Video Chat Robot Software Instructions

February 8, 2011

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What does this software do?

This program allows you to drive an iRobot Create using either local or network control with a keyboard or mouse. It requires 1-2 Windows 7 computers and was written in C# (for those interested in the source). It was originally written to be used in with a netbook that is providing video conference capability (using a service such as Skype) and is mounted on the iRobot Create to create a low-cost video chat robot. It has only been tested on Windows 7 32-bit and 64-bit computers.

The software manages several lower level tasks such as communicating with the robot over the serial cable, monitoring battery and sensor state, sending drive commands, docking commands, a UI for controlling the robot, a network listener to receive drive commands over the internet, a network sender to connect to a remote robot. It also manages motor acceleration/deceleration as well as a network heartbeat so the robot knows when it is out of control and stops automatically.

What do I need?

You need 4 things:

- 1 iRobot Create
- 1 netbook that can ride on the iRobot Create
- 1 iRobot USB serial cable
- 1 computer to drive the robot remotely

Optional things that may be nice:

- 1 extension cable with multiple plugs so both netbook and robot AC adapters can be charged easily
- 1 stand or riser that mounts on the robot and raises he netbook to seated height. This is not something purchasable and has to be made from plastic or light wood.

Mounting the Netbook on the Robot

The netbook can be mounted directly on top of the iRobot Create frame, or mounted higher using a stand or riser. Use Velcro, fasteners, tape, or screws where possible to secure the netbook tightly. Otherwise it will fall off.

Mount the netbook facing the **opposite direction** of the iRobot Create. This is how the software interprets the forward and backward drive commands. The reason for this is related to docking the robot for charging. It will allow the robot to "back into" the charging station, and then let you undock simply by driving "forward" once you connect.

If you mount the netbook on a riser, be conscious of the center of gravity. As you go up, the weight becomes unstable. So keeping the center of gravity of the netbook over the center of the robot will help keep it stable. It is also highly recommended to use the extra wheel that comes with the iRobot Create to support the extra weight.

Netbook
Direction

iRobot Create
Direction

Center
of graviy

Netbook
Direction

iRobot Create
Direction
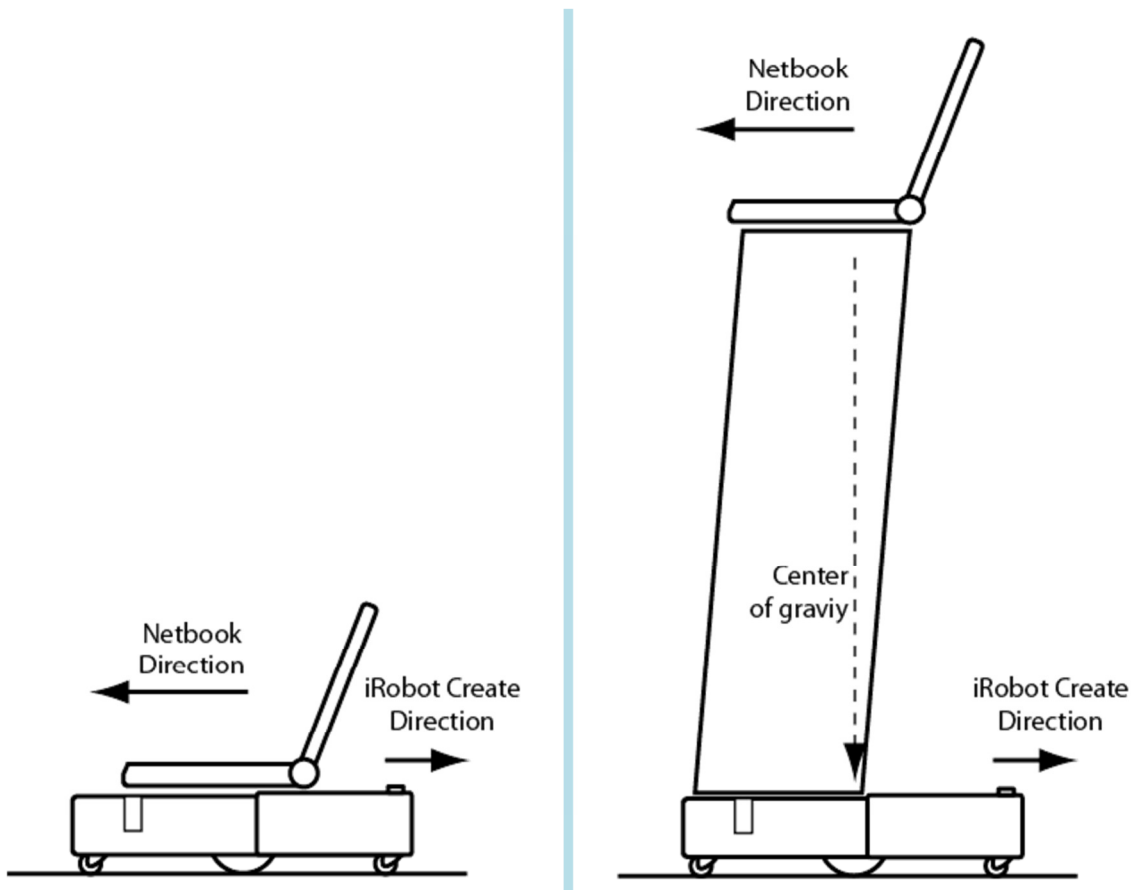
Controlling the local robot:

