



# MantaroBot™ User Guide and Operating Manual



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Version	Date	Change Summary
A		Initial Customer Release
1.0	5/11/2011	Changed version number to numeric, updated few screenshots. No feature changes.
1.1	6/21/2011	Added new details for release of Controller v1.5 and Robot v1.1

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Thank you for purchasing a MantaroBot. Please read the contents of this User Guide completely before using your MantaroBot.

## 1 Checking the contents of your shipment

The following items should be in your shipment(s):

1. MantaroBot
2. Battery Charger
3. A CD containing:
  - a. The MantaroBot User Guide (this document)
  - b. The MantaroBot Controller Application
  - c. Information sheet

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## 2 Knowing your MantaroBot and its limits



### 2.1 Overview

The diagram above shows the hardware features of the MantaroBot. Each of these features is discussed below.

**720P High Definition Camera** – A 720P capable camera is mounted on the top of the MantaroBot. It allows the remote operator to view the local surroundings. The actual resolution of the video image will depend on the communications link quality and is automatically reduced in resolution by Skype to accommodate slower links.

**Pan Tilt Mechanism** – The Camera is mounted on a pan tilt servo mechanism which allows the camera to be positioned to convenient viewing angles without moving the MantaroBot.

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**14 Inch LCD Display** – The display shows the remote operator's camera view. This is useful for showing the people local to the MantaroBot who is driving it. The display can also be used to show the remote user's computer "desktop" which can be helpful during a discussion.

**Dual Speakers** – Two speakers are located behind the display. The speakers have volume control allowing adjustment of the audio volume. The volume can also be adjusted from within the Skype program.

**Microphone** – A high sensitivity microphone is located below the display. The microphone allows the remote user to hear the local conversations.

**3 Position Adjustable Mast** – The Mast can be adjusted to three positions. The height adjustment is beneficial to the remote operator and people local to the MantaroBot as it allows "eye-to-eye" contact without looking up or down depending on whether you are sitting or standing. In general the highest position is best for most applications.

To adjust the mast:

1. Grab hold of the mast to support the weight of the display, speakers and camera.
2. Pull out the pin holding the mast in place.
3. Raise or lower the mast until the holes in the mast are aligned to the desired position.
4. Re-insert the pin through the desired hole.

**Netbook Access Door** – The Access Door allows convenient access to the Netbook so that Skype call parameters and user privileges can be set. The Netbook cover and Access Door should be closed during use of the MantaroBot. Powering on the Netbook puts the MantaroBot into a ready state for a call.

**Access Panel** – The Access Panel provides access to the Sealed Lead Acid Battery and the MantaroBot Controller Board. The Access Panel can be removed by carefully prying out the six plastic pegs. The Access Panel should not be removed unless the MantaroBot requires service such as replacing the battery.

**19.5V Charging Input** – The Charging Input is located underneath the rear of the MantaroBot. The MantaroBot should be plugged into the charger whenever it is not in use. It can also be used in a call while plugged in but care must be taken to disconnect the charger before it is driven away.

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**Docking Station Charging Pins** – Two pins are located at the front of the motor bracket that allow the MantaroBot to be charged in the optional Docking Station. No voltage is present on these pins unless it is connected to the Docking Station.

## 2.2 Moving the MantaroBot

To relocate the MantaroBot manually, hold on to the mast and tilt the MantaroBot onto the two rear casters wheels. It can then be pulled backwards and will roll easily on the two rear casters to the location that you want to place it. It is not recommended that the MantaroBot be moved manually while resting its drive wheels on the ground.

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## 2.3 WARNINGS

**TIPPING HAZARD** – The remote operator is responsible for keeping the MantaroBot under control. The MantaroBot has been designed to reduce the potential of tipping during normal operation. Rapid accelerating and stopping or sharp turns while moving at full speed may cause the MantaroBot to tip over and cause injury. The MantaroBot is the most stable when the mast is in the lowest position.

**INCLINES** – The MantaroBot is intended for indoor applications on level ground. Inclines of more than 10 degrees may cause the MantaroBot to tip over.

**DRIVING IN REVERSE** – It is not recommended that the MantaroBot be driven in reverse for more than a short distance. The camera cannot be faced to see in the rearward direction. It is recommended that the MantaroBot be turned around and driven forward in the direction desired whenever possible. The MantaroBot is more susceptible to tipping when driven in reverse.

**STEPS AND STAIRS** – Great care should be taken to avoid driving the MantaroBot down stairs or steps. The camera should be aimed in the direction that the robot is moving and aimed down such that obstacles can be readily seen.

**CAMERA VIEW** – It is the remote user's responsibility to have an awareness of where the MantaroBot is being driven. When the camera is facing straight ahead, the remote operator's view from the camera presents an illusion that the MantaroBot is 2 to 4 feet ahead of its actual position. This can result in collisions with obstacles (chairs, door frames etc.). It is recommended that the camera be positioned slightly down such that obstacles can be readily seen. Similarly if the camera is directed down such that it is looking at the ground, the remote user may not be able to see obstacles that the MantaroBot is being driven towards.

**NETWORK DELAY** – Network delays can cause control commands that are sent to the MantaroBot to be buffered and delivered at a later time. When network delays exceed one second great care is required by the operator to ensure that the MantaroBot remains in control.

**SECURITY** – The MantaroBot has user level password control to help prevent unauthorized access. However the Skype application can be configured to various levels of permission for accepting calls. It is recommended that you review the Options - Call Settings on the MantaroBot's Skype for your application.

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## 3 Powering On

The MantaroBot's Netbook computer is located under the Access Panel on top of the MantaroBot chassis. The MantaroBot is powered ON by pressing the power switch on the **RIGHT SIDE** of the Netbook. This will cause Microsoft Windows to boot and the MantaroBot Robot Application and Skype to load.

**Note:** When the MantaroBot is powered, but not in an active call and not plugged into the charger, the Netbook screen will be turned off. To turn the screen on, hold down the Windows key and press the letter 'P' twice and press 'Enter' (Windows-P-P s). This is useful for viewing the battery indicator directly on the MantaroBot Robot Application that is running.

**Note:** Installing other software applications on the Netbook computer may cause the MantaroBot to behave erratically.

## 4 Connecting to Wifi Network

The MantaroBot's Netbook computer is equipped with Wifi capability that **must** be configured to connect to your Network.

1. Open 'Connect to a Network' by clicking the network icon in the notification area. (bottom right of screen)
2. In the list of available wireless networks, click the network you wish to connect to, and then click Connect.
3. Most networks require a network security key or passphrase. To connect ask your network administrator or Internet service provider (ISP) for the security key or passphrase.

**Note:** Your network must have an Internet connection that will allow connection to Skype.



## 5 MantaroBot Software

This section provides an overview of the software needed to use the MantaroBot before providing further details later in this user guide.

### 5.1 Robot Application Overview

The MantaroBot Robot application runs on the Netbook computer in the MantaroBot and is ***already pre-installed***. When new software updates are available they can be installed (information for updating is provided later). This application is where the configuration and initial user administration must occur for the MantaroBot. A user with administrator privileges will also be able to perform most administrative tasks remotely using the MantaroBot Controller application.

