CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J1912

Project Title
A New Perspective with a Digital Pinhole

Abstract

Objectives/Goals
The objective is to determine which pinhole size will produce the best resolution for a Nikon D200 digital pinhole camera.

Methods/Materials
The digital pinhole camera was made by piercing a hole in the body cap. The lens was removed and an aluminum foil with a pinhole was taped to the body cap. A total of eight pinholes were made. Exposure was taken several times for control of brightness. Out of all of the pictures taken, only eight best pictures (one for each pinhole) was printed out. The resolutions were then measured on a scale of 1-10, where 10 was the best resolution outcome and 1 was the worst resolution outcome.

Results
Five objects were tested: chair, eye chart, eye chart-2, fence, and a house. The eight different pinholes have a size of 0.005mm, 0.01mm, 0.2mm, 0.3mm, 0.4mm, 0.8mm, 1.3mm, and 2mm. The largest pinhole with a diameter of 2mm allowed in too much light making the image blurry. On the other hand, the smallest pinhole with a diameter of 0.005mm allowed in too little light that the light rays overlapped each other causing diffraction. It turned out that a pinhole with the size of 0.2mm produced the most effective resolution.

Conclusions/Discussion
This experiment helped to achieve the objective. A pinhole that was either too small or too large had bad resolution and could not be seen well. The next pinhole that was almost as equally clear as the first one had the size of 0.01mm. This suggest that any pinhole size between the range of 0.01mm and 0.2mm will have a clear resolution while anything else above or below will not have such good resolution image due to diffraction.

Summary Statement
A pinhole with the size of 0.2mm gave the best resolution image for a Nikon D200 digital pinhole camera.

Help Received
Professor Steve Sprangler gave many helpful advices; Dad helped in taking pictures and choosing the best one for each pinhole.