Plug in the USB serial communication cable into both your netbook and your iRobot Create.   Windows should automatically install the driver software for the cable. Open the Windows "Device Manager" (Start Menu-> Right Click Computer -> Properties -> click Device Manager in upper left). In list, you should see "Ports" listed. Expand "Ports" to see which COM port was added (eg. COM3, COM4, etc). If you have more than one, unplug the USB serial cable to see which one is associated with the iRobot Create. Remember the port name since we will need it later.

Run "iRobotCreateControl.exe" and you should see this window popup. :
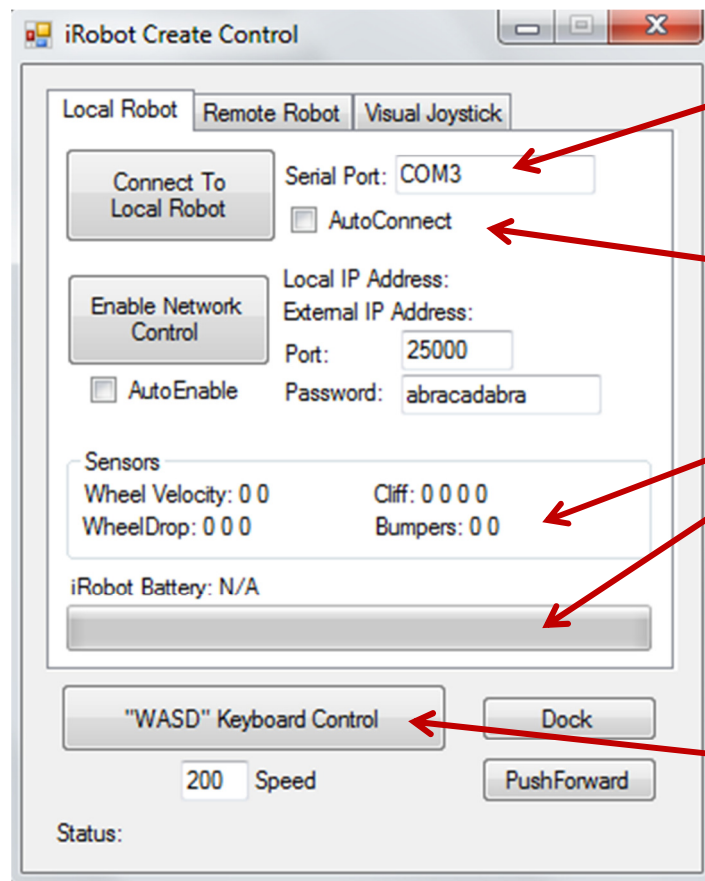
Enter the COM port that is associated with the iRobot Create here. Then click the "Connect To Local Robot" button.

