing variables of fan blades, air ducts and power input. It was hypothesized that air accelerated due to a combination of the largest amount of fan blades, a convergent duct and a greater amount of power would generate the largest amount of thrust.</p> <p><b>Methods/Materials</b><br/>For this experiment, I acquired sheet metal to craft out the necessary air-ducts and fan pieces. The fan pieces, consisting of either 8, 12 or 16 blades was attached to a DC motor. Batteries ( 0.175 and 0.35 watts) were used to power and spin the fan to accelerate air through either a divergent, cylindrical or convergent air duct. An electronic balance was positioned constantly at the back of the air duct to measure amount of thrust generated based on the force of air pushed against it.</p> <p><b>Results</b><br/>Results suggest that thrust was directly proportional to the amount of power input as well as the convergence of the air ducts. Increasing the power input by twice the amount quadrupled the amount of thrust produced. A switch to more convergent ducts also significantly increased the power output of the system. However, the results also show that larger amounts of fan blades resulted in a decrease in thrust, contradicting the hypothesis.</p> <p><b>Conclusions/Discussion</b><br/>This experiment provided an insight to how these factors affect airflow and propulsion as well as highlighting the complexity of fan-blades and factors of its performance, a topic of further research.</p> |                                       |
| <b>Summary Statement</b><br>To determine how different air ducts, number of fan blades, and power input can affect overall airflow thrust.   |                                       |
| <b>Help Received</b><br>My dad helped me with the set up of the experiment such as placing and securing the components. My cousin also helped me with part of the experiment.  |                                       |