### 5.2 Controller Application Overview

The MantaroBot Controller application needs be installed on a computer of the user's choice (other than the Netbook on the MantaroBot). The requirements of this computer are described later in this guide. This application is used to connect to your MantaroBot for remote use. The Controller application allows the user to drive the MantaroBot and hold video teleconferences.

Once an administrator user account is created on the MantaroBot Robot application, an administrator will be able to remotely login to the MantaroBot using this Controller application and perform user and most robot administration tasks. There are certain configuration parameters that can only be done from the Robot application.

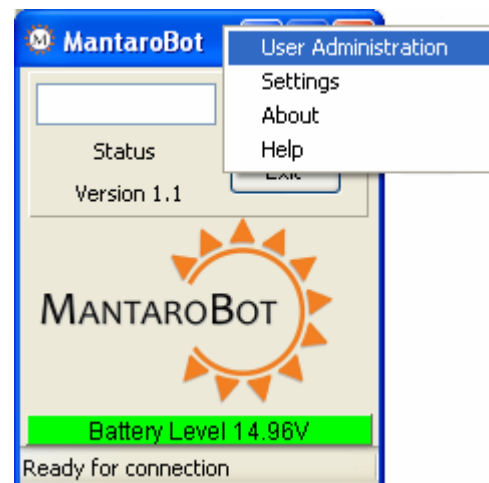
## 6 Robot Application

This section will provide important information regarding the MantaroBot Robot application that runs on the Netbook of the MantaroBot. It will provide details on all 'Options' sub-menus.

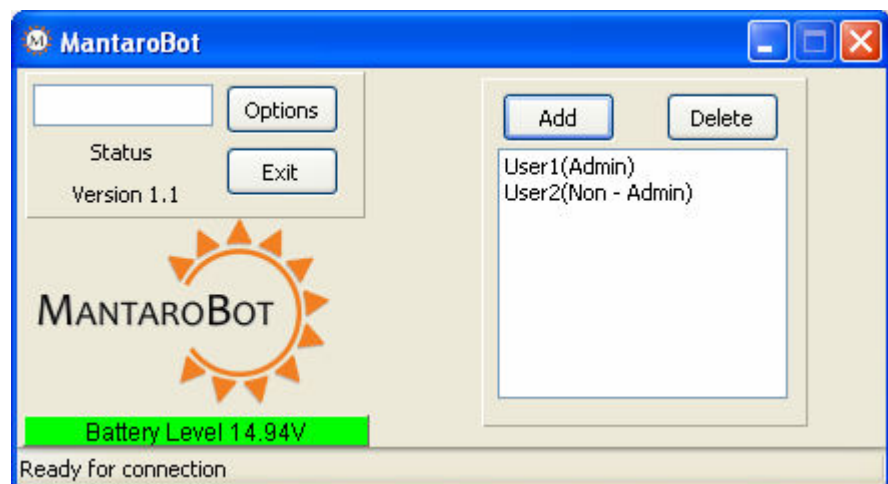
### 6.1 Options - User Administration

The MantaroBot requires a user name and password to connect to it. Prior to use you will need to setup User names and passwords for each of the users who will be accessing the MantaroBot.

1. Open the Access Door and power ON the Netbook computer using the button on the right side of the Netbook.
2. Click on the MantaroBot window (to view the MantaroBot Robot application). Select the 'Options' button and select 'User Administration'.



3. Click on 'Add' to add a new user. This will open a new dialog box.

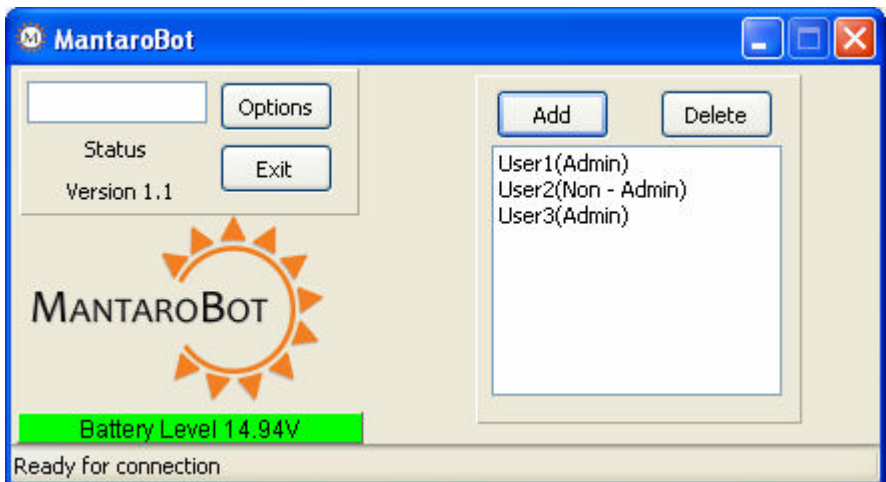


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4. Type the User name and Password into the corresponding box. If the user is to be an Administrator click on the "Give user administrative privilege" check box and press OK.

A screenshot of the "Add New User" dialog box. It has a blue title bar with the text "Add New User" and a close button. The main area is light beige and contains three input fields: "Username" with "User3" entered, "Password" with four dots, and "Confirm Password" with four dots. Below these is a checked checkbox labeled "Give user administrative privilege". On the right side, there are "OK" and "Cancel" buttons.

5. Each user will appear in the Window as you add them with a designation beside their name to indicate if the user is an Admin or a Non-Admin user.



**Note:** Setting up a user as an Administrator will allow that user to add and delete users remotely using the Controller Application.

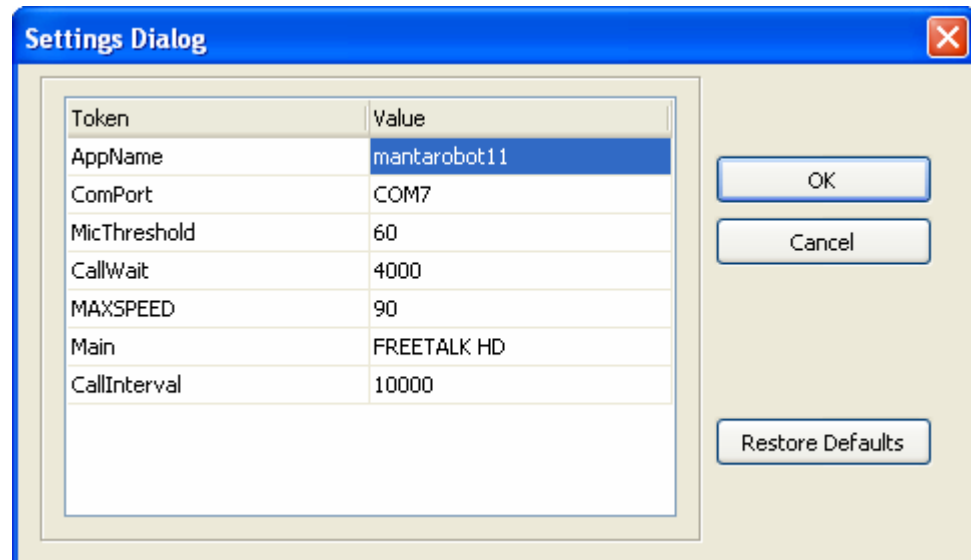
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## 6.2 Options - Settings

The MantaroBot Robot application is pre-configured with all the necessary settings when shipped from the factory. If it becomes necessary for the MantaroBot administrator to change the robot settings the 'Settings' options menu can be used.

