



MANTAROBOT™ TELEGO

Web Controller

User Guide

And

Operating Manual



MantaroBot™

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Version	Date	Change Summary
1.0	09/10/2014	- Initial Customer Release.
1.1	12/19/2014	- Added TeleGo support for MantaroBot TeleMe and Classic - Added picture showing TeleGo and A/V app both running on one tablet.
1.2	05/01/2015	- Added TeleGo support for MantaroBot TeleMe 2 - Implemented administrative features that were previously only available via the desktop installable MantaroBot Controller application. - Added "AUTO" as control path option.
1.3	10/5/2015	- Added keyboard Arrow Key driving control

Note: New or significantly modified features from previous versions in the future will be marked as 

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DISCLAIMER

MantaroBot will not be held responsible for misuse of the telepresence robot that results in damage or harm to the robot itself, the user device (tablet or smartphone), other people or the surroundings in which the robot is used.

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1 Introduction to TeleGo web controller

The TeleGo web controller provides a convenient way to connect to and drive your MantaroBot without the need to install an application on your PC/Mac, tablet or mobile device. Simply enter the web link into your favorite browser, select your MantaroBot, enter your user name and password and you are up and running. For subsequent uses you can create a bookmark of your robot and you can connect with just a couple of clicks.

The TeleGo web controller has three different user interfaces each optimized for specific device types. The MantaroBot desktop controller executable for Windows user interface is replicated in the web format for use with a standard PC/Mac with keyboard and mouse. In addition, two user interfaces are available for mobile devices with touchscreen and/or accelerometers: one for tablets and one optimized for small mobile phones such as the Apple iPhone or Samsung Galaxy.

The TeleGo is designed for everyday use and convenience and provides almost all the features supported by the desktop controller. For more detailed information about your particular MantaroBot please see the associated User Guide and Operating manual.

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1.1 WARNINGS

USER DEVICE INSTALLATION – If you are using a TeleMe or TableTop TeleMe, PLEASE ensure that the user device (i.e. tablet or smartphone) is plugged all the way into the device holder and is fully mated with the docking connector inside the bottom of the device holder. If a landscape holder was purchased for a user device (e.g. iPad) that has the charging connector on the short side (normally designed for charging in portrait orientation), please insure the lock on the back of the holder is turned to the lock position. Improper installation could result in your device falling out of the holder and breaking!!!

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. Note that the risk of tipping increases with the weight of the tablet that is used in the holder. If you have purchased a Tablet weighing more than 20 ounces additional care should be taken such as reducing the acceleration setting in the controller.

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. It is recommended that the camera on the user's device be tilted down such that obstacles can be readily seen when driving the MantaroBot.

NETWORK DELAY – The video coming from the camera and the robot control commands may travel through the network with varying amounts of delay. Due to the varying delays, the video you are viewing may not represent the current location of the MantaroBot. Network delays can cause 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.

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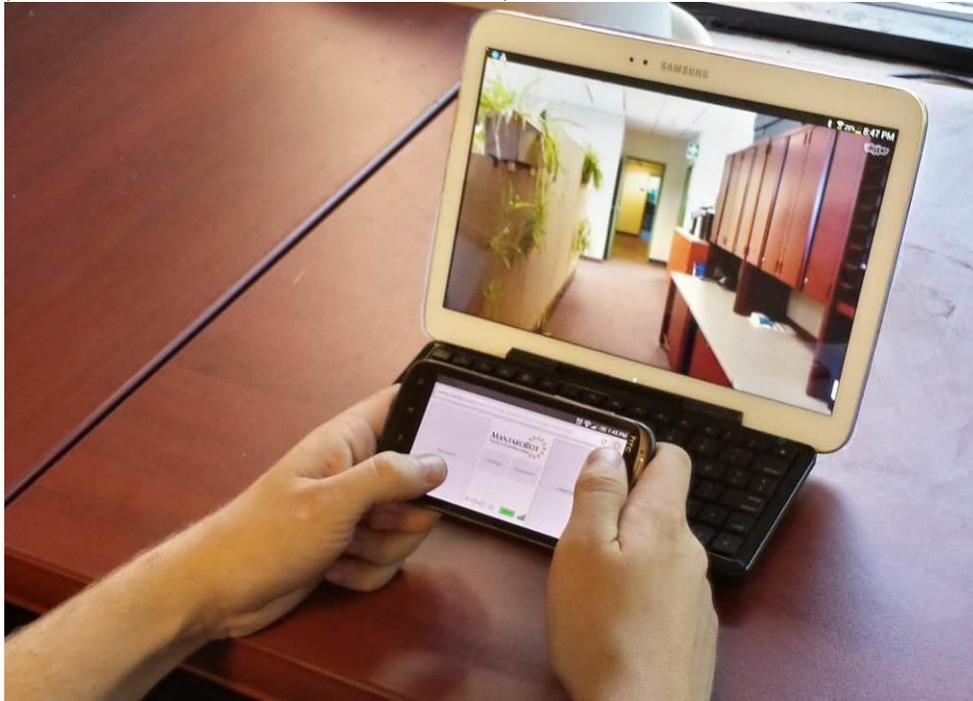
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SECURITY – The MantaroBot has user level password control to help prevent unauthorized access. However Skype and other video conferencing applications can be configured to various levels of permission for accepting calls as well. It is recommended that you review the Call Settings for the video conferencing application in use on your tablet or smartphone.

2 Connecting to MantaroBot

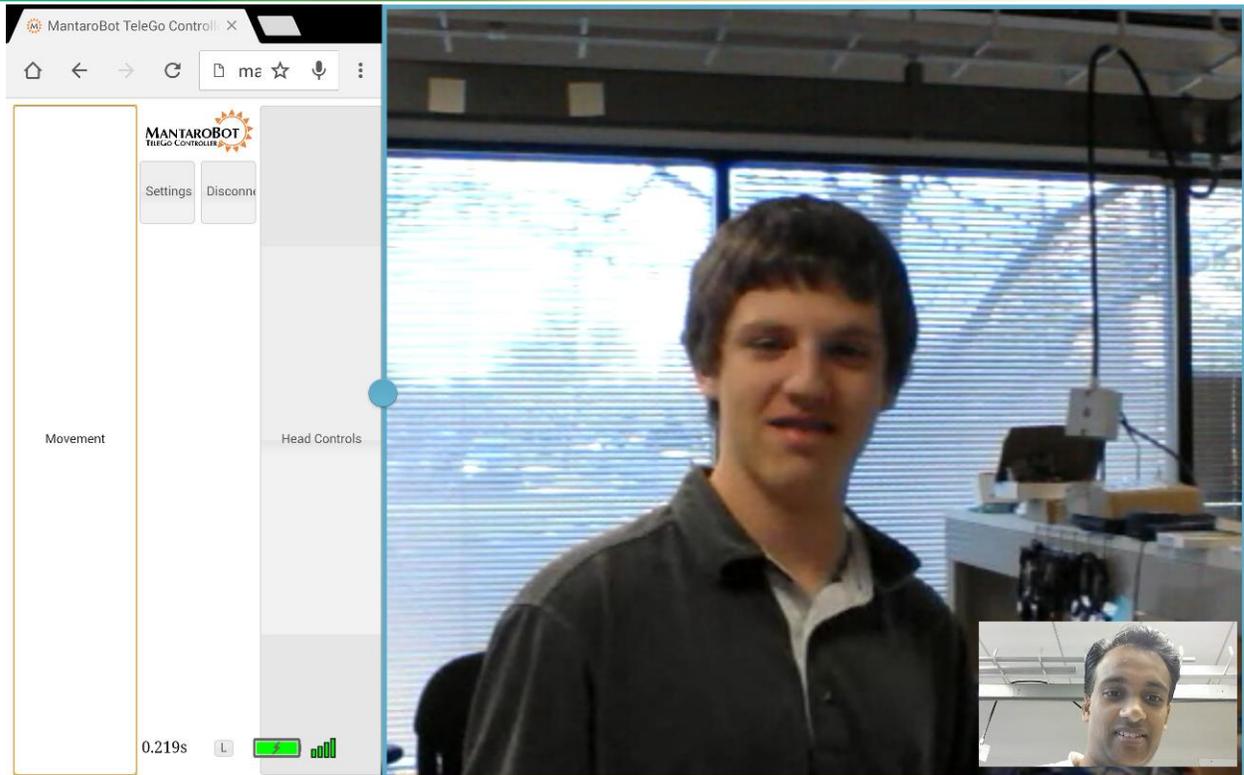
2.1 Using the TeleGo with your A/V Application

The TeleGo Controller must be used with an Audio Video application such as Skype, Google Hangouts, FaceTime, Polycom, Jabber, Zoom or similar application. This is the application that allows you to see and hear what is going on around the MantaroBot. The typical use scenario is to use a PC/Mac or large screen Tablet for the audio/video conference. On a PC/Mac the TeleGo (running in a web-browser) can share the screen and will run simultaneously with the video app. Most mobile devices only allow a single application to share the screen so the mobile device can be used as a controller while viewing the video on a separate tablet, mobile device or PC (two separate devices shown below).