Check this box if you want the program to auto-connect to the robot on launch.

If communication with the robot is working correctly, you should see the battery level bar become green and all the sensor readings to display. You can push on the bumpers on the front of the robot to see if the values update.
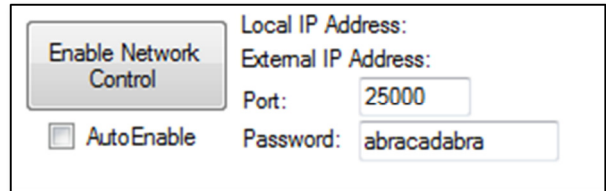
At this point, you should be able to click the "Keyboard Control" button, and use the W,A,S,and D keys on your keyboard to move the robot. Note: key commands will stop driving the robot once you click something besides this button.

The speed of the robot when using the keyboard can be adjusted below. The maximum is 500, but is difficult to drive at that speed.

Enabling Remote Control

To allow a local robot to be remote controlled over the network, click on "Enable Network Control". Numbers should appear next to Local and External IP address. These are the network address for this computer, and you will need to enter these on the other computer you will use for remote control. If you want this to start automatically, when you start the program check "AutoEnable".

Note: If you are behind a router that supports UPnP, it will *attempt* to auto setup port forwarding rules so that people can connect using your external IP address over the internet. But, this is not well tested and you should consider yourself lucky if it does work. You may need to set up port forwarding manually. Ask a more knowledgeable friend if you don't know how to do this.

Optional (but recommended): You set can set the password for robot control. If you don't change this from the default, anybody that knows your IP address can use a copy of this program to take control of your robot!!!

Optional: You can change the Port number for the network listener. This is an advanced option and most people probably won't need to change this.

Controlling a Remote Robot

On the second computer you would like to use to drive the robot, click on the "Remote Robot" tab at the top.

Enter the IP address of the remote computer that is connected to the iRobot Create. To minimize the likelihood of networking problems, it's probably best to first test by connecting both computers to the same network and use the "Local IP address" from the other computer. If you have changed the port or password, make sure those match the other computer. Once you have verified the local connection works, you can try the external IP for internet control.

Click "Connect To Remote Robot". If it connected successfully, the battery bar should become green and the sensor values should change.

Click on the Keyboard Control button, and you should be able to drive the robot using the W, A, S, and D keys just as before on the other computer.
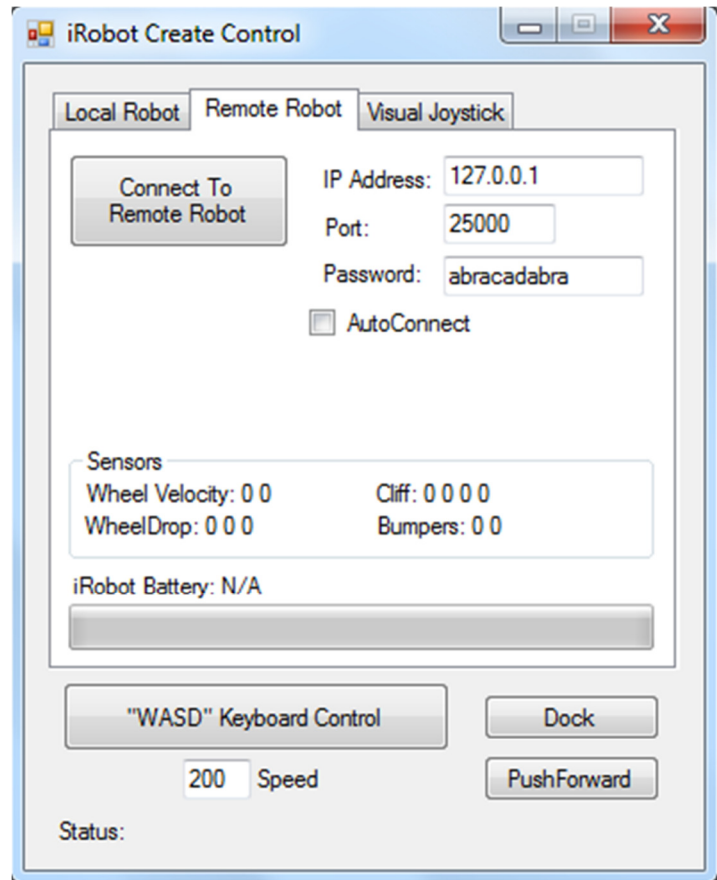
Dock and **Push Forward:** If you have made modifications to the charging base station for the iRobot Create so that it will charge the robot base and the netbook, these buttons will help with the charging process. Drive the robot near the base station, and turn so that the bumpers are facing the charging station. If you have mounted the netbook in reverse direction as recommended, that means you should turn so that netbook camera is face away from the charging station. Press the "Dock" button, and the iRobot Create will use its sensors to autonomously find and dock with the charging station. Sometimes it may take a couple tries. If it succeeds, the robot will play a tone. If it is going out of control, click "Connect To Remote Robot" to regain manual control. After it plays the tone, it's a *good idea* to click "Push Forward" which will make the robot go forward until the bumpers are pressed. With the added weight of the netbook (and charging adapter delay), it sometimes bounces out of the charging station before coming to a stop. This will help seat it in the charger correctly. If pushing this button does nothing, then that means it is already properly charging.

