Robotics Challenges Level 1

Once you've completed the tutorials, you can start earning more and more advanced challenges. This is somewhat like earning badges in scouting or making higher level teams in sports.

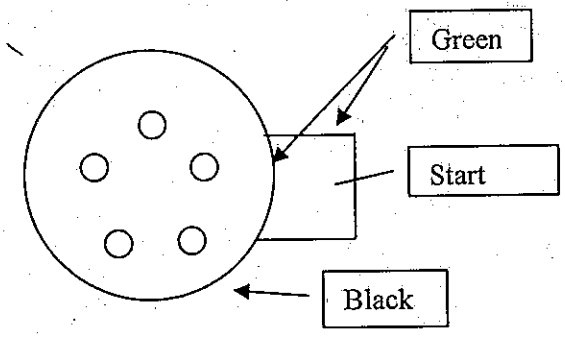
Flashlight Follower – 100 RoboBucks

Design a robot that can follow a flashlight from more than ten feet away.

CanDo Basic - 100 RoboBucks

The field consists of a 36" diameter white circle with a black border. Inside this circle are placed five "cans". Your robot must move at least three of these cans outside of the circle within two minutes while keeping them upright.

The field looks something like this:



Rules:

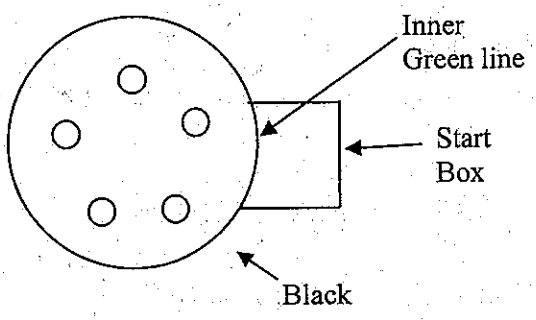
1) Robots must start completely inside the Start Box. None of their parts can extend out past the start box until "Run" is pressed.
2) Robots must push the cans out of the circle
3) A can is counted out the moment it is completely over the boundary circle. It must be standing upright when released by the robot.
4) Touching or signaling a robot during a round disqualifies it from finishing the rest of the round. Cans already outside the circle are counted.
5) Robots may use the area just outside the ring for turning only

CanDo Advanced – 300 RoboBucks

This is much the same as the Basic CanDo challenge except for one nasty twist.

The field consists of a 36" diameter white circle with a black border. Inside this circle are placed five "cans". Your robot must move at least three of these cans back into the green start box within three minutes.

The field looks something like this:



Rules:

1) Robots must start completely inside the Start Box. None of their parts can extend out past the start box until "Run" is pressed.
2) Robots must push the cans back to the green start box.
3) A can is counted out the moment it is completely past the inner green line of the start box. It must be standing upright when released by the robot.
4) Touching or signaling a robot during a round disqualifies it from finishing the rest of the round. Cans already outside the circle are counted.
5) Robots may use the area just outside the ring for turning only
6) Each round is three minutes long
7) If a robot is stuck outside the boundary circle for more than 15 seconds, the round is over and the cans are counted

Robot Artist – RoboBucks Vary

Create a robot that can draw a picture. It should be able to raise and lower its pen. You'll probably want to mount the pen in the center of the robot so it will draw a sharp corner when the robot turns.

Sound Tracker – 600 RoboBucks

Using two microphones, design a robot that can home in on and go towards a continuous tone. The higher the tone the more directional it is. That tone might be produced by another NXT, a tone generator, or a whistle.

Monorail – 200 RoboBucks

Build a robot that can travel along a 2x4 on the robotics track in the lab. It must make it from one end to the other without touching the ground and then reverse.

Joystick Controlled Robot –500 RoboBucks

Build a joystick that can steer a robot. You'd use two rotation sensors or NXT motors to sense the joystick position in either axis and translate that into movement of the robot. Do a Google search for "NXT joystick" for ideas, especially on the philohome website.

Lego Musical Instrument – RoboBucks vary

Make a musical instrument out of Legos. This could be anything you can dream up. Some ideas are a trombone, piano, drum, xylophone, player piano.

