

RoboRemo User Manual v1.9.1

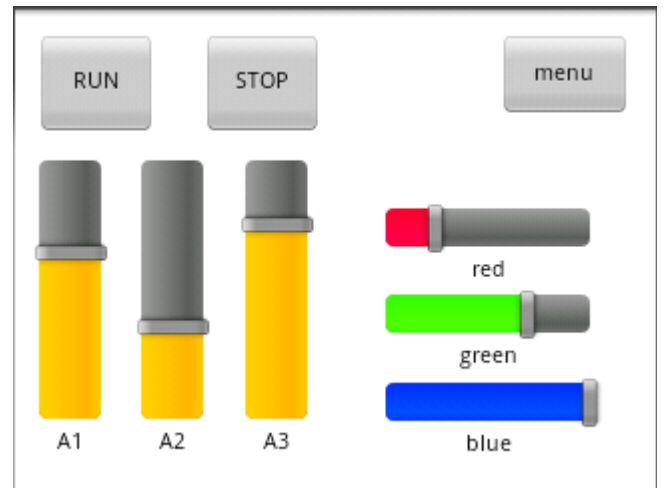
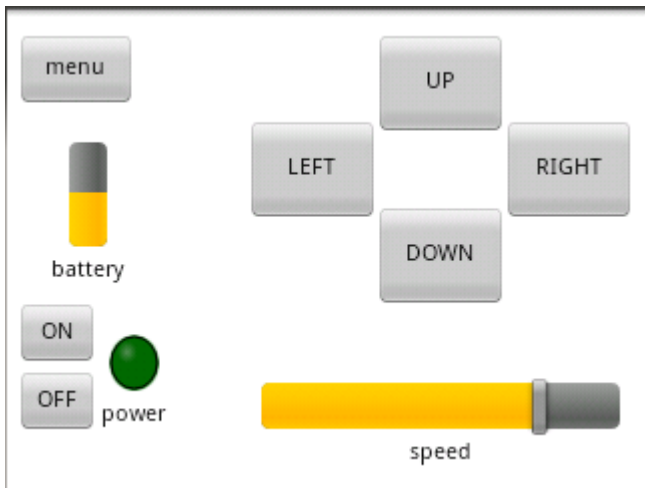
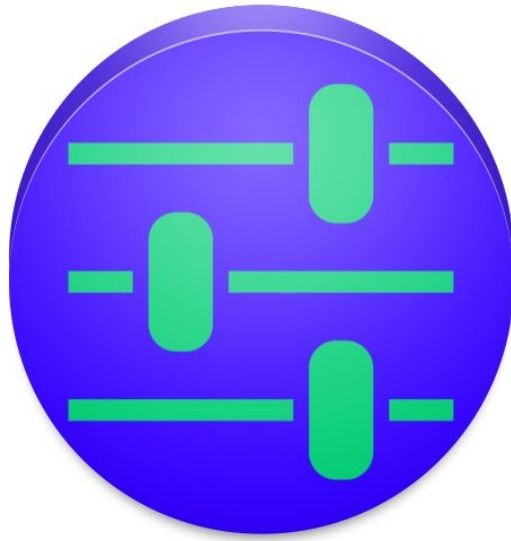


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General Description

RoboRemo is a user **customizable** remote control application intended mainly for **electronics hobby projects**. RoboRemo can connect over **Bluetooth (RFCOMM)**, **Internet** or **WiFi (TCP, UDP)**, and **USB (CDC-ACM, FTDI, CP210X)**.

Disclaimer: Don't use RoboRemo for life support systems or any other situations where system failure may affect user or environmental safety. Please don't use RoboRemo in projects where high-level security is required.

To connect over **Bluetooth**, a remote device must contain a **Bluetooth to Serial adapter** like **BlueSMiRF, BTM-222, HC-05, HC-06, etc.** and a **microcontroller** programmed to interpret commands from RoboRemo. You can also find adapters for **WiFi (like ESP8266)** or **Ethernet**. For **USB connection**, your phone / tablet must have **USB API** and **USB OTG**.

All the **commands** from RoboRemo are **text strings**, ending with **command ending** which is **LF** character **'\n'** (hex code 0x0A) by default, but **user can change it**. For example if you configure a button to send “abc” when pressed, it will send “abc\n” if command ending is '\n' or it will send “abcqwerty123” if command ending is “qwerty123”. The **command ending** is used by the microcontroller program **to know where each command ends**.

