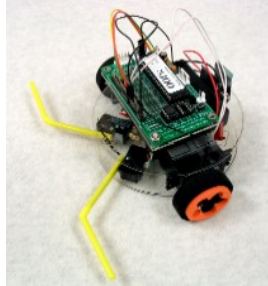


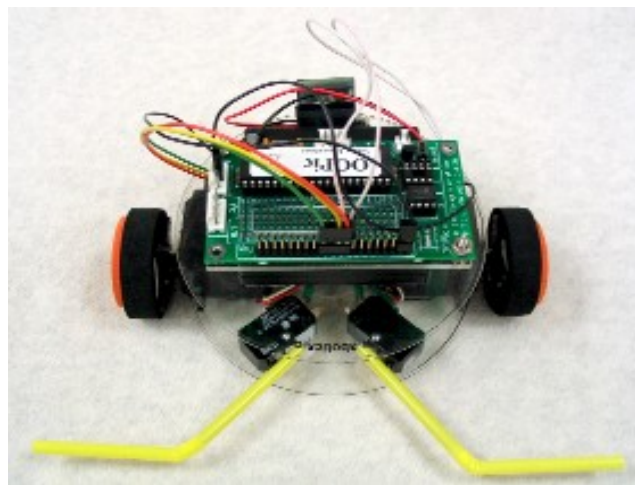
Abe Howell's Introduction To The NewCDBot™



The NewCDBot Kit is not a toy and is to be used by adults or supervised by adults!

Introduction:

The NewCDBot is a fully autonomous robot that is capable of data collection and can be interfaced with a desktop computer to extract any collected data. The body of the NewCDBot is almost entirely made from compact discs (CDs) and the remainder of the NewCDBot's body is fabricated from readily available components. The NewCDBot has been designed to be low cost so that anyone interested in robotics can easily get started.



Picture of the NewCDBot.

Recycled CDs are used to form the body of the NewCDBot robot. One of the most important components used in the NewCDBot is the Dual Lock™ Reclosable Fastener that is manufactured by 3M™. This tape allows for the disassembly/reassembly of the NewCDBot and also allows it to be more cost effective.



3M™ Dual Lock™ Reclosable Tape (pictured in black, but also made in clear).

The NewCDbot also integrates two modified hobby servos into its body design so that they can provide rigidity and support. Modified servos are just standard servos that have been modified for continuous rotation since standard servos only have a range of rotation that is limited to approximately 180 degrees. The modified hobby servos are used to supply the NewCDbot with a means of locomotion.



Modified Hobby Servo.

Foam wheels are attached to the modified servos. These foam wheels help to provide the NewCDbot with traction. The final component used in making the robot's body is the roller wheel. The roller wheel is used as a third wheel for the NewCDbot so that the back end of the robot doesn't drag on the ground.

The remainder of the NewCDbot comprises the electronics used to make the NewCDbot fully autonomous. The 4-AA batteries and one 9-volt battery power the NewCDbot. Rechargeable batteries can be used and this is encouraged. A (4)-AA-battery holder and a 9-volt holder and clip are used to contain all the batteries that power the NewCDbot. The user can turn on/off the NewCDbot as desired with the miniature switch on the AA-battery holder.



AA-Battery Holder.

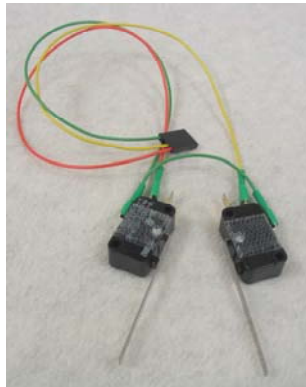


9-volt Battery Clip



9-volt Battery Holder.

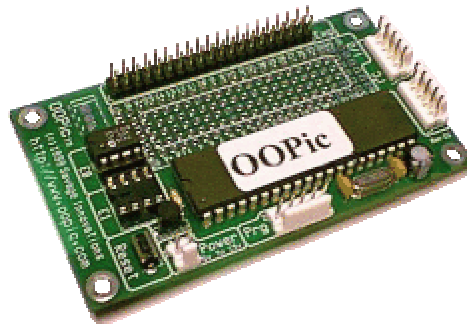
The NewCDbot uses bumper switch sensors to detect any obstacles in its path. The sensors are mounted on the front of the NewCDbot. The sensors can detect an obstacle that the bumpers come in contact with. If the obstacle doesn't touch the bumpers then it can't be detected.



Bumper Switch Sensors.