Some devices such as the Galaxy TAB S allow you to run 2 applications so you can run TeleGo in one window and A/V app in a second window (single device shown below).

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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 a surveillance drone to that of a person.

2.2 Connecting to your MantaroBot

The TeleGo Web Controller has the flexibility to be configured to use one of three available robot control paths to provide the network connection between the TeleGo and the MantaroBot. The flexibility of a control path that is independent of the video application allows the use of any audio/video conferencing application. The configured robot control path is the network connection which the TeleGo web controller communicates with the MantaroBot to control its various robot functions (e.g. drive, pan/tilt, etc.). The robot control path is an independent communication path from that of the audio/video conference itself. In fact, the audio/video conference itself can be established from a separate device than the one running the controller application (e.g. a remote user using an iPad running FaceTime for the audio/video and simultaneously a mobile phone running the TeleGo controller to control movement.)

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Control Path:

MantaroBot Name:

Username:

Password:

Controller View:

Conferencing App:

Remember me

[Create Bookmark Link](#)

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When calling a MantaroBot using the TeleGo, the user also has to select which robot control path will be used for that particular call session. Below are the three available robot control paths and some differences between them. There is also a fourth option “AUTO” which will automatically choose one of the control paths below for you.

1. WebRTC
 - a. Use any application available for the user device for audio/video conferencing
 - b. Can run audio/video conferencing application from a separate device than the device running the controller application
 - c. Uses port 9001 to setup the initial robot control path, but then a direct peer-to-peer connection will be used to communicate robot control commands (free, no additional user cost incurred)
2. MantaroBot Communications Service
 - a. Use any application available for the user device for audio/video conferencing
 - b. Can run audio/video conferencing application from a separate device than the device running the controller application
 - c. Use MantaroBot Communications Service (cloud based service) for communicating robot control commands (monthly service plan required – please contact MantaroBot for more information)
 - d. Uses port 80 for data transfer alleviating the need of port forwarding for NAT traversal
3. Direct Socket connection

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- a. Use any application available (including Skype) for the user device for audio/video conferencing
 - b. Can run audio/video conferencing application from a separate device than the device running the controller application
 - c. Uses direct socket connection between MantaroBot and the TeleMe Controller for communicating robot control commands (free, no additional user cost incurred)
 - d. Primary use for within private/corporate networks (including remote user via VPNs) where traffic does not or can not leave the IT infrastructure.
4. AUTO – This selection will automatically cycle through the above control options when attempting to log into the MantaroBot. The control path order that the AUTO selection tries is as follows: 1) Direct Socket 2) WebRTC 3) MantaroBot Communications Service

2.3 Login Step by Step Instructions

1. Launch the TeleGo web controller by entering www.mantarobot.com/telego in to your web browser. The web controller website will auto-detect the type of device you are connecting from and provide you with a controller interface that is most appropriate. The interface type can be changed from the Settings options (more information later in this guide).

2. Select the Robot Control Path using the drop down list.



Control Path: ←

MantaroBot Name:

Username:

Password:

Controller View:

Conferencing App:

Remember me

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5. Enter the name/serial number or IP address of your MantaroBot.



Control Path: MantaroBot Communication Service ▼

MantaroBot Name: mantarobottleme999 ←

Username: user1

Password:

Controller View: Desktop ▼

Conferencing App: Other ▼

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6. Enter your Username and Password credentials in to the fields.



Control Path: MantaroBot Communication Service ▼

MantaroBot Name: mantarobottleme999

Username: user1 ←

Password:

Controller View: Desktop ▼

Conferencing App: Other ▼

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- The TeleGo controller will auto-detect the best 'Controller View' for the device you are connecting from. The user can change this selection before logging in or can also change this selection from the Settings window after logging in. If you change the auto-detected selection, a browser cookie will remember your selection the next time you use TeleGo.



Control Path:

MantaroBot Name:

Username:

Password:

Controller View: 

Conferencing App:

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8. Select the Audio/Video Conferencing App that you are using. If the website detects that you are connecting from a mobile phone, this field will not be displayed since the phone will only be used as the remote controller and will not run the audio/video conferencing application simultaneously. The choices for this field are Skype and Other. If you select Skype a field will appear for you to enter the Skype name of the robot that you are calling and a call will automatically be placed to your MantaroBot when you click on Login. (This feature only works on Windows PCs running Skype for Desktop, not Metro). Select "Other" when you are using any Audio/Video application other than Skype or if you want to initiate the Skype call yourself.



Control Path:

MantaroBot Name:

Username:

Password:

Controller View:

Conferencing App: 

MantaroBot Skype Name to connect to:
 

Remember me

[Create Bookmark Link](#)

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9. Once you have entered your information you can check the "Remember me" check box if you want the User Name and Password fields to be automatically filled in the next time you log in.
10. You can also click on the "Create a Bookmark link" which will create a URL with the MantaroBot credentials in the web browsers address bar. You can then create a bookmark in your browser for each MantaroBot that you will be using allowing you to login in by clicking the bookmark and then the login button.

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3 TeleGo (Desktop View)

The TeleGo desktop view user interface is split into four sections. The left side is the Drive Motor Control Pad, the middle is for “head” unit Tilt / Pan Control, the right side is for various Options and ending the call, and the bottom is for providing status and control for additional accessories.

NOTE: The next three sections 3.1, 3.2, and 3.3 do not apply to the TableTop TeleMe. The control pad view for the TableTop TeleMe will not include drive controls shown on the left in the picture below.

3.1 Drive Motor Control Pad



3.2 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.

Moving the cursor to the two small circular areas on either the left or right side of the drive pad will cause the MantaroBot to pirouette in place in the direction shown by the arrows.



An alternative method of driving the robot (keyboard driving) is to use the up ↑, down ↓, left ← and right → arrow keys in conjunction with either the ALT or CTRL key. The ALT or CTRL key is used to command the robot to “GO” and assures that someone intends for the robot to move. The robot will

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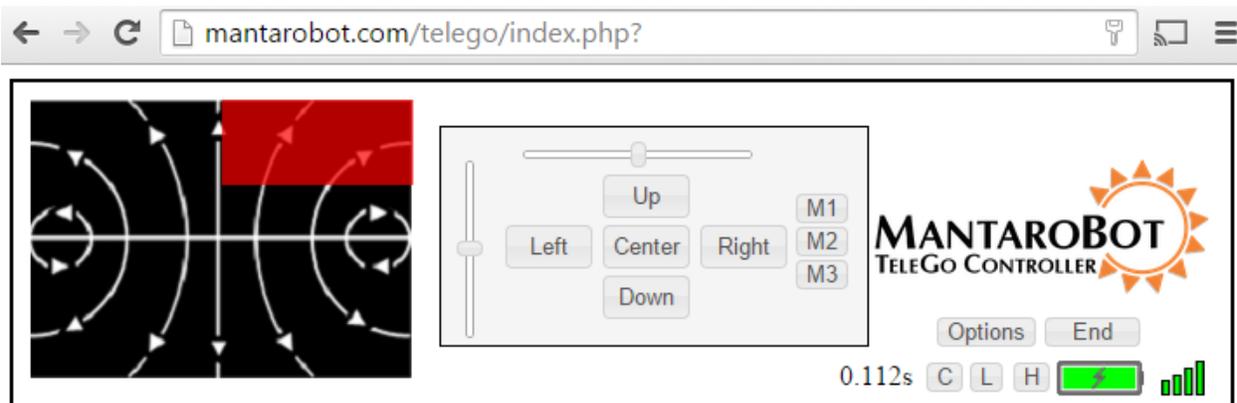
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continue to move in the direction indicated as long as either ALT or CTRL is pressed. Releasing these keys will cause the robot to stop. To drive the robot hold down the ALT or CTRL key and press the ↑ key. You will observe the drive button icon in the drive pad move up the screen as the ↑ is pressed. Repeatedly pressing the ↑ will increase the robot speed. The ↓ will cause the robot to slow down or to move in reverse if the drive button is moved to the lower half of the drive pad. Left and right movements are controlled by the ← and → keys respectively. If when turning, you want to drive straight immediately, simply press the ↑ once and the robot will drive straight in the current direction as indicated by the drive button icon jumping to the center line of the drive pad.

