



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> Sarah Knight; Amanda Whitney	<b>Project Number</b> <b>S1212</b>
<b>Project Title</b> <b>A Simulation of Optic Flow in a Predator Prey Relationship</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this project was to design a computer program that could accurately simulate Optic Flow and its effects on a predator/prey relationship. <b>Methods/Materials</b> A mobile robot with simple vision capabilities was used to run short optical flow algorithms that simulated the tracking of mobile #prey# in an artificial environment: a darkly colored arena with contrasting white paper insects that a simple linear camera could detect. The computer programming language, Python, was used to program the robot to take pictures with the linear camera until #prey# was visualized. The program was then designed to do contrast stretching, pixel thresholding, grouping of continuous blocks of light (blobbing) and blob tacking (Optic Flow). The contrast stretching improved the visual image, and the thresholding served to eliminate all unnecessary visual information like an organism#s brain eliminates all visual noise. The robot was programmed to find and characterize contiguous image features (find the best #prey#) and simulate an organism#s neuro-muscle network by determining a correct direction of travel to the image feature of interest. <b>Results</b> The program accurately provided the robot with reactions comparable to organisms in their natural environments, and therefore, an Optic Flow model is plausible and merits further research. <b>Conclusions/Discussion</b> Further experiments with colored cameras also deserve research to more accurately simulate Optic Flow of organisms that see in color.	
<b>Summary Statement</b> The purpose of this project was to determine how Optic Flow in a predator/prey relationship could be plausibly explained through a simulation of behaviors applied to a Hemisson robot by a computer programming language, Python.	
<b>Help Received</b> Phill Whitney helped build arena; Robin Knight provided robot and framework programming	