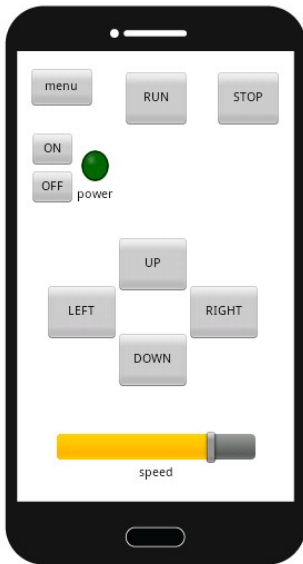
RoboRemo also can receive commands for updating some interface items (for example you can have a battery level indicator to monitor the battery level of the remote device). These **input commands also must end with command ending**.

It is **not** recommended to set command ending to **empty string**, because receiving commands from microcontroller to app will not work properly. (App “will think” that command ends after each received character). However the commands from app to microcontroller will be sent as expected (a button configured to send “abc” will send “abc”).

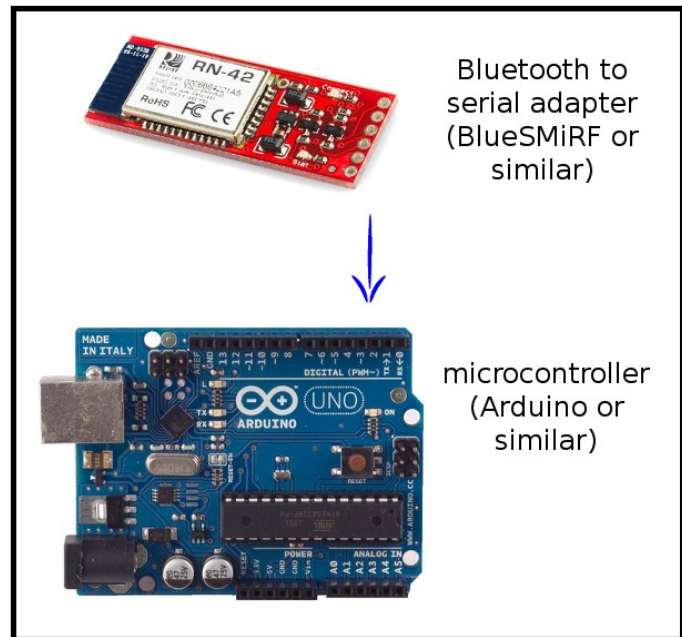
Bluetooth / WiFi / Ethernet / USB modules

RoboRemo was tested and works with these modules: BlueSMiRF, HC-05, HC-06, BTM-222, ESP8266 (ESP-01), HUZDAH ESP, Arduino UNO, Arduino Mega (Arduino connected directly with USB cable), but other modules should work too.

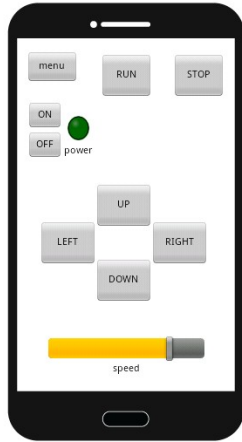
When using Bluetooth module and microcontroller, please **make sure** the microcontroller uses **same BaudRate** as the module. The default BaudRate for BlueSMiRF is usually **115200**, and for HC-05 / HC-06 is usually **9600**.



