



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

<b>Name(s)</b> Sean S. Haas	<b>Project Number</b> <b>S1410</b>
<b>Project Title</b> Unbeatable PONG through Artificial Intelligence	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Since the dawn of the industrial revolution machines have worked side by side with humans, but they have not always been able to reason out and overcome human inconsistencies. The goal of this project was to make an artificially intelligent computer program to play the novel game, PONG. The computer program mimicked human thought processes, and its programmed speed and efficiency was tested against humans. My null hypothesis was that there would be no difference in the success of a computer controlled paddle and a human controlled paddle while playing the PONG game.</p> <p><b>Methods/Materials</b> Three programs of PONG were written to determine the successes of both humans and a computer program while playing PONG. Human vs. wall and computer vs. wall games were used to gather baseline data, and a human vs. computer game was designed to compare relative successes in an actual competition. The computer used a modified slope-intercept equation to predict where the ball would intercept the wall, and moved its paddle to the point of intersection. The number of successful hits by each player was divided by the total number of possible hits; this rendered a percentage of successful hits and rates of success. I used the baseline tests as controls to compare to the results from the human versus computer game. These programs were written using Microsoft Visual C# Studio.</p> <p><b>Results</b> All computer trials, both against a wall and against a human opponent, obtained a 100 percent success rate. Human success rates ranged from 62 to 85 percent in both the baseline tests and the actual game, with an overall average success rate of 73 percent.</p> <p><b>Conclusions/Discussion</b> The null hypothesis that there would be no difference in the success rate of a computer programmed paddle versus a human controlled paddle while playing PONG was rejected (<math>P &lt; .001</math>). The computer was significantly more successful than humans while playing PONG. My results demonstrated how a computer or machine can be programmed to carry out human tasks much more efficiently than a human. The results also demonstrate how computers can react logically and more efficiently than humans. The results also show that the use of computers to calculate predictions could easily be expanded to be used in assembly lines with on the fly adjustments and self troubleshooting capabilities to minimize the effects due to human error.</p>	
<b>Summary Statement</b> I wrote artificially intelligent computer programs to test against humans.	
<b>Help Received</b>	