Analog Robot Control

Instead of using the keyboard to control the movement of the robot, you can also use the mouse to get more analog control.

Click on the "Visual Joystick" tab at the top, and you can click and drag with the mouse. Up is forward and down is backward. The distance from the center will control the speed of the motors giving you analog control.

Personally, I find the keyboard much easier to use, but this may be useful in some cases.

This is available during either local or remote robot control after respectively connecting to the robot.
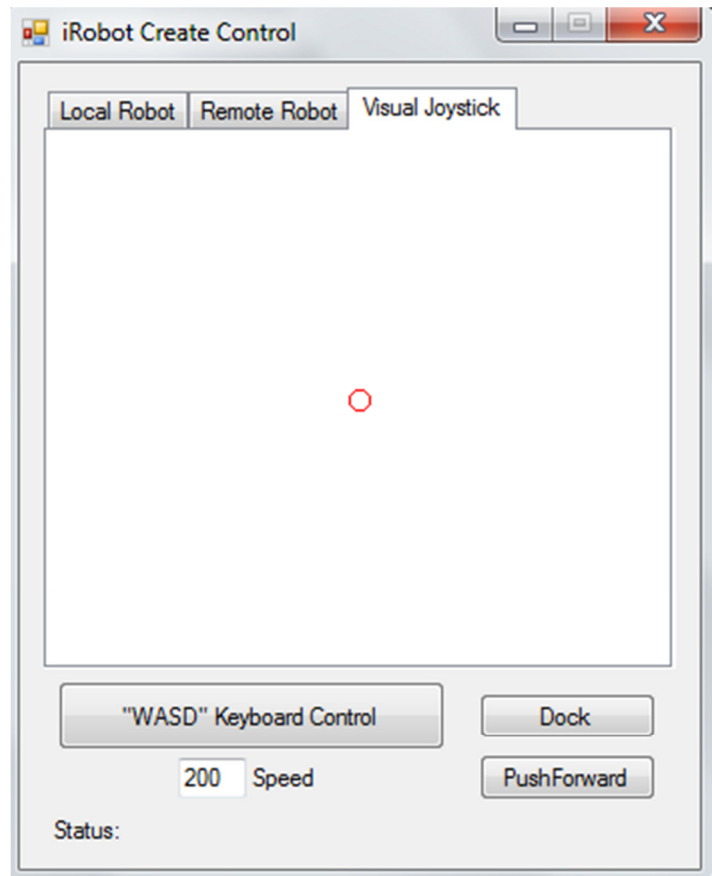
Remote Troubleshooting: Remote Desktop

Sometimes the netbook just gets into a bad state, or something crashed. The best way to easily solve this problem remotely is use remote desktop software. I personally like Team Viewer and they have a free version for non-commercial use.