CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)

Nicholas A. Hosein

Project Number

22041

Project Title

Demonstration of the Shape Memory Properties of Nitinol through a Simple Robot

Abstract

Objectives/Goals

To demonstrate the shape memory property of nitinol and its possible application to artificial limbs as well as robotics. To show the advantages of nitinol over standard servos used in artificial limbs anx robots.

Methods/Materials

Through the use of Nitinols linear motion an angular motion can be created by attaching the Nitinol wire close to the joint of the leg allowing for a small amount of torque. the angular motion of the leg will push the robot foward. The Nitinol wire will have a rubber band as a bias force streaching it out again so that it can repeat the stepping motion repeatedly causing the robot to walk.

Results

The nitinol has a contraction percent of 5% on average. It moved the robot leg as intended and proved to operate for long periods of time.The longer the wire the more current needed to cause it to contract. If I didnt give the wire enough current then it would not contract very much. If I heated it too much the wire would burn out quickly.

Conclusions/Discussion

The robot worked very well. The Nitinol wires were able to handel very little torque, which verifies that it must be very strong. Some problems faced were that the Nitinol wires would burn out quite often whenx controlling the robot manually. I solved this by using a basic stamp to turn on and of a switch, which sent current through the Nitinol wire. When building the robot the Nitinol was very hard to work with because of the fact that it was the thickness of a human hair. It was very interesting working with nitinol because it is amazing how strong and durable it is. My conventional wire cutter could not cut the nitinol. I belive that nitinol has a lot of potential and I plan on doing further research into it.

Summary Statement

The shape memory properties of nitinol.

Help Received

Chris polous taught about circuitry design