NOTE: While using the keyboard to drive the robot, the A-D-S-W-C keys can still be used to pan/tilt the camera. However, please note that if you are using the CTRL key for driving (instead of the ALT), simultaneously hitting the 'W' key to tilt the camera up will actually close the browser window because CTRL-W is a Windows command to control the current program. Use the ALT key if you plan on pan/tilting the camera at the same time as driving the robot.

3.3 Proximity IR Sensors

The MantaroBot TeleMe is equipped with two obstacle detecting IR sensors. The sensors detect obstacles approaching the left wheel or the right wheel and will inform the user through the MantaroBot Controller Drive Motor Control Pad. As the left drive wheel of the robot approaches an obstacle in the front, a half red or white bar will appear on the top left of the Drive Motor Control Pad area, and if the right drive wheel of the robot approaches an obstacle in the front, a half red or white bar will appear on the top right of the Control Pad area (as shown in the following picture). The MantaroBot Classic/Classic 2 is equipped with 4 obstacle detecting IR sensors; one on each side front, rear, left, and right.



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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 30 cm ahead of it. Note forward speed is not reduced if the robot is moving slowly. 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.

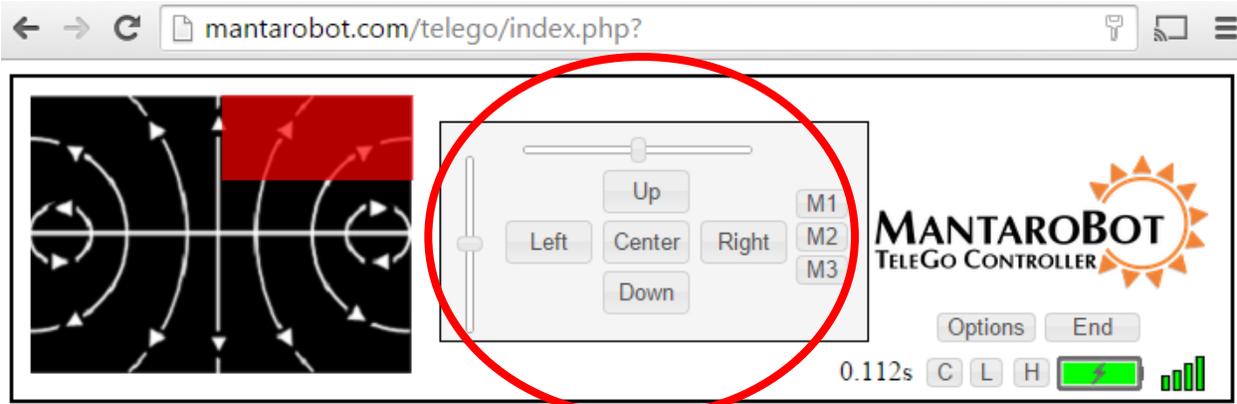
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3.4 Camera Control



NOTE: References to “Pan” in this section only apply if your TeleMe is equipped with the factory installed optional Mast with Motorized Pan Mechanism. If your TeleMe does not have this option, the associated control buttons/slider will be grayed out.

3.5 Pan/Tilt

The Camera Control buttons allow the user to pan/tilt the “head” of the MantaroBot (which has an integrated camera) independently of driving the MantaroBot. This is useful in a meeting environment where you want to observe items or people in the room without driving the MantaroBot around. It is also necessary to look down to avoid obstacles when driving. The camera will move in the direction of the buttons. The “Center” button causes the head 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 head. This provides users with finer control of the camera and 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.

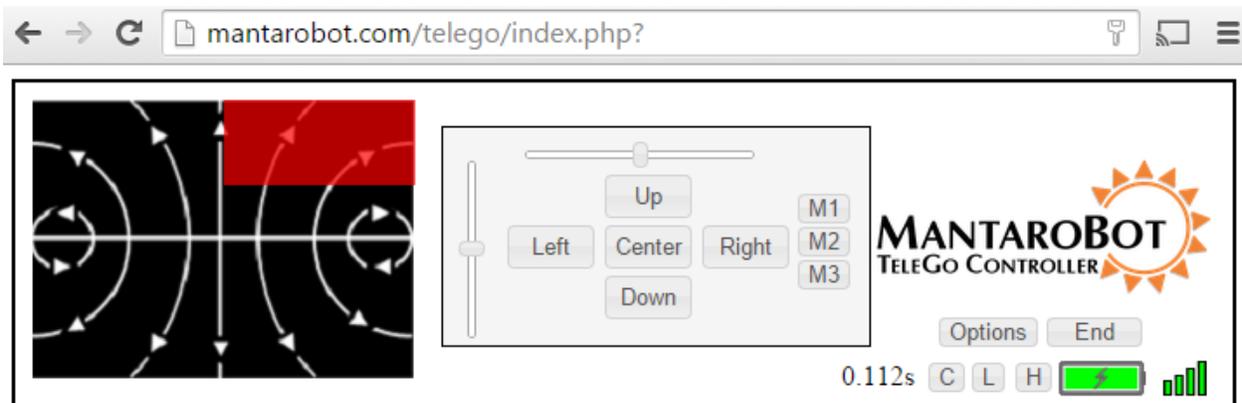
A = left
 D = right
 S = down
 W = up
 C = center

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NOTE: The Camera Pan control should be centered prior to moving the MantaroBot. There is also a Controller Setting option to 'Auto-Center' the camera when driving.

3.6 Memory Positions

Three memory position buttons on the side of the camera control (M1, M2, M3) are provided to save and recall three head (camera) positions for easy pointing of the camera. If your MantaroBot does not have the motorized pan option, the memory buttons can still be used to save/recall the tilt position. 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 tilt positions with one hand while driving with a mouse in the other.

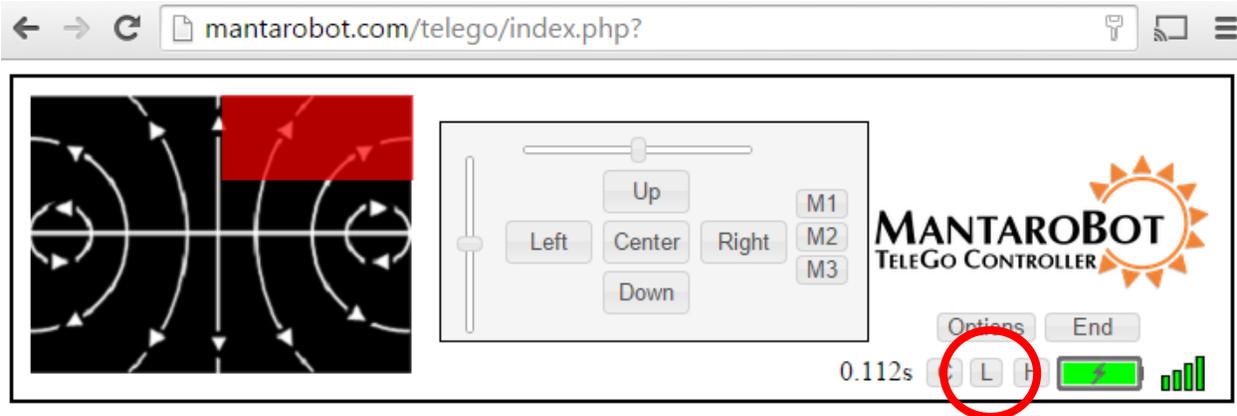
Note: The keyboard keys can not be used for saving memory positions. They are for only recalling memory positions.