Please note that the settings are tightly tied to how the MantaroBot functions and an incorrect setting may disable the MantaroBot.

A 'Restore Defaults' button is provided to restore settings to factory defaults.

A screenshot of the 'Settings Dialog' window. It has a blue title bar with the text 'Settings Dialog' and a close button. The main area contains a table with two columns: 'Token' and 'Value'. The table has the following rows: 'AppName' with value 'mantarobot11', 'ComPort' with value 'COM7', 'MicThreshold' with value '60', 'CallWait' with value '4000', 'MAXSPEED' with value '90', 'Main' with value 'FREETALK HD', and 'CallInterval' with value '10000'. To the right of the table are three buttons: 'OK', 'Cancel', and 'Restore Defaults'.

The following is a description of each of the Settings.

**AppName** – Unique identifier required by Skype for its application stream connection. For MantaroBot purposes, it's always the same as the Skype User Name of the Robot. Please note that changing the AppName here will require all the remote users to update their MantaroBot Controller robot list to have the name to connect to the Robot.

**ComPort** – Virtual Serial Com port used by the MantaroBot Robot Application to talk to the internal control board. The port information can be found by looking at the Device Manager -> Ports (COM & LPT)-> USB Serial Port in the Windows Control Panel.

**MicThreshold** – Threshold in percentage of total speed at which to mute the microphone on the MantaroBot to prevent feedback noise from the MantaroBot. The allowed limits are from 0 – 100. Each MantaroBot Controller application can also configure this setting from the Options – Settings – Controller Settings menu.

**CallWait** – Waiting period (in milliseconds) to give time for internal control board to wake up from sleep state when a call is received.

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**MAXSPEED** – Maximum speed at which the robot can be driven. The allowed limits are from 40 – 100. This parameter is also configurable by an administrator via the Robot Settings menu in the MantaroBot Controller application.

**Main** – Name of main camera as recognized by Skype in its Video Settings tab. It requires that the name be same letter for letter including the capitalization of the letter.

**CallInterval** – Waiting period (in milliseconds) between successive calls to give the MantaroBot enough time to gracefully shutdown all the electronics and unload the necessary driver before it can except a new call.

Note: Any change in the settings requires the MantaroBot Robot application to be restarted so that the changes can take effect.

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## 6.3 Options - About

The 'About' window in the MantaroBot Robot application shows the user the version numbers for the components of the MantaroBot - Robot Application, Firmware, Hardware and Serial Number. This information can be viewed by clicking on 'Options' button and selecting 'About'.



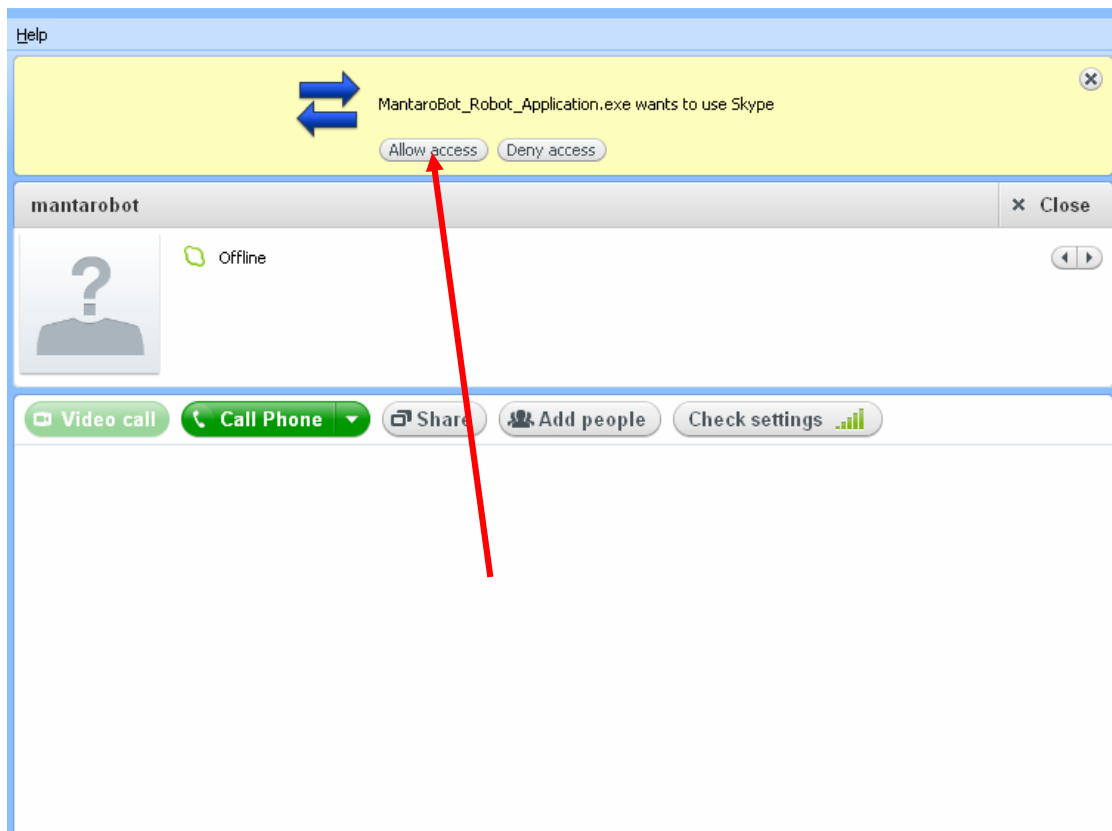
This window also provides links to the MantaroBot Support site and ability to check for software updates.

## 6.4 Upgrading the Software

1. To check for updates click on the 'Check for Updates' link in the MantaroBot Robot application 'Option' – 'About' window using the Notebook. Alternatively, checking for updates on a particular MantaroBot can be checked from the MantaroBot Controller application 'Option' – 'About' window when it is in an active call.

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2. If an update is available, download it to the MantaroBot from the MantaroBot's support website. Click on the installer file and it will automatically install the application in the same path the application was installed when shipped from the factory.
3. Before launching the new software, verify Skype is running on the MantaroBot. Double-click on the MantaroBot desktop icon to launch the software.
4. Switch to the Skype window and observe the request for permission to allow access to the MantaroBot Robot Application. Please click on "Allow access".



5. The upgrade is now complete and you may close the lid to the Netbook.

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## 7 Controller Application

### 7.1 Remote PC Requirements

To use the MantaroBot Controller application, the computer must meet the following requirements:

1. A PC with at least a 1 GHz processor
2. A 32-bit version of Windows XP or Windows 7 Operating system running
3. The latest version of Skype installed
4. A desktop mouse. (The MantaroBot can be controlled from a touch pad but it is not recommended.)
5. Headphones and microphone (will improve audio experience)
6. A webcam (if two-way video is desired)

Note: It is suggested that a webcam be used at all times such that people interacting with the MantaroBot can see who is controlling it. This practice improves the interpersonal dynamics and changes the way the MantaroBot is perceived by those local to it from that of a surveillance drone to that of a person.

