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CSCI197
3/2/2005

Project Proposal: IR control

Construct a robot using Lego Mindstorms (LM) components that will be capable of re-programming other(s) LM robot(s) via IR receiver/transmitter.

Introduction

In a rescue mission scenario, where the scene of an accident presents some danger it will be wise to stay at a safe perimeter and allow a robot to carry out its functions. Controlling a robot directly via a remote has a major drawback in as it takes at least one person to fully control a single robot, thus limiting the amount of robots that can be deployed. Another drawback is the need to have constant and reliable communications link with a remote controlled unit, thus limiting the operational range of the robots.

Solution

A robot that can perform tasks without constant input from a human controller does not need a reliable communications link (allowing it work in more places). Several of such robots may be deployed simultaneously without the need for more human controllers. Communication problems can be overcome by a special (competent) robot that has the ability to program those that are in the field (incompetent).

Scenario

Multiple LM robots are executing a program that requires completion of several objectives (which are assigned priority). Since real world is rarely static, it is often necessary to change the priority order of objectives or to begin execution of a new program entirely. Another challenge of the real world is that contact is often lost with robots that are too deep in the field.

An LM robot can be controlled from a desktop computer using an IR tower attached to that computer's USB port. Once out of the tower's range, however, an LM robot cannot accept additional instructions. This challenge is solved with a competent robot.

Once new instructions are generated, they will be transmitted to a competent robot by conventional means (IR tower). Competent robot, in turn, will seek out incompetent robots and relay new instructions. An incompetent robot will gain a new set of software instructions, but will not be made competent. Advantage of this solution is that it eliminates the need to set-up a 'control base' in proximity of operations.

Required Equipment

Demonstration will require at least two RCX bricks, IR tower and a portable computer. I require one RCX brick. I will provide the competent robot made from my

own LM set, an IR tower, as well as a portable computer. If there are no spare RCX bricks available, I will ask for a 'volunteer LM robot' once its presentation is complete.

Deliverables

Competent Robot

Robot will be programmed with lejos. It will be built in form of a rover, with touch sensors attached to a bumper to minimize collisions, and at least a light sensor to aid its search for incompetent robots.

The robot will carry out a 'seek-reprogram-seek' algorithm outlined further on the next page.

Incompetent Robot

This can be any RCX brick provided that it has batteries.