1 = recall M1 camera position

2 = recall M2 camera position

3 = recall M3 camera position

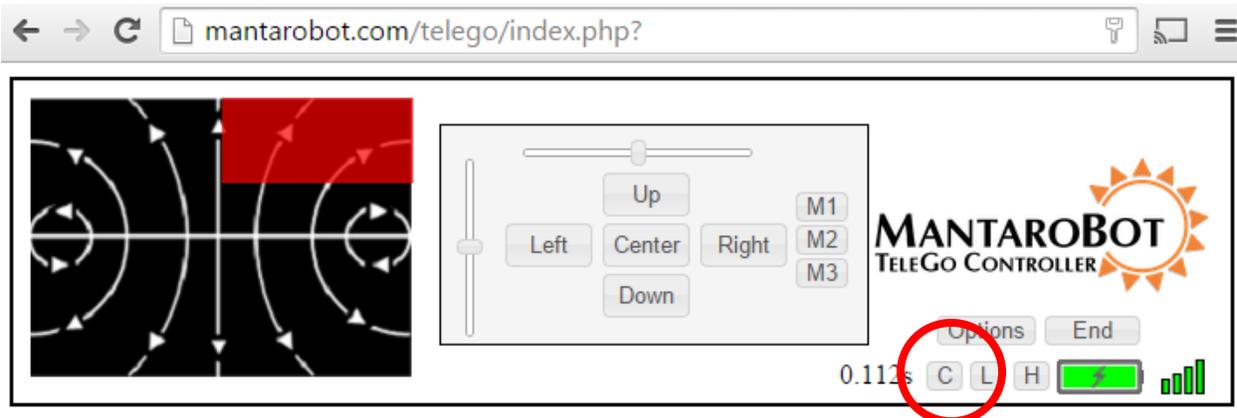
3.7 Laser Pointer



If the MantaroBot is equipped with a Laser Pointer the “L” button at the bottom of the Controller window will not be grayed out. Clicking on the “L” with your mouse or alternatively hitting the “L” button on your keyboard will turn the laser on/off. The laser can be pointed by using the Camera Control functions and turning it on while the camera is facing the location of interest.

WARNING: Care must be taken to avoid shining the laser at someone’s eyes. This can be dangerous and may cause permanent eye damage.

3.8 Charging User Device



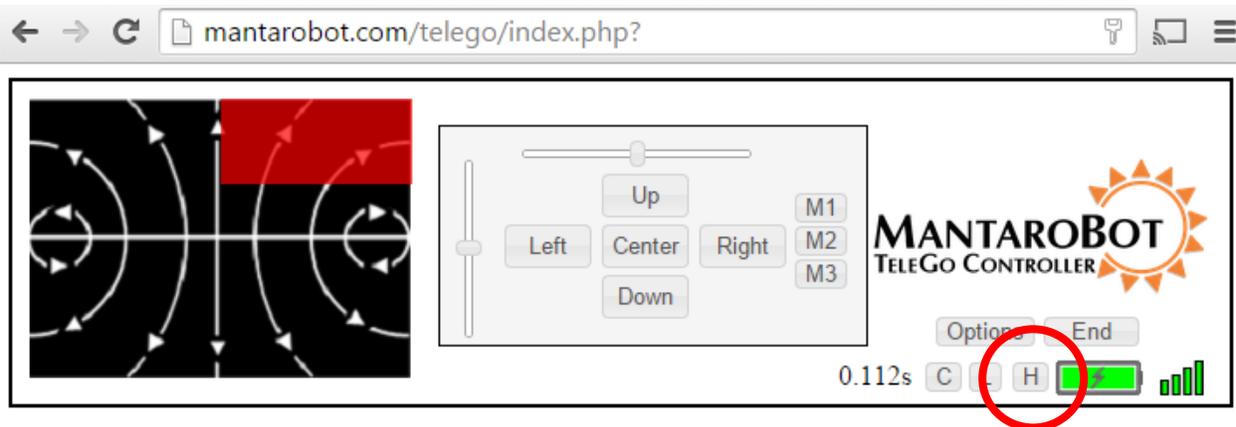
This feature applies to MantaroBot TeleMe and TableTop TeleMe. During a call, there may be instances when the internal battery of the MantaroBot has plenty of charge but a person local to the TeleMe or TableTop TeleMe may notice that the user device plugged into the device holder is running low on charge. In those instances, the remote user has the option to charge the user device (only while the call

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is on) by drawing power from the MantaroBot's internal battery. To do this, simply click the 'C' at the bottom of the Controller window. When the call ends, the charging of the user device will also end.

If the MantaroBot is plugged into a charger, the 'C' will be greyed out as the user device is already being charged.

3.9 LED Headlights



The "H" circled in the above image will only be shown if you are connected to a TeleMe 2. If the TeleMe 2 is equipped with LED Headlights, the "H" button at the bottom of the Controller window will be activated. Clicking on the "H" with your mouse or alternatively hitting the "H" button on your keyboard will cycle the LED Headlights from the following states: Low beam – Med beam – High beam - OFF. The color of the "H" button will also cycle through as the button is repeatedly clicked (white – blue – red – black).

The LED Headlights are very useful for driving the TeleMe 2 when the environment around it is poorly lit, especially at night.

3.10 Options - Settings

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

Settings allows the user to configure the settings of the TeleGo Controller while connected to the MantaroBot. Some of the settings are MantaroBot specific and will only appear based on which MantaroBot you are connected to (Classic/2, TeleMe/2, or TableTop TeleMe).

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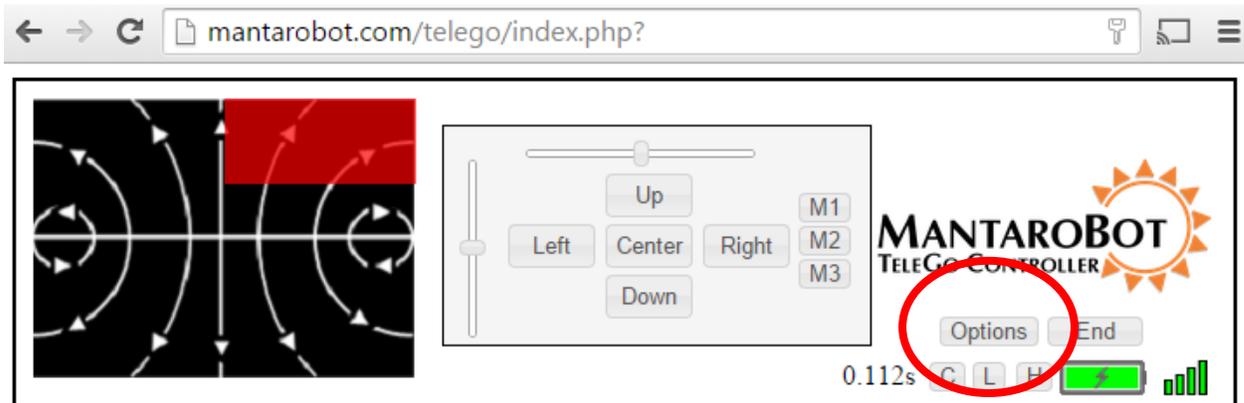
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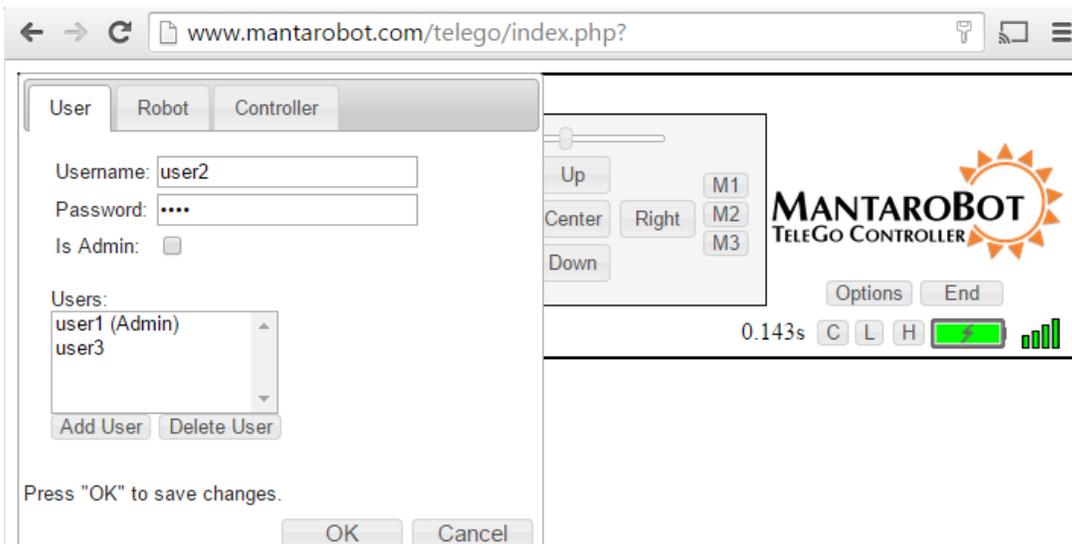
3.10.1 User Settings

The User 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 tab to add or delete users.



