CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Rui Jin

Project Number
S1310

Project Title
Intelligent Irrigation Control System

Abstract

Objectives/Goals
An enormous amount of real-time information that is available on the Internet can be accessed and used in traditional control systems to improve performance. The objective of this project is to design and build an autonomous control system that manages an irrigation system to save water using Internet-obtained weather forecasts and local-obtained rainwater level information.

Methods/Materials
The control system consists of a computer and a circuit controlled by a microcontroller. In the computer, a Java program developed by the exhibitor downloads XML weather data from the Internet, parses the data to interpret the probabilities of precipitation for the next five days, and sends the precipitation data to the microcontroller through a serial port. An exhibitor-developed BASIC program in the microcontroller then interrupts the irrigation system if rain is predicted within two days. During and after a rain, the control system utilizes a rain sensor to detect the presence of rainwater, and keeps the irrigation interrupted when rainwater is present. To interrupt irrigation, the microcontroller breaks the connection between the irrigation system power supply and the irrigation valves.

Results
The control system successfully interrupts an irrigation system when one of the following conditions is met: precipitation is predicted within two days based on Internet weather forecasts, or rainwater present during and immediately after a rain is detected by the rain sensor. In arid environments such as San Diego, this control system could save an estimated 8000 gallons of water per year for a 1000 square feet lawn, or 21% of the total water to irrigate the lawn. The water savings from using both weather forecasts and a rain sensor is 53% more than the water savings from using only a rain sensor.

Conclusions/Discussion
Water conservation is vital in today's world parched by record droughts. Using Internet-obtained weather forecasts as an additional input for an irrigation control system significantly increases the system's performance, saving large amounts of irrigation water. In addition to irrigation control systems, Internet resources may be accessed and used in other applications, such as in traffic light control systems, thermostat control systems, and electrical grid control systems.

Summary Statement
The exhibitor designed and built an autonomous control system that manages an irrigation system to save water using Internet-obtained weather forecasts and local-obtained rainwater level information.

Help Received
None