Lab 6 – Description

At the end of Lab 5 you should have succeeded in finding a ball in a prescribed search area. Lab 6 will investigate using the Bluetooth subsystem to arrange a rendez-vous with another Tribot at the found ball position.

Step-by-step

1. Modify the code from Lab 5, Section 3 to include an odometry program running in the background and displaying current position, relative to the starting point, on the NXT LCD display. Repeat the experiment (finding the ball) and note the position indicated on the LCD display at the ball found position. The TA's wll have set up a starting location and placed the ball at a predefined location. Determine the accuracy of your odometry.
2. The next step is to set up a Bluetooth link to a second Tribot that the TA's have pre-programmed for this experiment. They will provide you with the appropriate pairing information so that you can link your Tribot. The BTlib files that are part of the Lab 6 folder provide you with a simple Bluetooth library that you are to use for this exercise. In this exercise, your Tribot will operate as a slave, and will continually write odometry values in an outgoing mailbox as follows.

   Recall that there are 10 mailboxes, numbered from 0-9. In addition, the slave maintains an additional 10 mailboxes for outgoing messages to the master, so, to write to mailboxes 1, 2, and 3 on the master, the slave would write to mailboxes 11, 12, and 13 as shown in the following example:

```
long x,y, status;
string msg;

msg=NumToStr(x)
BTSendMessage(0,11,msg);
msg=NumToStr(y)
BTSendMessage(0,12,msg);
msg=NumToStr(status)
BTSendMessage(0,13,msg);
```

   Modify your code from Part 1 to include a communications thread that continually broadcasts current position as determined by odometry and status information where 0 indicates "searching" and 1 indicates "ball found". Pair your Tribot with the TA's machine and repeat Part 1. The TA's machine will be programmed to continually post the position and status of your Tribot to its LCD display. Verify correct operation of your code and demonstrate to the TA.
3. The final part of the exercise is to write the code for implementing a rendez-vous at the ball location. This code will run on a second Tribot that will be started from the same origin as in Part 2 (after the first Tribot is sent on its way to search for the ball). The second Tribot will continuously monitor the position of the first and display the positions of both robots on its LCD display. When the status of the first robot indicates "ball

found", the second robot will move to the position indicated by the first. However there will be one slight modification needed to the first robot's code. Rather then reporting its location on finding the ball, it will add an offset indicating where the second robot should arrive at, i.e., the rendez-vous location. The offset should place the second robot approximately 10 cm on the other side of the ball. Final orientation is not specified, i.e., the two robots do not need to face each other for this exercise.

The second robot is to be programmed as the Bluetooth master, and continually reads mailboxes containing the slave status information. You should be able to reuse much of your code from Part 2. For demonstration, you will be provided with a second Tribot on which to demonstrate the robot 2 code.

To hand in

1. Your fully documented code for all 3 questions.
2. A description of the test procedures you used to validate your code.
3. A brief analysis of the performance of your system for Parts 1-3.

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