



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Raam Tambe</b>	<b>Project Number</b> <b>J1414</b>
<b>Project Title</b> <b>What If We Were Wrong? Security Algorithms' Sensitivity to Noise in Terms of Defender Expected Utility</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> In security games, defenders allocate resources then the attacker attacks as to maximize utility. However in a given security game, if the matrix changes and a target is worth more or less than previously predicted, a recipe for disaster is created. Applied to the real world, smugglers, poachers, terrorists etc., could make away with doing much more harm.</p> <p><b>Methods/Materials</b> This project tests two algorithms DOBSS and Match in terms of robustness to noise, or their sensitivity to change, by testing them in four different matrices with various amounts of noise in the input and measuring the defender utility. If two programs DOBSS and Match were tested on their sensitivity to noise in the matrix, it was believed that Match would yield a higher utility than DOBSS.</p> <p><b>Results</b> Contrary to the hypothesis, on average between all matrices, DOBSS yields a higher expected utility of 1.33462 points, than match yielding a utility of 0.1992 points, an average 1.13542 points higher. DOBSS therefore within the given setting is more robust to noise than match.</p> <p><b>Conclusions/Discussion</b> Alone, the results are not sufficient enough alone to indicate whether or not DOBSS is more or less robust to noise than Match, further research and more tests are needed to provide an answer that would hold true in almost all scenarios. However this project provides massive steps towards future projects, and sheds needed light on the issue.</p>	
<b>Summary Statement</b> This project tests security algorithms implemented across the nation on how well they would continue to protect us if the presumed values for targets the algorithms are defending changed.	
<b>Help Received</b> Dr. Milind Tambe, for teaching me the concepts that lead to this project being created; Andrea Acres, my science teacher, for helping correct papers, and giving the project direction; and Sonali Tambe, my mother for providing me with support when I was stressed.	