## 7.2 Installation & Upgrades

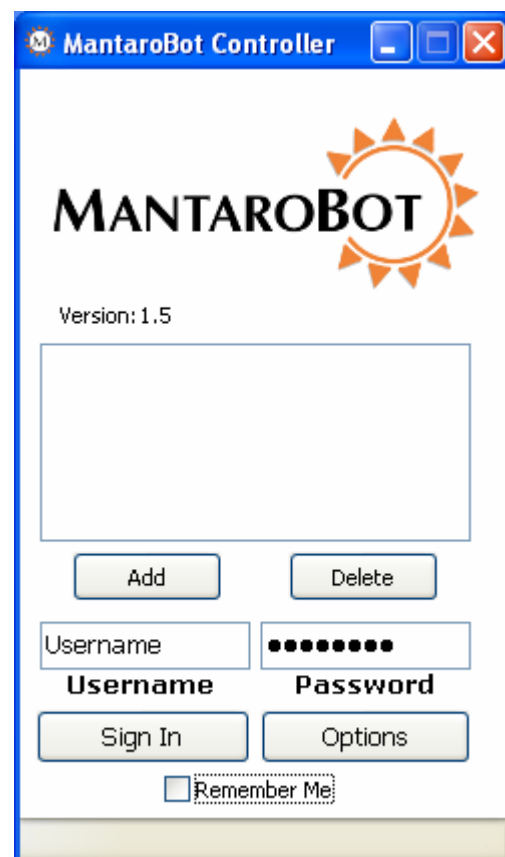
The MantaroBot Controller application works in conjunction with Skype™ to control the MantaroBot. The following steps describe the installation and/or upgrade process:

1. Install and run the latest version of Skype if it is not already installed on the PC that you will use to control the MantaroBot.
2. Run the MantaroBot\_Controller\_Setup\_verXXX.exe installer. This file is available on the CD that came with the MantaroBot. This file and any newer versions are available for download on the Mantaro website at [www.mantaro.com/products/mantarobot/support.htm](http://www.mantaro.com/products/mantarobot/support.htm).
3. If this is an upgrade to an existing installation, it is necessary to point the update to the existing installation path so the files can be replaced.

## 7.3 Creating MantaroBot Contact List

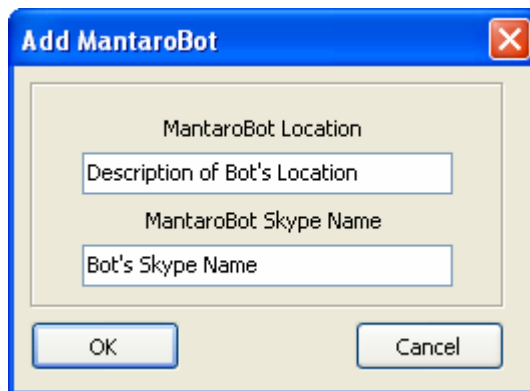
To connect to a MantaroBot, you must first add it to the Controller contact list (picture on the right shows a box with an empty contact list).

1. Launch the MantaroBot Controller program and the following window on the right will appear.
2. Click on the 'Add' button to add your first MantaroBot to the Controller list. You can add more as necessary.



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3. When the 'Add' button is clicked, the window shown on the left below will appear. In the MantaroBot Location field, type the name that you want to see appear in the Controller contact list. This can be any descriptive text you choose. (suggestion: the place where the MantaroBot is physically located)
4. In the MantaroBot Skype Name field, type the exact Skype User Name of the MantaroBot to be controlled. This name must match the Skype User Name (same as AppName value from Options-Settings menu in MantaroBot Robot application) for it to connect. The default Skype User Name is provided on the information sheet provided with your MantaroBot.

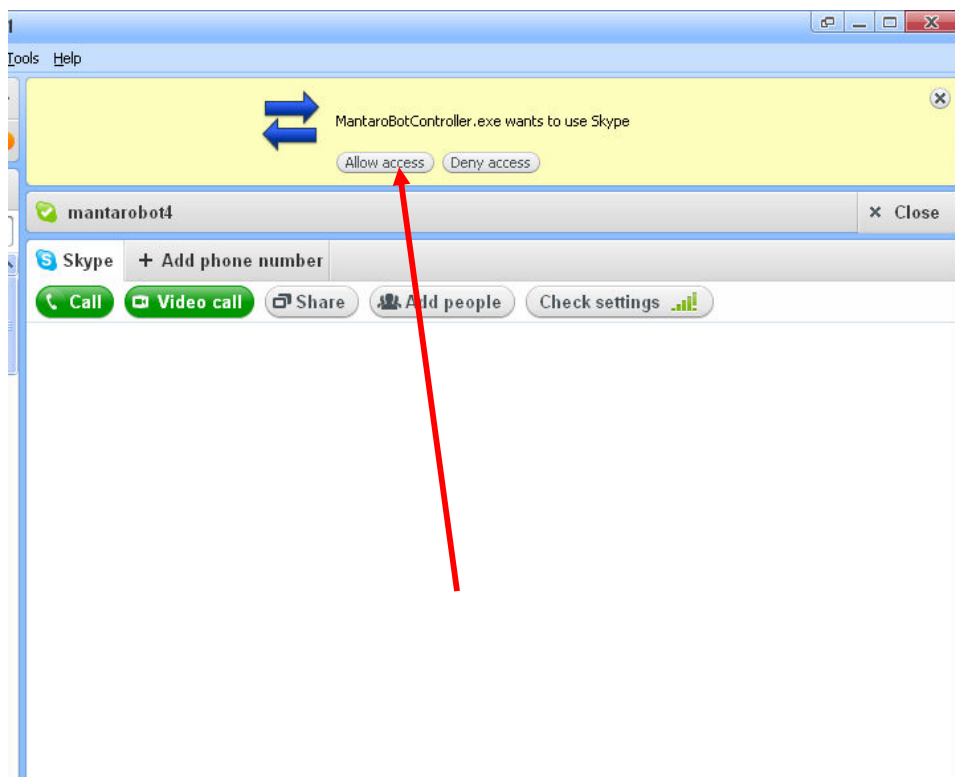
A Windows-style dialog box titled "Add MantaroBot" with a close button (X) in the top right corner. It contains two text input fields: the first is labeled "MantaroBot Location" with a placeholder "Description of Bot's Location", and the second is labeled "MantaroBot Skype Name" with a placeholder "Bot's Skype Name". At the bottom are "OK" and "Cancel" buttons.The main window of the "MantaroBot Controller" application. It has a title bar with the application name and standard window controls. The interface includes the "MANTAROBOT" logo and "Version: 1.5" at the top. Below is a list box containing "MantaroBot\_Bldg1" (selected) and "MantaroBot\_Bldg2". There are "Add" and "Delete" buttons below the list. Further down are "Username" and "Password" labels with corresponding input fields; the password field is masked with dots. At the bottom are "Sign In" and "Options" buttons, and a "Remember Me" checkbox.

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## 7.4 Connecting to a MantaroBot

### 7.4.1 The First Time or after Software Updates

1. To connect to a particular MantaroBot for the first time, add the MantaroBot's Skype username into your Skype contact list (this is in addition to creating a MantaroBot Contact list described earlier). The factory default username/password is provided on the information sheet provided with your MantaroBot.
2. In the MantaroBot Controller window, select the MantaroBot you want to connect to.
3. Enter your username and password and click the "Sign In" button.
4. If it is the first time that the application has been launched on your computer (or has just been updated with a software update), observe that the Skype window requests permission to allow access to the MantaroBot Controller application. Please click on "Allow access".