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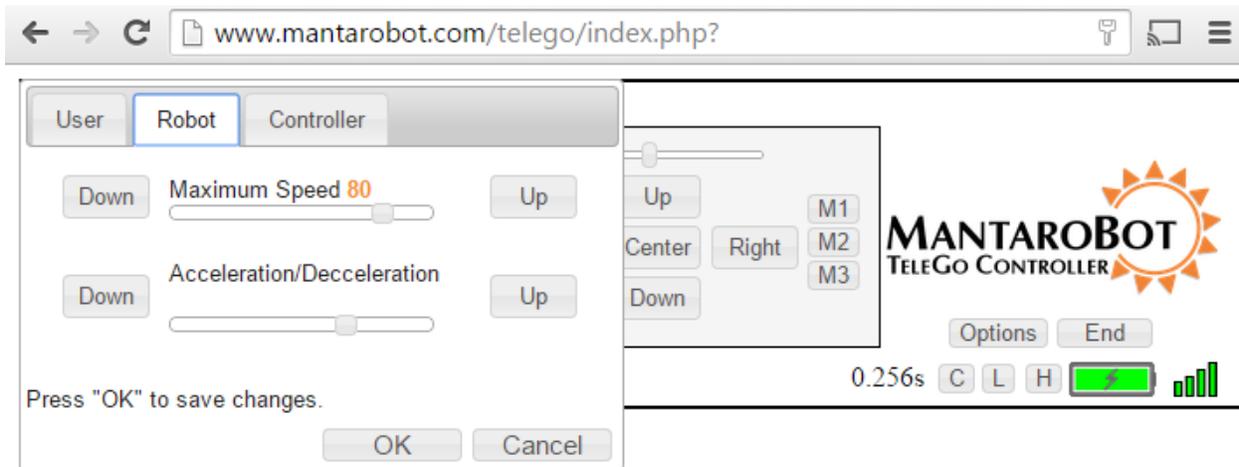
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3. You will see the current user list in this dialog box. To add a new user, fill in the Username and Password fields. Then select "Is Admin" if the user is to have administrator privileges and click on "Add User".
4. To delete a User, select the user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

Note: The changes to 'Add User', or 'Delete 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. If the 'Cancel' button is pressed before the 'OK' button, all changes will be lost!

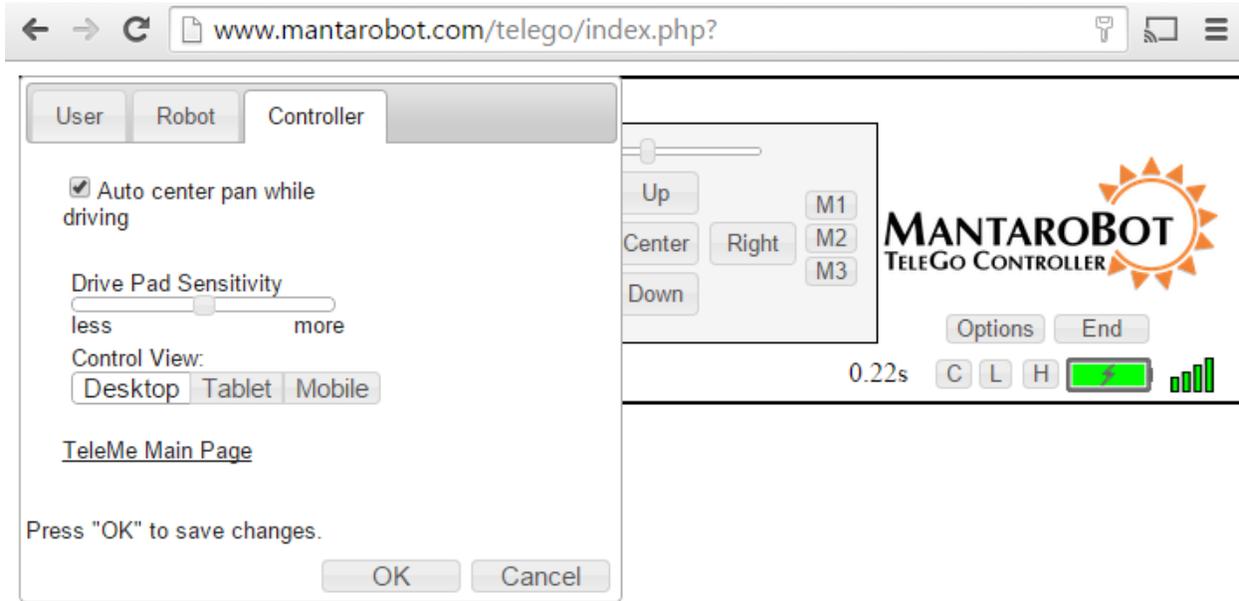
3.10.2 Robot Settings

The Robot Settings tab allows administrators to set the maximum speed (value 40 to 99) of the MantaroBot currently logged into as well as the Acceleration/Deceleration of the MantaroBot. Acceleration / Deceleration sets how abruptly or smoothly the MantaroBot will respond to drive pad or accelerometer movement commands. It is recommended that the Acceleration be set to slow initially until users become familiar with the drive controls. Similar to the User settings tab, changes will not be saved and uploaded to the MantaroBot, until the 'OK' button is pressed



3.10.3 Controller Settings

The Controller Settings tab is accessible to all users and allows the user to configure the settings of the TeleGo controller. **NOTE: These settings are not MantaroBot-specific and will apply regardless of which MantaroBot the user is connected to.**



The user can:

1. Enable/Disable Auto-Centering pan of camera when the MantaroBot is being driven. Enabling the auto-center feature will center the camera in the pan direction once the MantaroBot has reached a predefined speed. The tilt of the camera will not be auto adjusted and will remain under user control to tilt up/down as the user desires. Recalling memory positions while driving the MantaroBot will recall the tilt position only. If the MantaroBot is not equipped with the pan feature this setting will not be displayed in the window. [Default: Enable]
2. Set the Drive Pad Sensitivity (turning radius sensitivity) of the Drive Motor Control pad.
3. Drive timeout is a setting related to connection delay. When the Drive timeout crosses the current setting threshold (equal to a certain connection delay value), the MantaroBot will be stopped from moving. Set the drive timeout to be high or low depending on the quality of your connection. If the connection is bad, set the drive timeout to a higher setting to prevent the MantaroBot from stopping drive movements. However, setting the drive timeout to a high setting with a bad connection also means that drive control movements could be quite delayed.

