



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Megha Manjunath	Project Number J0625
Project Title Stereo Vision: Do We Really Need to Recognize Images to Perceive Depth?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Stereo Vision refers to the ability of animals and humans to fuse the left and right eye images to perceive the 3D world around us. This depth perception requires matching visual features from the left and right eye images. In this study I explore how the presence of these recognizable visual features affect the time it takes to perceive the depth. In particular, do we need to recognize the image content individually to perceive depth?</p> <p>Methods/Materials Students in the age group 10-14 were selected to view 15 stereo image pairs, and three random dot stereograms. Stereo images were taken from a standard digital camera by displacing the camera by 6 centimeters from left to right. The stereo images were combined together on the computer using Photoshop software. Each pair was altered in 3 different color variations; original color, black & white, and inverted color. The random dot stereograms were taken from the Magic Eye II book. Random dot stereograms do not have a distinguishable pattern when viewed one at a time. Stereoscopes were used to view all 18 images. The times the viewers took to perceive the 3-D images were recorded into a log book.</p> <p>Results The normal stereo image pairs took about 1-10 seconds for the viewers to see, while they took 30-90 seconds to see the random dot stereograms. The data was graphed onto four different graphs. Each graph represents the average time to perceive depth and its standard deviation. The first graph compares the stereo images amongst themselves. The second graph compares the original color stereo images to the black & white images and the inverted color images. The third graph compares the random dot stereograms amongst themselves. The fourth graph compares both the stereo images to the random dot stereogram.</p> <p>Conclusions/Discussion The time to perceive depth increases as the complexity of the image features increases. There wasn't any significant difference between the color and black & white version images, but the inverted color images were much more difficult to see. Surprisingly, experiments with the random dot stereograms showed that we can still perceive depth with absolutely no recognizable image information at all!</p>	
Summary Statement This project is about how the presence of recognizable features in image pairs affect the length of time to perceive depth.	
Help Received Dad helped in graphing results. Got help from UCSB graduate students, Dmitry Federov, Michael Quinn, and Thomas Kuo to take stereo pictures.	