



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Anjaney P. Kottapalli</b>	<b>Project Number</b> <b>J0118</b>
<b>Project Title</b> <b>A Question of Propellers</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My project was to determine whether an increase in propeller size of an indoor free flight rubber band powered aircraft will lengthen its flight duration. I believe that if you do increase the propeller size then the flight duration will increase. <b>Methods/Materials</b> Five different propellers of proportionally different sizes (long, short, wide, thin and, the original "control" propeller) and the same pitch were constructed out of a sheet of balsa wood using a self-made pitch form. One EZ Penny Plane (designed by George Xenakis) was used as the base test plane. Also used were five rubber bands each of the same cross section and length. All five propellers were tested on the EZ Penny Plane five different times for accuracy and repeatability (for a total of 25 test flights). After the test flights were completed my project advisor, Mr. Francis Lee, helped me analyze my data and put it into a presentable form. <b>Results</b> The long propeller had the longest flight duration with the short propeller coming in second followed by the thin propeller. The original propeller had the fourth longest flight duration with the wide propeller having the shortest flight duration. <b>Conclusions/Discussion</b> My hypothesis was partially true because the long propeller had the longest flight duration while the wide propeller had the shortest flight duration. When I began my project I thought that the only variable I had to think about was the propeller size. After analyzing my data I figured that there were some other variables to consider. For example, the drag created by the extra area on the propellers. In my analysis of variance I found that the original, short, and thin propellers had no significant difference between any one of them. The long propeller having the longest flight duration could be explained by the fact that it had so much more tip area that the extra area created more propeller lift or aircraft thrust but the extra area was not enough to create a lot of drag. For the wide propeller my explanation is that it had so much extra area that it created too much drag to be overcome and therefore had less aircraft lift, limiting its time in the air.  Using my project's results the aircraft manufacturers could design a fuel efficient propeller which provides more thrust for less fuel. This would increase the range of propeller aircraft.	
<b>Summary Statement</b> My project is about the effect of propeller size on the duration of flight.	
<b>Help Received</b> Built propellers and plane under supervision of Mr. Lou Young. Flew under supervision of Mr. Francis Lee. Father timed test flights.	