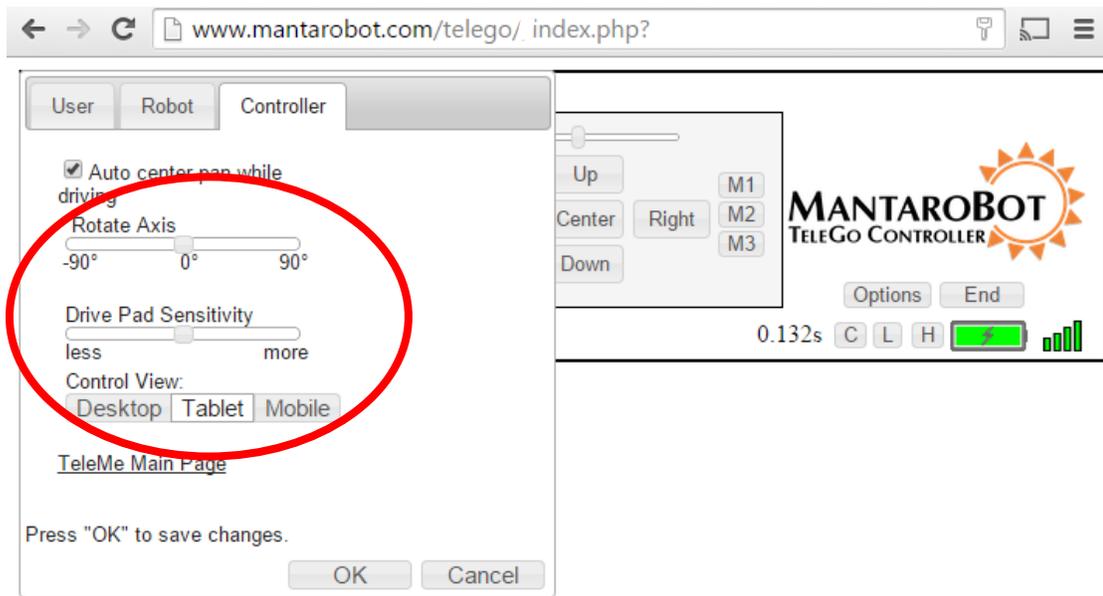
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4. If you are logged in and on the same local area network (LAN) as a MantaroBot TeleMe/2 or TableTop TeleMe (could be via VPN), the Configuration web pages of the MantaroBot can be accessed by clicking on the “TeleMe Main Page” link. This will launch the web browser on your computer.
5. If your PC or Tablet has accelerometers then two additional sets of controls will appear that will allow you to tailor the controller for the attributes of your particular device. The Rotate Axis allows you to select the preferred orientation of your device for driving the MantaroBot. Adjust this control as required to match your Tablet/Mobile Device accelerometer orientation for your preferred device orientation. For example an iPhone being held in the portrait orientation with camera at the top will require a setting of 0°. However if the same iPhone is held in the landscape orientation with the camera on the right then 90° is required.

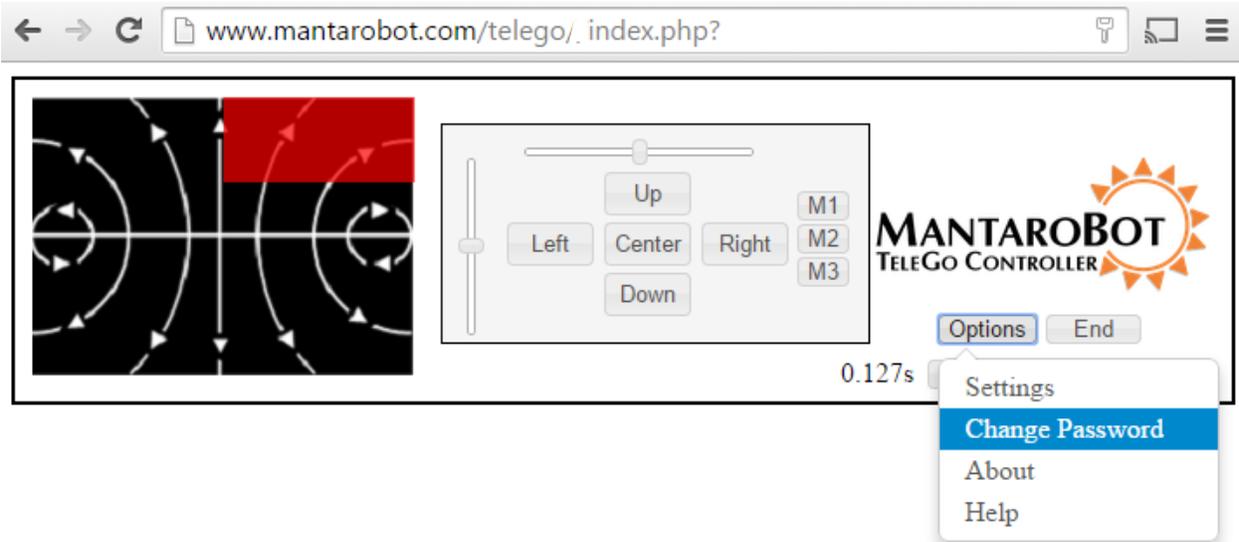


6. Control View allows you to select which user interface you want to use on your device.
 - a. Mobile: designed for small devices such as phones that have small screen area.
 - b. Tablet: designed for use with devices like tablets that have large screens where you can easily use the touchscreen in addition to the accelerometers.
 - c. Desktop: designed for Desktop PC/Mac and is the default mode if your device does not have accelerometers.

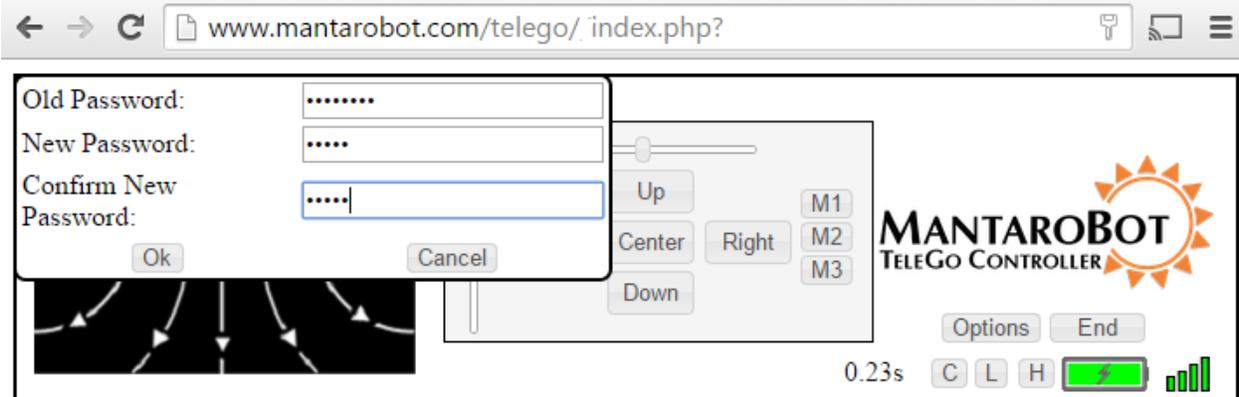
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3.10.4 Change Password

If you wish to change the password while operating the MantaroBot, click on “Options” button and then “Change Password”.



The window below should then appear, asking you to enter the password of the current user, as well as the desired new password. You must enter the same password in both the “New Password” and “Confirm Password” fields, then click “OK.”