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5. Once the access has been provided to MantaroBot Controller and the user authenticated, the MantaroBot will initiate a Video call back to your Skype client.
6. Accept the Video Call and you will see the control pad as shown below.

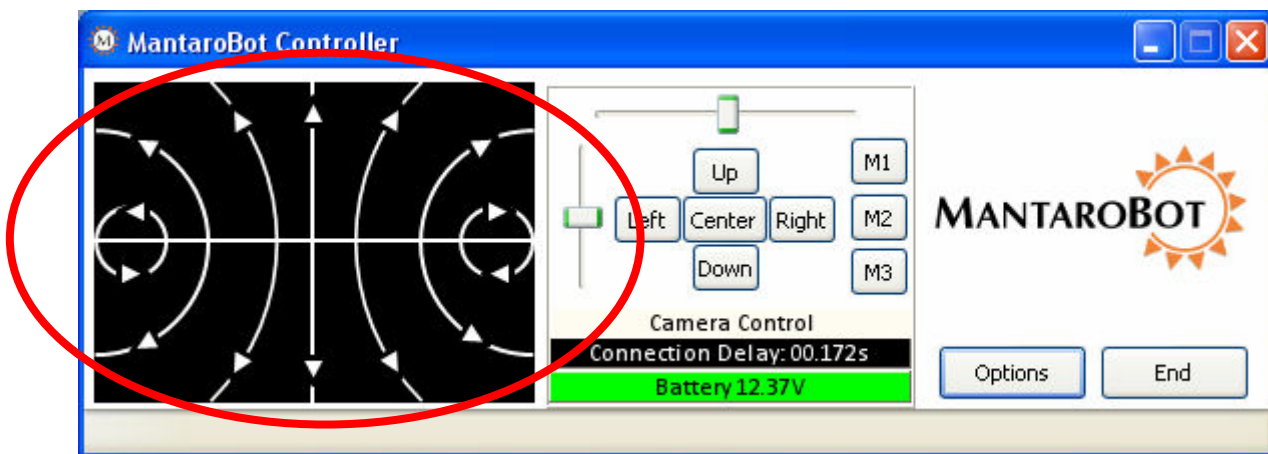
## 7.4.2 Normal Operation or Busy Indication

1. In the MantaroBot Controller window, select the MantaroBot you want to connect to.
2. Enter your username and password and click the "Sign In" button.
3. The MantaroBot will initiate a Video call back to your Skype client.
4. Accept the Video Call and you will see the control pad as shown in the next section.
5. If the MantaroBot is already in a call, the status bar of the Controller will give a Busy indication. Once the MantaroBot is free, it will automatically send a Skype IM message saying "MantaroBot available for use now".

## 7.5 Controlling a MantaroBot

The MantaroBot Controller is split into three sections. The left side is the Drive Motor Control Pad. The middle is for Camera Control and the right side is for various Options and ending the call.

### 7.5.1 Drive Motor Control Pad



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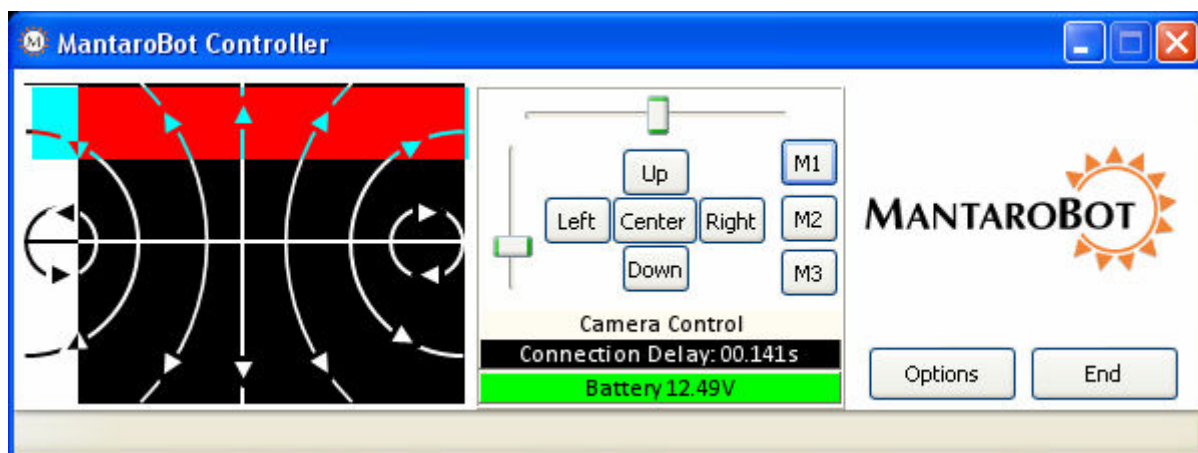
## 7.5.1.1 Driving MantaroBot

To move the MantaroBot, position your cursor on the center of the left area of the controller and hold down the left mouse button. Dragging the cursor up will cause the MantaroBot to move forward. The speed will increase as the cursor is moved further from the center. Moving to the right or left will cause the MantaroBot to turn right or left. The further the cursor is moved to the left or right the sharper the turn is made. Similarly, movement in the reverse direction can be made by moving the cursor down the control pad area. The reverse direction speed is limited to 50% of the forward direction speed.

**Tip:** It is recommended that you use a mouse to drive the MantaroBot.

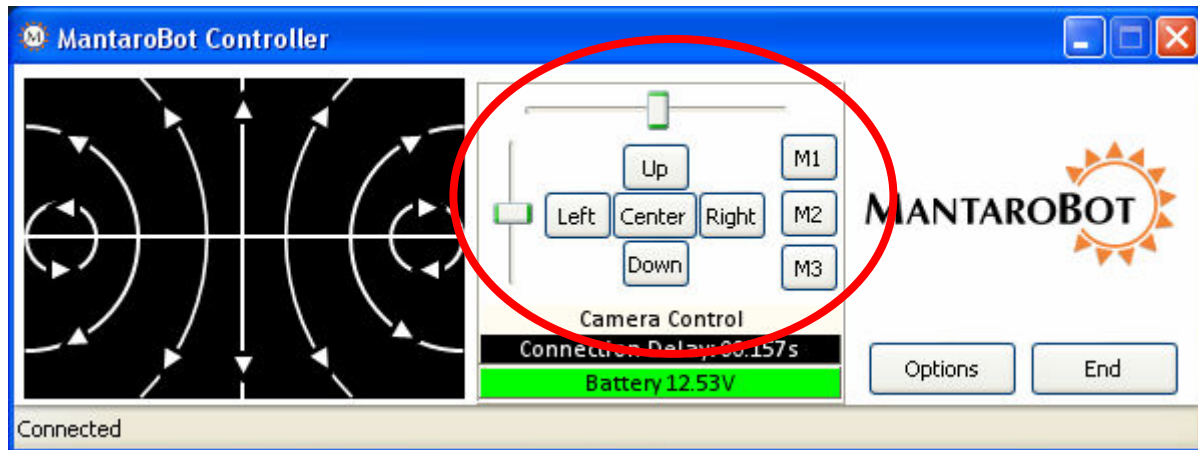
## 7.5.1.2 Proximity IR Sensors

MantaroBot is equipped with 4 proximity IR sensors to detect obstacles while driving the robot. When the sensors detect any obstacle approaching, it will inform the user through the MantaroBot Controller Drive Motor Control Pad. As the Robot approaches an obstacle a red or white area representing the distance from and the relative direction of the obstacle appears on the screen as shown below.



