

## Challenge Three: *Touch-Free/Wander*

ROBOTIC AUTONOMY  
Summer 2002

Your trikebots now have *sensors*. You can tell when the trikebot is pushing on an object, and you can use the rangefinder to measure distance. Now it is time to write autonomous programs for the trikebot so that it can wander and so that you can take it places *quickly*.

### Touch-Free (30 points)

In this challenge you will help your robot get from its starting position to a goal position as quickly as possible. The only means you'll have to guide your trikebot is to signal to it with your hand or another part of your body. This action makes use of the rangefinder. This is the only way you can communicate with your robot! The start and goal positions are in opposite hallways, through the main foyer in Building 17.

#### Additional rules:

- Your trikebot may not hit *anything*, including you.
- There will be three zones. Each of your team members will be "conducting" the robot in one zone only.
- There will be obstacles scattered in the main foyer.
- You will have 1 practice run followed by 3 official timed runs. You are allowed to change parameters (such as robot speed) for each official timed run. Your score will be based on reaching the goal. *Extra credit will be given for a fast time.*

### Wander (35 points)

Create a button that, when pressed, enables your robot to autonomously wander through any space. A good wanderer explores effectively and is enjoyable to watch. We will test your robot by subjecting it to various test environments and situations with fixed and moving obstacles. For example, your trikebot should not be stationary for more than 10 seconds or bounce back and forth infinitely in a tight space. Human intervention to free a trikebot that is stuck will cost you points. However, if the robot recognizes this and asks for help, you will gain points. *Extra credit will be given if your program uses randomization of trikebot movement to guarantee that it does not become infinitely stuck.*

### Open Source (15 points)

We want you to start sharing your code with your fellow robonauts! So, put a ZIP file containing your code for WanderBot in your team folder: the UserWindow.java and UserThread.java files. In order for someone to not just get a copy of your code, but actually be able to use it, you need to provide them some helpful information in the form of a document. Your writing about the code should include the following ingredients:

- Summary: what this program does
- Directions: how to run Wanderbot
- Performance: how you have tested Wanderbot and how well it did
- Limitations: how and what causes Wanderbot to perform poorly
- Suggested Improvements: what you would do next to improve Wanderbot

To support your description, we will ask you to help videotape a ten-second shot of your Wanderbot moving as well as two pictures showing it in normal circumstances. We will put these pictures and video in your team folder.

### Web Documentation (15 points)

The questions to submit for your web site this week are:

- 1) Describe the key piece of code you wrote or modified that made Touch-Free. What does it do? How?
- 2) Make a sketch for scanning of the obstacles your trikebot encountered in Wander. Indicate for each obstacle your trikebot encountered what sensor was activated and how your trikebot responded. Give a general idea — it's just a sketch!