3.11 Options - Help / About (Accessories)

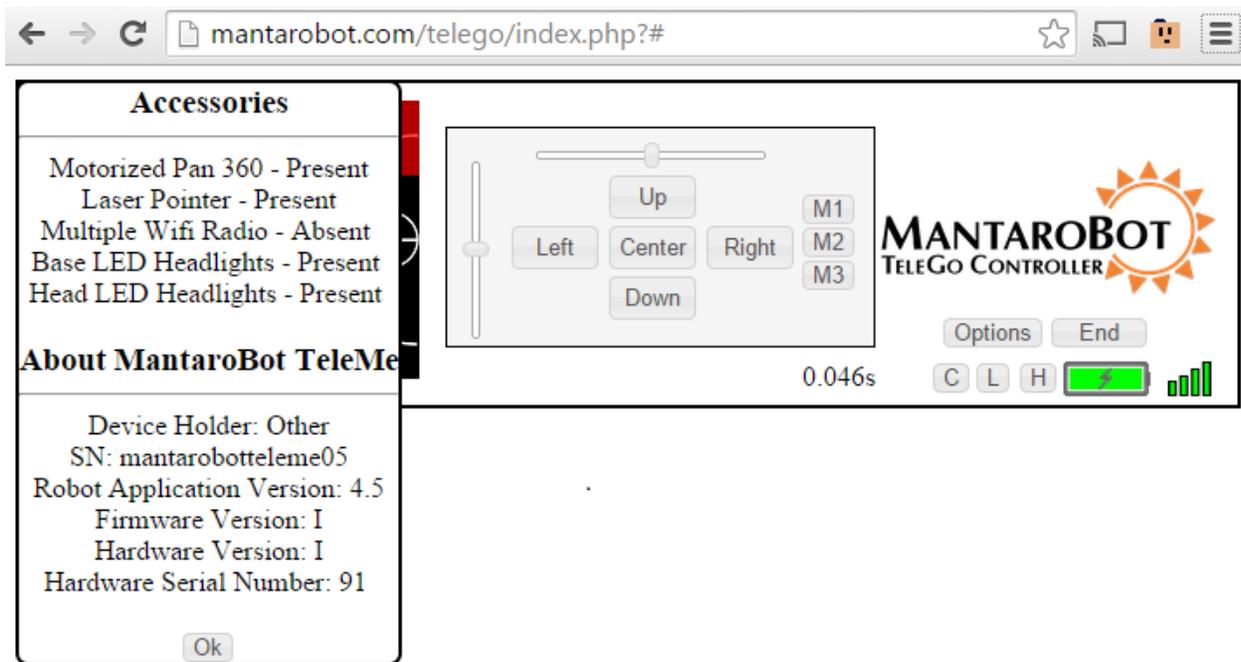
3.11.1 Help

The 'Options' – 'Help' button will open up to the latest version of this TeleGo User Guide from the web.

3.11.2 About (Accessories)

The 'About' window selectable from the 'Options' button shows the serial number and version numbers of the components of the MantaroBot it is currently logged into, as well as the device holder type. It also lists all the possible accessories for the particular MantaroBot device and which ones are present/absent. Based on the accessories that are present (absent), the TeleGo controller will enable (grey out) certain features or enable (remove) certain graphics (e.g. user will not see a pan camera slider if there is no Mast with Motorized Pan Mechanism installed). This information is useful in any tech support inquiries.

NOTE: Optional Extended Battery is not considered an accessory and will not be displayed on the Accessories list.



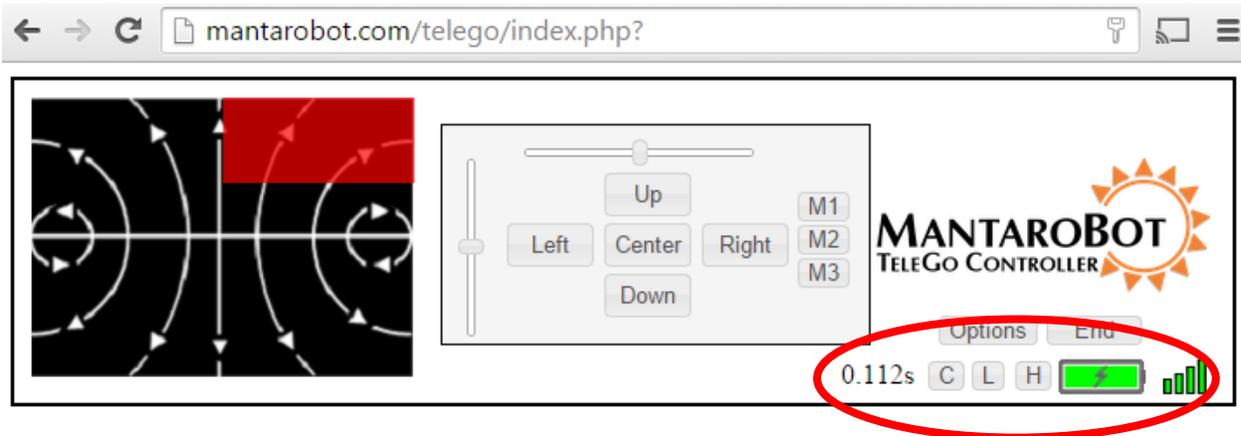
Note: Updates that are available for the MantaroBot Robot Application can only be installed by a user local to the MantaroBot.

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3.12 Miscellaneous

This section describes the in-call status information provided at the bottom right of the Controller application.



3.12.1 Connection Delay

The Connection Delay displays a measurement of the approximate round trip delay from the TeleGo Controller 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 your MantaroBot. Increasing connection delays only indicates that your wireless and/or internet access is or has become slow.

3.12.2 Battery Indicator

The battery indicator provides status of the internal MantaroBot battery (it does not provide battery status for the user device being used as the "head"). A lightning bolt will display in the indicator when the battery is being charged. When it is not being charged, rolling the mouse over the indicator will provide remaining time information for the battery.

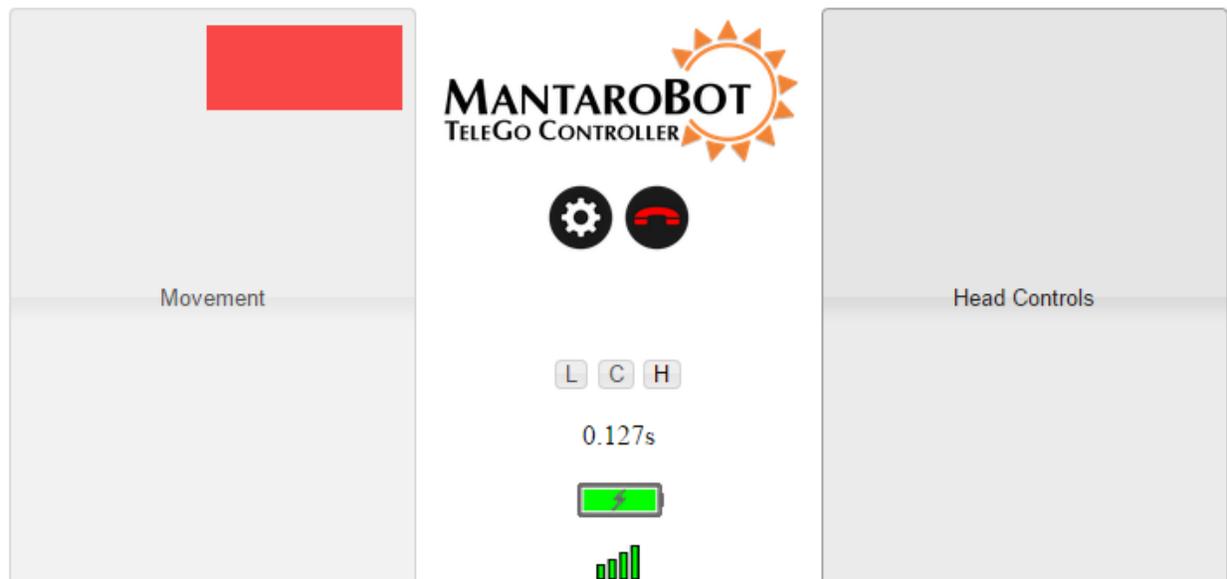
Below a certain battery charge level, the color of the indicator will turn red and the status bar will show a message stating "Battery very low. Charge now!" If the battery reaches a very low voltage, the call will automatically end.