**Note:** To reduce the likelihood of a high speed collision (e.g. driving the MantaroBot into a wall) a feature has been included in the MantaroBot that reduces the robot's forward speed when it detects an obstacle 60 cm ahead of it. A red area will appear on the pad to indicate that the speed has been limited. These sensors will not detect all types of wall surfaces or prevent the MantaroBot from falling down steps or stairs.

## 7.5.2 Camera Control



### 7.5.2.1 Pan/Tilt

The Camera Control buttons allow the pan/tilt camera on the MantaroBot to be moved independently of the MantaroBot drive wheels. This is useful in a meeting environment where you want to observe items or people in the room without driving the MantaroBot around. The camera will move in the direction of the buttons. The “Center” button causes the camera to re-center from any position.

Another method of moving the camera is to use the two sliders. The horizontal slider actuates the pan control while the vertical slider actuates the tilt control of the camera. This provides users with finer control of the camera and the ability to position it in the desired position with one or two drag operations.

Additionally, the camera can also be controlled with the A-S-D-W-C keys of the keyboard. This is useful for moving the camera with one hand while driving with a mouse in the other.

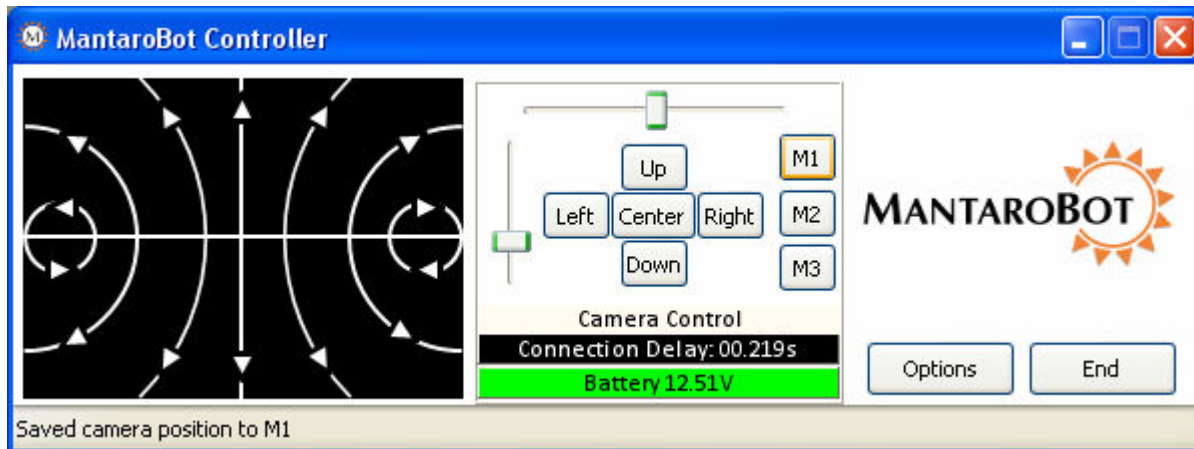
A = left  
D = right  
S = down  
W = up  
C = center

**NOTE:** The Camera Pan control should be centered prior to moving the MantaroBot.

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## 7.5.2.2 Memory Positions

Three memory position buttons on the side of the camera control (M1, M2, M3) are provided to save and recall three camera positions for easy pointing of the camera. To operate the memory buttons, point the camera to the desired position and press the button for 3 seconds to store the present position. The user is notified via a message on the status bar when the position is successfully stored.



Any subsequent clicks of the memory button will point the camera to the stored position and the status bar will indicate that the memory position was recalled.

Additionally, the camera positions can be recalled using the 1, 2, or 3 key on the keyboard. This is useful for recalling previously stored camera positions with one hand while driving with a mouse in the other.

Note: The keyboard keys can not be used for saving memory positions. They are for only recalling memory positions.

- 1 = recall M1 camera position
- 2 = recall M2 camera position
- 3 = recall M3 camera position

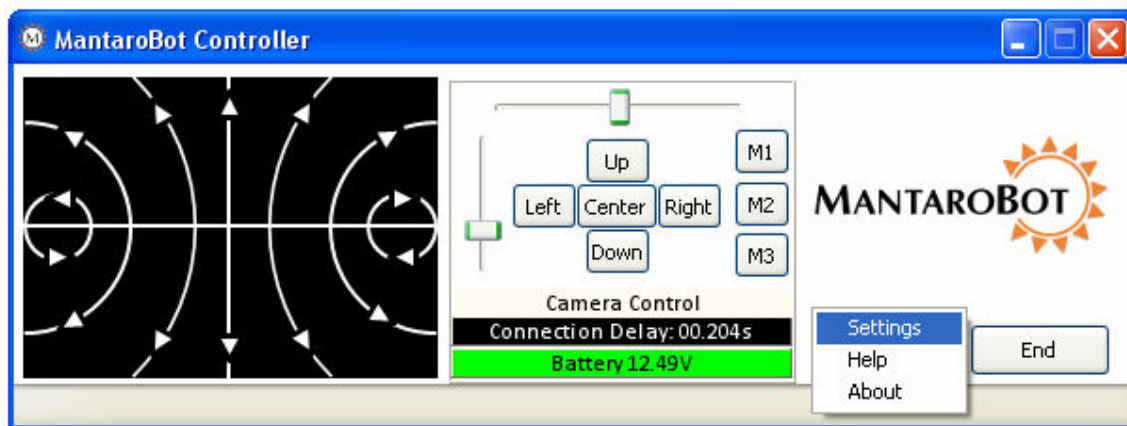
## 7.6 Options – Settings

Clicking on 'Options' and then 'Settings' provides three tabs of menus for User Administration, Robot Settings, and Controller Settings. The User Administration and Robot Settings tabs will only appear if the user logged in has administrative privileges.

