

## NCPS Tutorial#2

In this tutorial you will learn to calculate the actual speed of your NewCDBot by writing a simple program to drive the robot forward for 10 seconds and then stop. You will then measure the distance traveled by your robot and use a formula to calculate the speed.

We are ready to start programming with the NewCDBot Programmer Software (NCPS). First open up the NCPS by double clicking on the NCPS icon, which should appear as shown below.



To start a new program, simply click on the File menu and then click New and your code should be as shown below. Also be sure to give your new program a unique name using the Save As menu command.

```
Sub RunRobot()  
  'Delete this line of code and add your own code!  
End Sub
```

You can go ahead and delete the commented line of code that reads, “Delete this line of code and add your own code!” using the “Delete Line of Code” button. Your code window should now display the code shown below.

```
Sub RunRobot()  
End Sub
```

You may want to add a comment line to your code so that everyone knows who wrote the program. For this tutorial I will type in the following comment: “This program was written by Abe Howell.” The code window will now display your comment as shown below.

```
Sub RunRobot()  
  This program was written by Abe Howell  
End Sub
```

You are now ready to program the speed of your robot by using the “CDBot Speed” scrollbar. Simply drag the scrollbar until it reads 10, like the one shown below.



To program the CDbot Speed into our program we click the “Set Speed” button and your code should appear as shown below.

```
Sub RunRobot()  
  This program was written by Abe Howell  
  speed= 10  
End Sub
```

We will want our robot to wait a little once we turn it on, so we need to use the “Delay” scrollbar. Set the “Delay” scrollbar to 1 second as shown below.



To program the delay into our program we need to click the “Add Delay” button. Now the code window should display the following code.

```
Sub RunRobot()  
  This program was written by Abe Howell  
  speed= 10  
  OOPic.Delay= 100  
End Sub
```

We would now like to program our robot so that it goes forward for 10 seconds and then stops. To do this we will need to use the “Forward” button, “Delay” scrollbar, “Add Delay” button, and “Stop” button.

First click the “Forward” button so that the robot goes forward. Next, set the “Delay” scrollbar to 10 seconds, and finally click the “Stop” button. Your code window should display the code shown below.

```
Sub RunRobot()  
  This program was written by Abe Howell  
  speed= 10  
  OOPic.Delay= 100  
  FWD  
  OOPic.Delay= 1000  
  STOP  
End Sub
```

This will complete the programming part, but now we need to compile and download the program to our robot. The programming cable must be connected to the robot before we can compile and download the program.

After properly connecting the program cable, simply click “Compile and Download Program” from the “File” menu. Once the OOPic Multi-Language Compiler has loaded press the ‘F5’ key on your keyboard and your code will be compiled and downloaded to the robot.

Now that your robot has been successfully programmed, you are ready to run it and then measure the total distance traveled by your robot. First, setup a starting line for your robot using a piece of tape and then place the front of your robot so that it is even with the starting line. Turn on your robot and it should drive forward for 10 seconds and then stop. Once the robot has stopped, measure the total distance traveled using a tape measure. Be sure to measure from the starting line to the front of your robot and record the distance in inches.

After measuring the distance traveled by your robot you will have to calculate the actual speed in inches/second using the formula below.

$$\text{Real speed [inches/sec]} = (\text{Distance traveled in inches}) [\text{in}] / (10 \text{ seconds}) [\text{sec}]$$

As an example, lets say that your robot traveled a total of 20 inches in the 10 seconds. Using the above formula along with the distance traveled of 20 inches would mean that your robot has an actual speed of 2 inches/second.

$$(20 \text{ inches}) / (10 \text{ seconds}) = 2 \text{ inches/second}$$

You have just completed the tutorial!