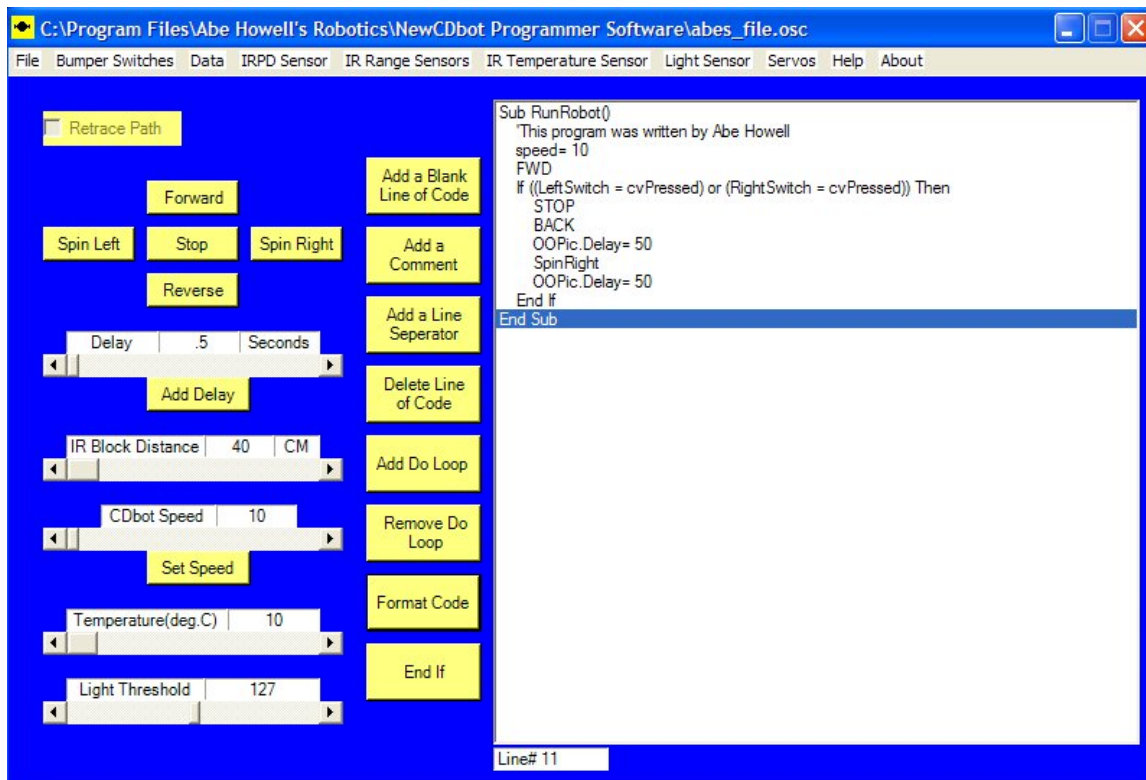
The brain of the NewCDbot is the OOPic micro-controller from Savage Innovations Inc. The OOPic monitors the bumper switch sensors (or any other type of sensors that you have installed) and also controls the motion of the robot so that it will avoid any obstacles detected by the sensors. The OOPic allows the NewCDbot to operate in a fully autonomous mode where it can make decisions on its own. Additional sensors such as Infrared Thermometers, accelerometers, a digital compass, or even a speech module can

be connected to the OOPic (These extra sensors must be purchased separately). However, you the programmer must program the NewCDBot to use or react to any of the above sensors!



OOPic™ Micro-controller by Savage Innovations Inc.

The NewCDBot can be programmed using the free NewCDBot Programmer Compiler Software (NCPS). The NPCPS allows you to program the NewCDBot to react to its infrared sensors in a specified manner. The NPCPS also allows you to control the speed of your NewCDBot. Support is also included for the thermistor-based thermometer. When an additional EEPROM chip is installed in the second EEPROM socket on the OOPic, the NewCDBot can be programmed to collect data and even retrace its path!



Screenshot of NCPS

The NPCPS will enable you to program your NewCDBot with specific behavior all without actually writing code. You simply click buttons and use the drop-down menus to generate

the necessary code. Once you are done writing your program, simply save it, and then compile and download it to your NewCDBot using the OOPic Multi-Language Compiler, which is available from Savage Innovations Inc. as a free download. The NPCS will automatically spawn the OOPic Multi-Language Compiler and load your program. All you need to do is properly connect the programming cable, hit the 'F5' key on your keyboard, and watch will your program is compiled and downloaded to your robot. The NPCS will allow you to view collected data from your NewCDBot. An additional EEPROM chip must be purchased and installed on the OOPic. The EEPROM chip can be purchased from Abe Howell's Robotics. With the NPCS, collected data from your NewCDBot can be viewed and then saved to your desktop or laptop computer. The collected data is a record of your robot's body velocity changes and their respective time stamps. If you have an appropriate light or temperature sensor properly connected, the NewCDBot will also collect light or temperature data. With this data a graph of velocity versus time can be created. The NewCDBot can use this data to retrace its path back to its starting position.

Data Points	Motion Code	Speed	Velocity(cm/sec)	Time(sec)	Temp.(Celcius)	Light Sensor
1	Forward	10	13.7	0.067	22.74	
2	Stop	10	0	1.217	22.74	
3	Reverse	10	-13.7	1.267	22.74	
4	Spin Right	10	0	1.850	22.74	
5	Stop	10	0	2.400	22.74	
6	Forward	10	13.7	2.467	22.74	
7	Stop	10	0	6.183	31.96	
8	Reverse	10	-13.7	6.233	31.96	
9	Spin Left	10	0	6.800	32.43	
10	Stop	10	0	7.350	32.89	

Screenshot of NewCDBot Data Downloader Screen

This will conclude the introduction to the NewCDBot Robot. The World of Robotics is filled with unforeseen problems, so please don't get discouraged when something does not work out as you had planned, instead go ahead and investigate your problem since this is in a nutshell what Robotics is all about! Send emails to abe@abotics.com