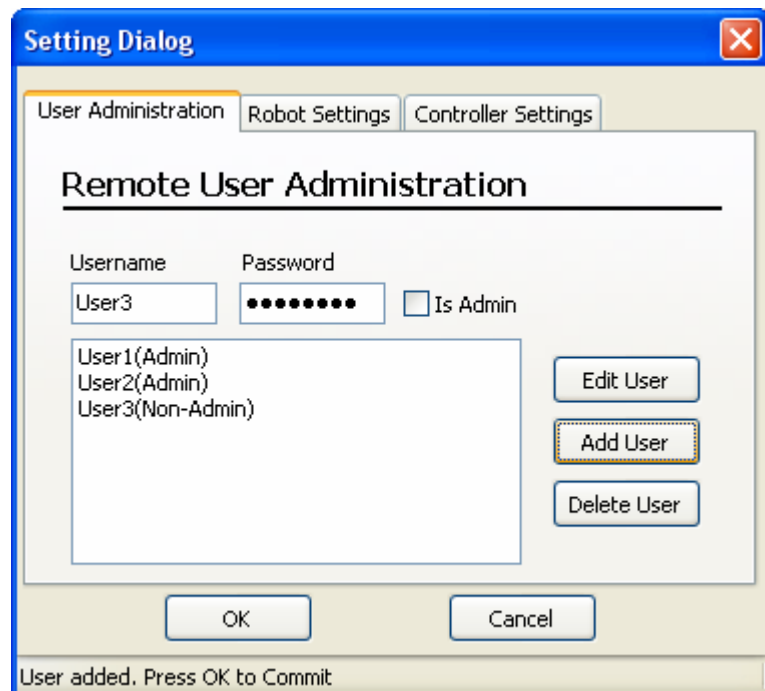
### 7.6.1 User Administration

The User Administration tab allows administrators to add, delete, or edit users to the MantaroBot it is currently logged into while using the MantaroBot Controller. In other words, the user credentials can be changed remotely without having to physically go to the MantaroBot location and use the MantaroBot Robot application. This is useful for providing temporary access credentials to a guest or adding a new user. The following steps describe the procedure:

1. Click on the 'Options' button and select 'Settings'.

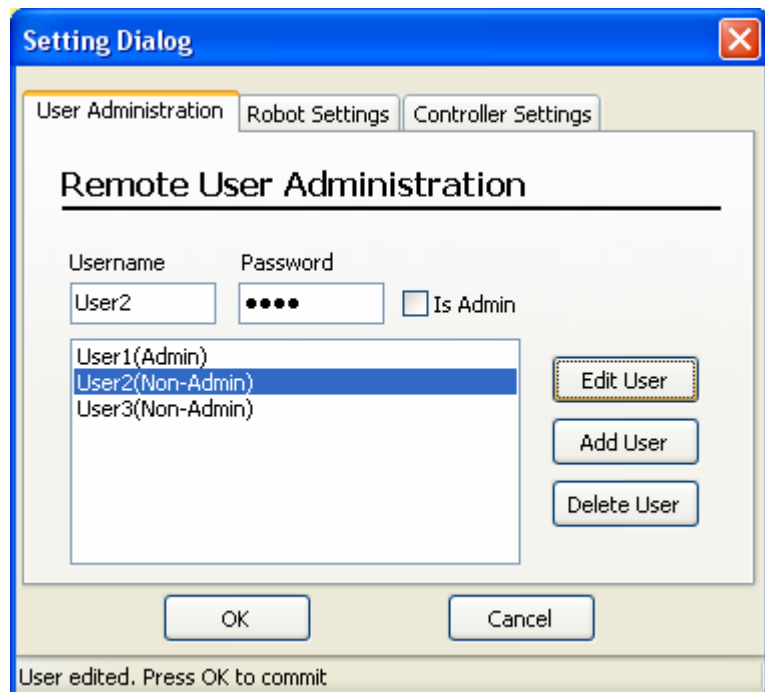


2. Click on the User Administration tab to add or delete users.
3. You will see the current user list in this dialog box. To add a new user, fill in the Username and Password fields. Then select "Is Admin" if the user is to have administrator privileges and click on "Add User".

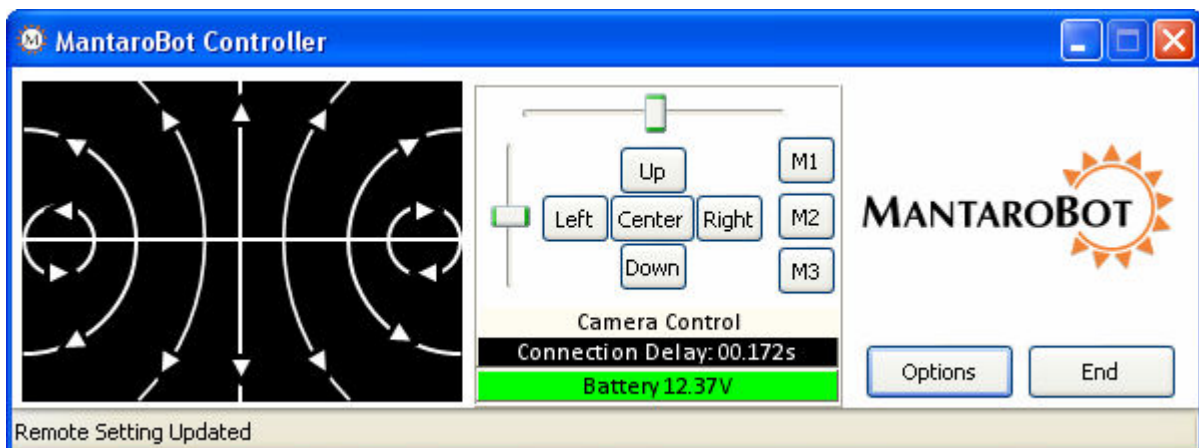
The image shows a software window titled "Setting Dialog" with a blue title bar and a close button. It contains three tabs: "User Administration" (selected), "Robot Settings", and "Controller Settings". The main area is titled "Remote User Administration". It has two input fields: "Username" (containing "User3") and "Password" (masked with dots). To the right of the password field is a checkbox labeled "Is Admin". Below these is a list box containing three entries: "User1(Admin)", "User2(Admin)", and "User3(Non-Admin)". To the right of the list box are three buttons: "Edit User", "Add User" (highlighted with a dashed border), and "Delete User". At the bottom of the dialog are "OK" and "Cancel" buttons. A status bar at the very bottom reads "User added. Press OK to Commit".

4. To delete a User, select the user and click "Delete User".

5. To edit a user's information, click on the user and edit his username and password. Once you are done editing press 'Edit User' to make the modification.



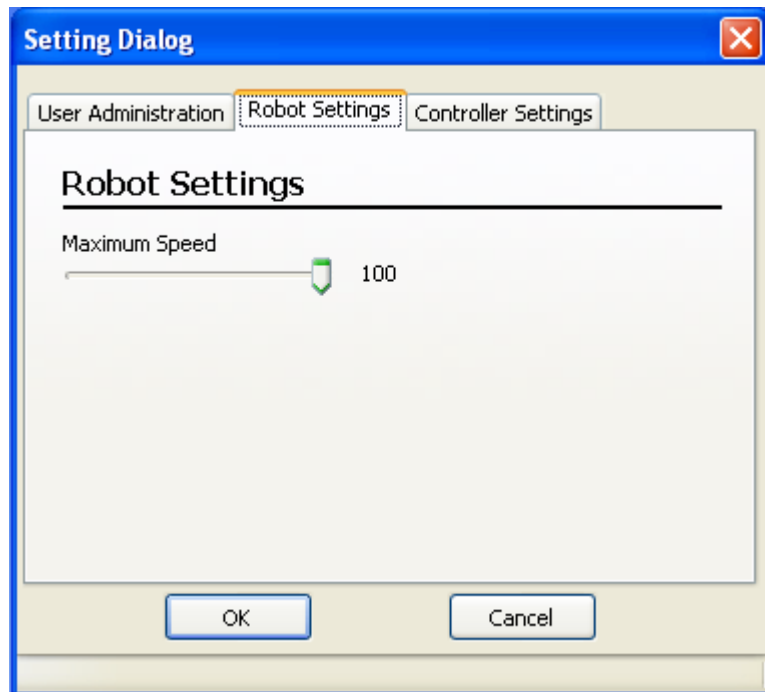
**Note:** The changes to 'Add User', 'Delete User', or 'Edit User' are not uploaded and saved to the remote MantaroBot (the robot currently logged into) until the 'OK' button on the bottom of the window is clicked. The message, 'Remote Settings Updated', will appear on the Controller status bar to indicate that the user names and passwords have been stored once the 'OK' button is pressed. If the 'Cancel' button is pressed before the 'OK' button, all changes will be lost!