Off the Road – 300 RoboBucks

Your instructor will create a course filled with all kinds of nasty obstacles and general crud from around the lab. These obstacles can be up to an inch tall. Your job is to build a robot that can make it through the course by climbing over, under, or through the obstacles to get from one end of the course to another. This is more about mechanical design than fancy software.

Table Cleaner – 700 RoboBucks

Create a robot that will wander around on a table top and pick up any Lego blocks it sees. Note that the robot can't fall off the table and can't just push the blocks around; they have to be collected within the robot somehow. Care should also be taken not to have the robot get tripped up on pieces that happen to get in the path of the wheels.

DrummerBot – 400 RoboBucks

Build a device that can play the Drums. Drums can be made out of Glad Wrap over wheel hubs. Your device should have two drums and a cymbal made from something you find around the house and should be able to play an entertaining drum solo, not just a bunch of noise.

Level 3

Quadruped – 500-1000 RoboBucks

Build a four legged robot of your own design that can move forward and backwards. An extra 500 RoboBucks if you can make it turn left and right! There are lots of these on the web which you are welcome to look at for ideas but the final must be yours.

Car Steering – 600-800

Build a robot that steers like a car rather than a tank. If the robot just drives around on it's own, 600 RoboBucks. If you remotely control it with a second NXT and a steering wheel - 800 RoboBucks.

Sound Controlled Robot – 700 RoboBucks

Create a robot that can take sound commands to move, forward, back left and right. These commands can take any form you like.

Fido – 700 RoboBucks

Fido is a robot "dog" that comes when called. No matter where you are you should be able to clap your hands (perhaps constantly) and have Fido come to you. No fair giving clapping signals to tell the robot to turn one way or another. It has to figure that out on its own.

Pong – 800

The game that started it all, now on the NXT! Control a paddle using the left and right buttons on your NXT to keep a ball bouncing on the screen. The ball just bounces when it hits a side that doesn't have your paddles on it. When you miss the ball, the game is over. 200 extra robobucks for keeping score based on how long the ball remains in play. 200 on top of that for having the difficulty increase with time. See Multiplayer Pong if you still want more!

Sorter – 700 RoboBucks

Build a machine that can sort color bricks (or marbles or M&Ms or ?) into two or more piles depending on color.

Catch the Trash – 700

Turn the NXT into a game system. In this game pieces of "trash" fall from the top of the NXT screen. You use the left and right arrow keys to move a trash can back and forth on the bottom to "catch" the trash. When you've dropped three pieces of trash, the game is over. Your score is the number of pieces picked up

Wall Climber – 100-1000 RoboBucks

Build a robot that can climb over a brick wall. The robot may not be any more than 5" high when the run button is pressed. You can't touch the robot again until after it is over the wall. It may not leave any parts or ramps behind and must start out flat on the ground (it can't be on a platform). A bonus of 200 RoboBucks will be paid if the robot is still in one piece and operational once it gets over the highest wall it is intended to climb.

1 brick – 100 RoboBucks (no bonuses)
2 bricks – 500 RoboBucks
3 bricks – 750 RoboBucks
4 bricks – 1000 RoboBucks
These are not independent payments. If your robot just made it over two bricks, you'll only get 250 additional RoboBucks if it makes it over three.

Follow the Leader – 500 RoboBucks

This uses two standard robots. The first one is the "scout". It drives around until it runs into something. It then backs up and turns away from it and continues. The second robot (the follower) gets signals from the first. When the scout does something to avoid an object, the follower does the same thing to avoid making the same mistake. They follow each other around the lab.

Can Collector – 800 RoboBucks

This robot seeks out white "cans" (really PVC pipe couplers) from Can Do and picks them up dumping them in a basket it carries with it. When it gets all three cans within 3 minutes, you win. It must stay within the Can Do circle and not be helped by humans. It must know that it has gotten 3 and stop.

Automatic Can Crusher – 1500 RoboBucks

This device can accept three or more soda cans and crush them one at a time. It feeds the new can in, crushes it, spits it out, and then feeds the next can.