3.12.3 Wifi Meter

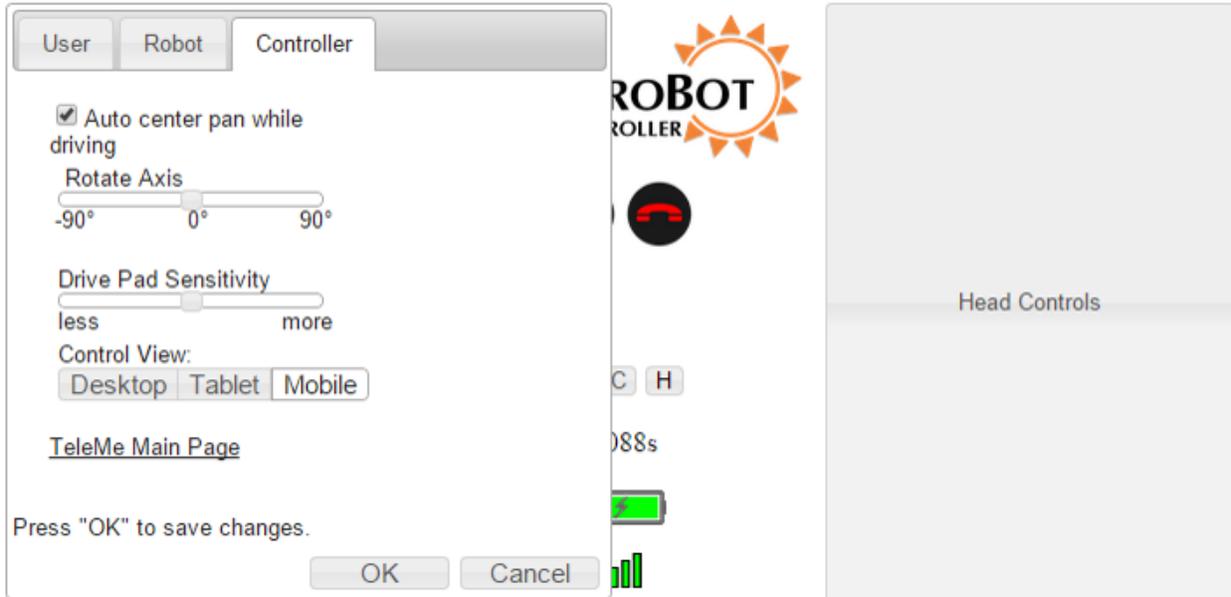
The Wifi meter provides Wifi strength information for the location where the MantaroBot is currently located. It is a good idea to keep the MantaroBot away from an area where Wifi coverage is poor, otherwise you may lose connection to the MantaroBot and not be able to regain it. Using the Wifi meter to determine if you are driving into an area with poor coverage will prevent this situation from occurring.

4 TeleGo (Mobile View)

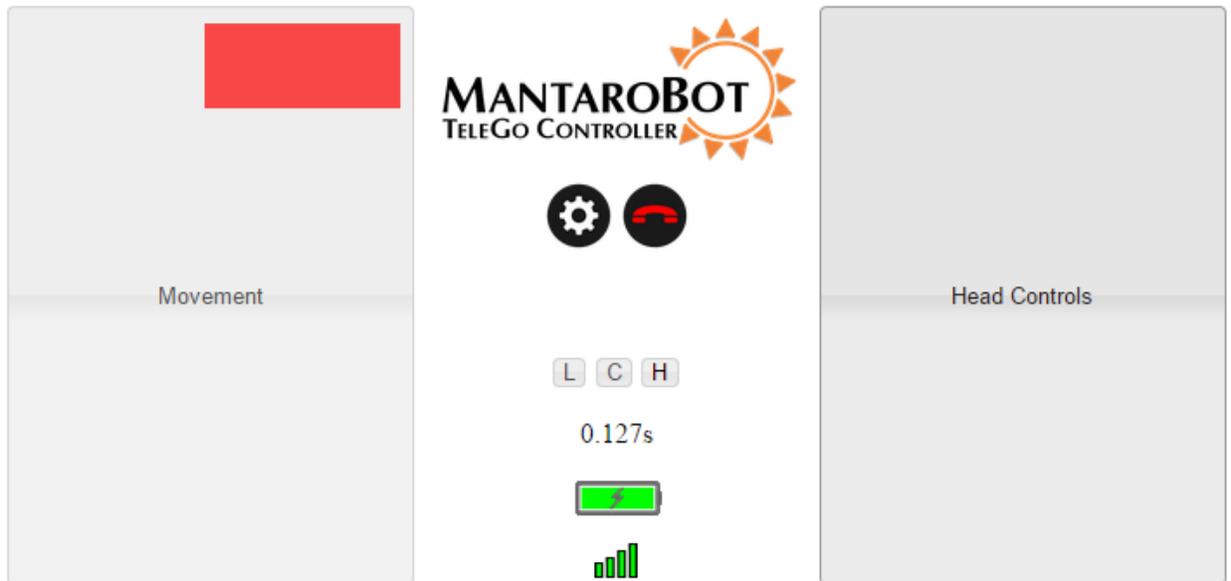
The TeleGo mobile view user interface is designed for small devices such as mobile phones or small tablets. These devices generally do not allow simultaneous use of a web browser and an Audio/Video application such as Skype, so on these devices the TeleGo allows the phone to operate as a separate controller while the operator is watching video on a second device. After you login the screen below will appear.



It is recommended that before moving your MantaroBot that you check the Controller Settings by tapping the Settings button on the screen. This will bring up the following screen.

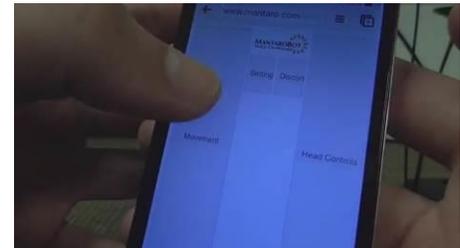


Adjust the Rotate Axis slider to match the orientation of your mobile device. On iPhones -90° is a landscape orientation with the camera to the left. Then select OK.



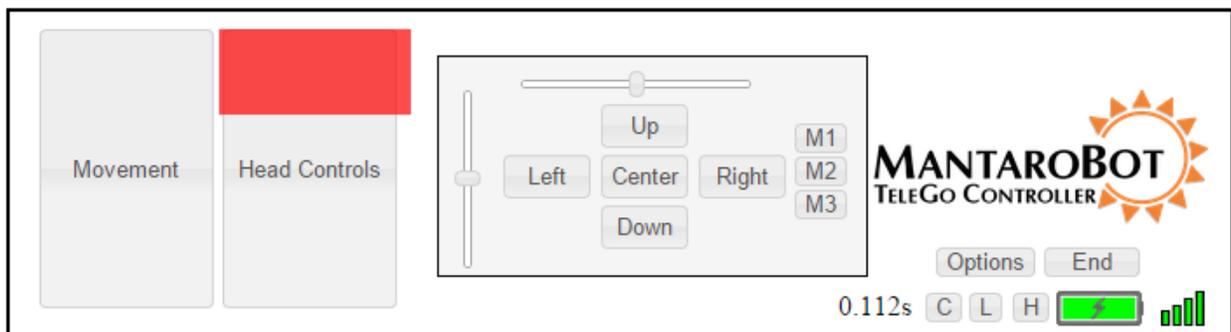
To tilt the head down put your thumb on the Head Controls area and tilt the device forward. If the head does not move in the direction that you tilted then you may need to adjust the Rotate Axis slider to match your device.

To drive your MantaroBot place your thumb on the Movement area and tilt the top of device forward (away from you) to move forward or backward to move in reverse. Left and right movements are a combination of tilt forward and down to the left or right as required. Every time you touch the Movement or Head Control button, the TeleGo controller will mark that physical position of the mobile device as the “zero” point from which movements are referenced to. Removing your finger from the Movement or Head Control area will stop any robot control movement and the “zero” point will be cleared.



5 TeleGo (Tablet View)

The TeleGo tablet view user interface is another accelerometer based user interface that combines the best features of the Mobile View and Desktop View user interface. It is for use on large tablets where the screen area provides enough fidelity to manipulate the sliders and buttons.



The advantages over the Mobile View user interface are as follows:

- a. Head Control sliders show the current position of the head.
- b. Head can be controlled either by tilting the device or using sliders, buttons or memory keys.

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6 Appendix A

6.1 Keyboard Mapping

Below is a map for all the keyboard shortcuts that can be used to control the MantaroBot.

Pan/Tilt Camera Control:

A = pan left 1 = recall M1 camera position
D = pan right 2 = recall M2 camera position
S = tilt down 3 = recall M3 camera position
W = tilt up
C = center camera

Laser Pointer:

L = laser on/off

LED Headlights:

H = headlights lo/med/hi/off



Drive Controls:

↑ = drive forward (increase speed)
↓ = drive reverse (decrease speed)
← = turn left
→ = turn right

Note: CTRL or ALT must be pressed to enable arrow key driving. (If CTRL is used simultaneously as 'W' to tilt camera up, the browser window will close because Windows uses CTRL-W to close current program. Use ALT if planning to pan/tilt the camera simultaneously while driving with the keyboard.)