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## 7.6.2 Robot Settings

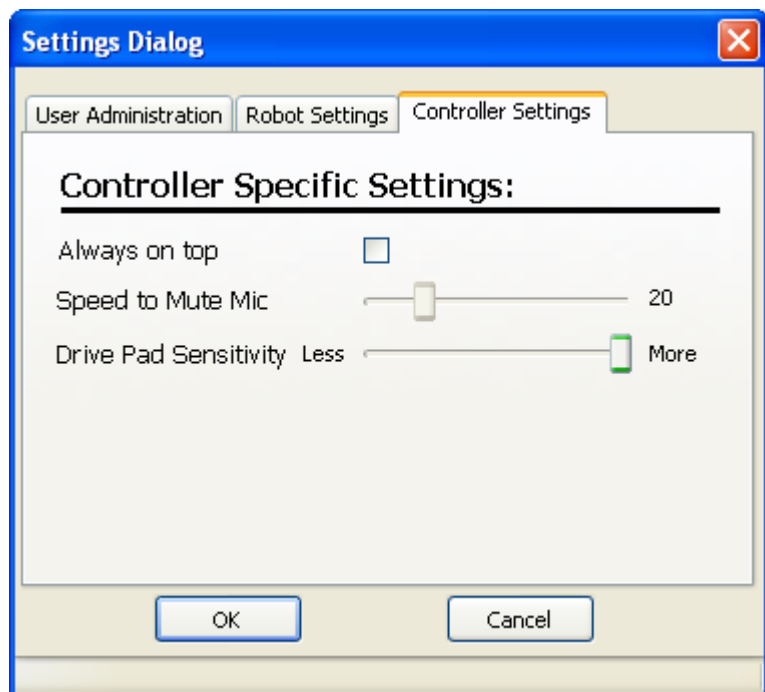
The Robot Settings tab allows administrators to set the maximum speed (value 40 to 100) of the MantaroBot currently logged into. Similar to the User Administration tab, changes will not be saved and uploaded to the MantaroBot, until the 'OK' button is pressed.



## 7.6.3 Controller Settings

The Controller Settings tab is accessible to all users and allows the user to configure the settings of the MantaroBot Controller application installed on the remote computer. The user can:

1. select if the application window is 'Always on top' or not.
2. select percentage of total drive speed at which to mute the microphone on the MantaroBot to prevent feedback noise.
3. set the turning radius sensitivity of the Drive Motor Control pad.



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## 7.7 Options – About

The 'About' window selectable from the 'Options' button shows the user the current version number of the MantaroBot Controller application and components of the MantaroBot (if in an active call). When the controller is not logged on to any MantaroBot, the window shows the version number for MantaroBot Controller application only. However, once the call is established, the version number for the remote MantaroBot's Robot Application, Firmware, Hardware and serial number will be displayed. This information is useful in any tech support inquiries. This window also



provides links to the MantaroBot support site and ability to check for updates. Available updates will be checked for the MantaroBot Controller and if in a call, will also check for updates for the MantaroBot itself. **Note: Updates that are available for the MantaroBot Robot Application can only be installed by a user local to the MantaroBot.**

## 7.8 Miscellaneous

This section describes the in-call status information provided below the Camera Control.

### 7.8.1 Connection Delay

The Connection Delay displays a measurement of the approximate round trip delay from the MantaroBot Controller application through the network to the MantaroBot. If the network that you are connected to has significant delays you can compensate by moving the MantaroBot slowly or in short movements. Any change you may see in the connection delay over time does not indicate an issue with

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your MantaroBot. Increasing connection delays only indicates that your wireless and/or internet access is or has become slow.

## ***7.8.2 Battery Indicator***

The battery indicator provides status of the internal MantaroBot battery voltage level. In addition to the voltage level indication, the indicator bar provides a three color status: green, yellow, and red.

- Above 12V the color will be green.
- Between 11.7 - 12V the color will be yellow and the status bar will show a message stating “Low Battery. Charge soon.”
- Below 11.7V the color will be red and the status bar will show a message stating “Battery very low. Charge now!” If the battery reaches 11.5V, the call will automatically end.

## 8 Maintenance

### 8.1 Battery Maintenance

The MantaroBot is equipped with a Sealed Lead Acid Battery. The life of this type of Battery is impacted by the depth of discharge. If the battery is repeatedly fully discharged the life of the battery will be reduced. The MantaroBot should be fully recharged after each use by connecting it to the charger. The battery charge level can be determined by connecting to the MantaroBot using the MantaroBot Controller Application. When the battery level is indicated at the Battery Low level it should be recharged as soon as possible.

**Note: The MantaroBot should be connected to the charger or Docking Station whenever it is not in use to keep the battery topped up.**

### 8.2 Replacing the Battery

The following steps should be followed should it be necessary to replace the battery.

**Note: Pushing the MantaroBot without the Battery installed may damage the control circuitry.**

1. Remove the front access panel of the MantaroBot by pulling out the 6 black pegs.
2. The battery brackets are held in with a Velcro strap. Unfasten the strap to remove the battery.
  - a. If this is the first battery replacement cut the plastic shipping strap.
3. Disconnect the battery connectors from the battery terminals.
4. Remove the battery.
5. Place the new Battery in the battery brackets.
6. Fasten the Velcro strap around the battery and the battery brackets.
7. Connect the Red wire to the Positive terminal of the battery first.
8. Connect the Black wire to the battery negative terminal.
9. Close and secure the front access panel using the 6 black pegs removed in Step #1.

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10. Plug the charger in and charge the battery for at least 8 hours or until fully charged before driving it on battery power.

## 8.3 Netbook Maintenance

The Netbook computer is loaded with Microsoft Windows Version 7 and the latest version of Skype. Windows Automatic update has been disabled to prevent unnecessary applications from being enabled when updates are installed. If enabled these applications use processing bandwidth that may cause a reduction in the MantaroBot response to control commands or may reduce the video quality. Skype updates will be installed automatically. These updates may at times require updates to other software components. Check the MantaroBot support website periodically for software updates and advisories.

It is recommended that the MantaroBot Netbook not be used for general purpose email or web browsing as no virus scanning software or firewalls are enabled. Enabling virus scanning and firewalls may reduce the performance and responsiveness of the MantaroBot.

## 9 Warranty

Mantaro warrants the MantaroBot to be free from malfunctions and defects in both materials and workmanship for 90 days from the date of purchase. If this product is found to be defective within the warranty period, Mantaro will either repair or replace the product. This warranty does not cover circumstances beyond the control of Mantaro. We make no other express or implied warranty for this product. Some states or jurisdictions do not allow exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. Some states or jurisdictions do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific rights, and you may have other rights which vary from state to state or by jurisdiction.

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