CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
Alexander T. Ryan

Project Number
J0920

Project Title
Web-Controlled Mobile Video-Enabled Collection Device

Abstract

Objectives/Goals
Litter is a big problem in today's world. In addition to its unappealing look, litter may actually harm animals and pollute the environment. Unfortunately, there are not really any good methods of collecting litter and removing it. Removing litter by hand is expensive, time-consuming, and inefficient. I wanted to see if it was possible to create a remotely controlled robot that could clean up efficiently and inexpensively.

Methods/Materials
I used an RC car as the wheelbase of the robot, and used a DLP-I08 USB I/O cable and relays to interface a laptop running Ubuntu and the radio control for the car. I purchased and assembled an advanced robotic arm kit, and interfaced it, using two DLP-I08s and relays, to a miniature computer (called a fit-PC) running Ubuntu. I created a webpage, running off Apache on the laptop, that linked to a shell script on both the laptop and the fit-PC. Each shell script controlled its respective DLP-I08s based on input from the webpage. I purchased a wireless webcam and attached its power cable to a battery. I attached wires from another battery to the miniature computer. I mounted both batteries, the fit-PC, its DLP-I08s, and the robotic arm on the RC car. I also cut and spray-painted an aluminum L-bar, mounted a trash receptacle and the webcam on it, then attached that assembly to the robot.

Results
The remotely controlled vehicle I built was able to pick up litter that weighed from 0.05 grams to up to 100 grams. The device could be controlled over the world wide web through any ordinary computer.

Conclusions/Discussion
I found that it was possible to create a litter-cleaning robot from readily available technology. A similar machine to the one I constructed could be mass produced fairly cheaply. The robots could be used to clean city parks, theme parks, parking lots, highways, or other places with large amounts of litter. Developing certain software could even eliminate the need for human control, allowing for a completely autonomous and efficient robot.

Summary Statement
In this project I attempted to create a wireless, remotely controlled device, capable of picking up litter, by creating circuit boards, a web page, and cgi scripts that controlled a vehicle and robotic arm.

Help Received
Parents paid for supplies; father supervised safety procedures and provided guidance; uncle helped me resolve software bugs.