# CALIFORNIA STATE SCIENCE FAIR
## 2011 PROJECT SUMMARY

**Name(s)**
Sankaran Ramanarayanan

**Project Number**
**J0122**

**Project Title**
## Shaping Stabilizers for Emergency Landings

**Abstract**

**Objectives/Goals**
The objective of this project is to determine which shape of horizontal stabilizers provides a safe, twenty-degree-angled touchdown for an air-plane. I tested seven shapes of horizontal stabilizers using a Balsa-wood Glider and a catapult. I predicted that the "Trapezoid-Backwards" stabilizers would result in the safest angle, for the increase of wind contact from back to front would lift the front of the glider. This experiment would translate in the real world to safer emergency landings.

**Methods/Materials**
Seven pair-stabilizers were shaped out of Balsa wood. They had equal surface area and mass. The stabilizers were inserted in a slit in the back of the Balsa-wood Glider. The glider was launched using a regular rubber-band catapult. A high-speed camera parallel to the landing site captured the angle of touchdown. There were twenty-five trials performed with each type of horizontal stabilizer in a garage with no wind interference.

**Results**
The "Trapezoid-Backward" stabilizer constantly reached a touchdown angle of fifteen to twenty-five degrees, while the rectangular, trapezoid-forward, semi-circle, and oval had results nearing the thirty to hundred-degree range. The "Triangular Backwards" stabilizer with similar shape to the winner came close with an average angle of more than thirty, but not close enough.

**Conclusions/Discussion**
Horizontal Stabilizers have a great impact on angle of touchdown for a jet. Preparing Horizontal Stabilizers with increasing surface area from back to front will help reduce landing-crashes in the world of commercial flights and mass transportation.

**Summary Statement**
The purpose of this project is to determine which type of Horizontal Stabilizer causes an air-plane to land with a safe angle.

**Help Received**
Mr.Talsky, my teacher, helped with background research; Father helped with lighting in the garage.