iRobot Window Checker

Introduction

Part of the college's Climate Action Plan is the reduction of energy used in the heating and cooling of campus buildings. Our class has identified an innovative way of further increasing the energy efficiency of the Chambers academic building. In the warmer months of the year, students and professors frequently open classroom windows to let in fresh air. The problem is that they then neglect to close the windows, leaving them open all through the afternoon and night. Since the temperature and air filtration systems of the rooms and building in general are self-regulating, much energy is wasted when the systems tries to regulate a room with open windows. A large amount of energy could be saved if it was ensured that these windows were closed after the last class leaves the room each day.

Proposal

To this end, the CSC 382 Artificial Intelligence class, taught by Dr. Laurie Heyer, proposes a solution which will help reduce energy waste through these open windows and provide us with an opportunity for first-hand experience in robotics, an increasingly important subfield of Artificial Intelligence.

Our solution centers on configuring, programming and testing small robots to navigate Chambers at designated times, determine which classrooms have open windows, and report the room numbers (e.g., by email) to an agent capable of closing them. In this class, we have learned a variety of data and image processing methods that will enable us to implement this solution, but the college does not have the appropriate hardware.

We propose purchasing two iRobot Create robots, essentially the same hardware as the Roomba robotic vacuum cleaner. These commercially available robots are designed for educational projects such as ours, and include developer tools that enable us to program the robot directly, as well as wirelessly communicate with the robot from a standard laptop or desktop computer.

Dissemination of Project

The class will describe and demonstrate the project in the Science Poster Session at the end of the spring 2012 semester. The poster session is open to all members of the campus community, and typically includes about 70 student projects.

Some members of the class will also demonstrate the robots at a local school. We will work with the HHMI Outreach Coordinator to find a suitable venue for this demonstration.

Future Use of iRobot

The purchase of these robots is an investment in interdisciplinary education for future generations of Davidson students. The robots are reconfigurable and re-programmable for other projects in future years. Professors will be able to incorporate

the robot into their curriculum, opening the door for interactive and innovative projects with robotics. With a two-year visiting professor in computer science joining the faculty next year (whose expertise is in Artificial Intelligence), and overall increased interest in computer science at Davidson, iRobot is an excellent investment in the future.

Estimated Budget

2 iRobot Create (developer's package w/ command module):	$600
1 BAM/bluetooth dongle combo for remote communication:	$100
Sensors:	
-Simple camera:	$ 50
- IR sensors:	$ 10
-temperature/humidity sensors:	$ 20
<u>Miscellaneous hardware:</u>	$ 20
Total:	$800