



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> Stephen C. Foster	<b>Project Number</b>  22791
<b>Project Title</b> Modeling Planetary Environments in Virtual Reality	
<b>Objectives/Goals</b> The purpose of this experiment is to show how air-resistance and gravity affects how a ball bounces on Earth and Mars. Also, to see if this can be molded in virtual realty environment. <b>Abstract</b> <b>Methods/Materials</b> 1- Find data on atmospheric density, needed in the formula for air resistance, and the gravitational pull on Earth and Mars. 2- Create a virtual reality simulation of a ball bouncing on Earth, using the variables of air-resistance and gravity, in the Python programming language. 3- Run the simulation using VRUT (Virtual Reality Utility, a 3D graphics environment specially designed for building and rendering virtual environments). 4- Record coordinates of ball position for 13 seconds, recording every 1/100th of a second. 5- Use the same procedure of steps 3 and 4 with the air resistance and gravity of Mars. 6- Compare the Earth simulation <b>Results</b> In my experiment the ball on Mars bounced farther, higher, faster, and for a longer period of time, compared to a similar ball on Earth. <b>Conclusions/Discussion</b> The variables of air resistance and gravity affect the bouncing of balls. I was able to sucessfully model this in virtual reality which enabled me to conduct my experiment in 3D.	
<b>Summary Statement</b> I modeled and compared the gravity and air resistance of Earth and Mars in virtual reality.	
<b>Help Received</b> Learned to use virtual reality software at University of California Santa Barbara under the supervision of Dr. Andy Beal during a summer internship. Borrowed university virtual reality goggles to view the final experiment.	