CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
J0212

Project Title
Safe Scratches on CD

Abstract

Objectives/Goals
The objective of this project is to examine how CDs are protected against scratches and markings. The error correction mechanism is pre-studied before this project.

Methods/Materials
Use 30 CDs which are fully recorded with the same data. Then, continue to make scratches on the surface of a CD and test the readability until the data is no more readable. The tests are performed for several types of scratches such as radial scratch, circular scratch, and optical markings.

The materials needed are:
PC with CD-ROM drive
30 Blank CDs
Exacto knife (making scratches)
Permanent black marker (marking)
Acetone (erasing markings)

Results
Experimental results show that a CD's protection against scratches depends on the pattern of scratches. When the scratches are thin and lie in the radial directions, the CD is well protected and the files opened in regular speed. However, with many scratches, reading operation finally stalled. When the scratches are thick or they lie in the circular direction, the files opened slowly, and tended to stall occasionally. Experimental results also show that a CD is very sensitive to markings. However, it returns to its normal condition once the marking is removed.

Conclusions/Discussion
A CD has different levels of protection against different patterns of scratches. It is very sensitive to circular scratches but radial scratches are relatively safe. This agrees with the error correction mechanism of a CD called the interleaving.

Summary Statement
This project examines how sensitive a CD is to different patterns of scratches and markings and discusses the protection mechanism of a CD against scratches.

Help Received
My father explained the protection mechanism of a CD. My school science teacher, Mrs. Miller, helped me with the clarification of hypothesis and also my English mentoring.