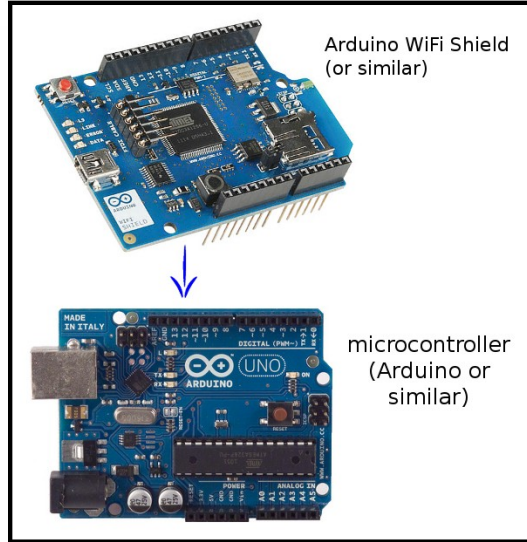
Android device
with RoboRemo app



Remote device



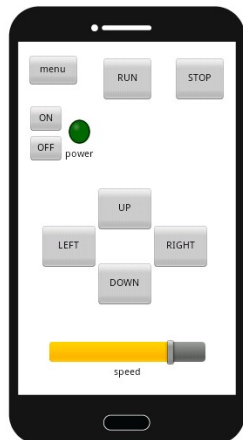
Android device with RoboRemo app



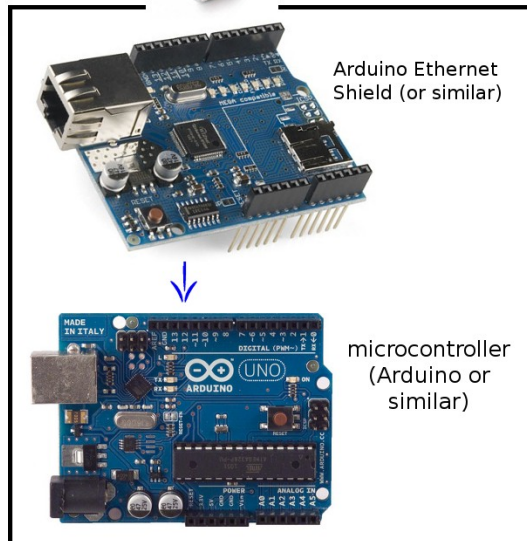
Arduino WiFi Shield (or similar)

microcontroller (Arduino or similar)

Remote device



Android device with RoboRemo app

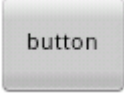




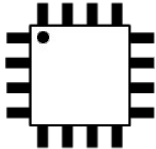
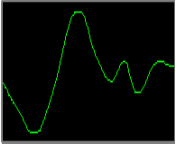



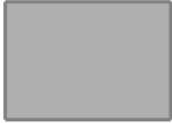




Arduino Ethernet Shield (or similar)

microcontroller (Arduino or similar)

Remote device

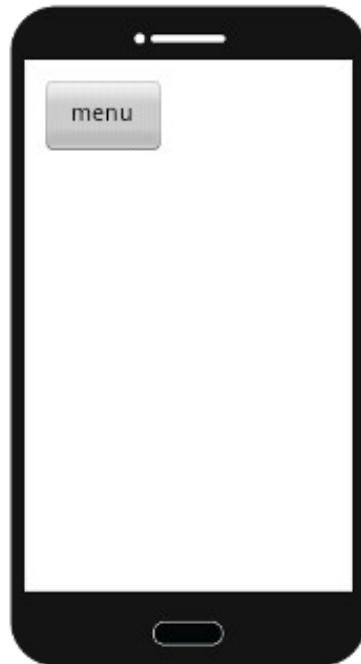
Available interface items

item name	photo	description
button		Buttons can be used for sending commands to the remote device. A button can be configured to send one command when pressed and other command when released.
slider		Sliders can be used to vary remote device parameters, for example volume control, or motor speed or light intensity.
led		LEDs can be used as indicators for remote device states.
level indicator		A level indicator item can be used to display data from remote sensors, for example temperature or battery level.
text log		A text log item is a log screen that can be used to display debug messages from the remote device.
accelerometer		The accelerometer can be used for sending periodically the acceleration measured by the phone's accelerometer. You can set the ids the 3 axes and the repeat (refresh) period.
text field	text	Text field item, to add some text to the interface. Note: if you want an item to be displayed on top of text field, copy the item, then remove it, then paste it.
plot		Plot item can be used to display some signals.

image*		Image item can be used to display an image that is sent from the microcontroller. *available only in RoboRemo Full version
touchpad		Touchpad item can be used to send position and motion of your finger.
kbd connector		Kbd connector can be used to send commands using the keyboard.
heartbeat sender		heartbeat sender can be used to periodically send some string (like a heartbeat signal). The remote device can watch for this signal to make sure it is still connected.
touch stopper		If you put a reset button for example, surround it with touch stoppers, so it doesn't get pressed when you touch the screen near to it. When you exit ui editor, touch stoppers become invisible, so they don't annoy you.
vibrator*		Vibrator item gives the remote device access to the phone's vibrator (you can send a command from microcontroller to make your phone vibrate). *available only in RoboRemo Full version.

Building the interface

First when you open the RoboRemo app, it will look like this:



To edit the interface, click **menu** → **edit ui**.

Now in edit mode, **click on blank** space to add an item, then choose the item type.

Item will appear on screen. You can **move** it by dragging the **top left corner**, and **resize** by dragging the **bottom right corner**.

To edit item options, click on the desired item.

Common edit options

option	description
copy	Copies the item so you can paste it when adding a new item.
remove	Removes the item.
lock edit	Locks the item, so you can not edit it anymore. This is useful if you want to add other items on top of this item. You can unlock all items from menu → interface → unlock edit all.

Button edit options

option	description
set text	Sets the text that appears on button.
set press action	For remote action type (default): Sets the string to send to the remote device when you press the button. (RoboRemo will append the command ending to mark the end for each command). For local action type: Sets the local action to execute when you press the button.
set release action	For remote action type (default): Sets the string to send to the remote device when you release the button. (RoboRemo will append the command ending to mark the end for each command). For local action type: Sets the local action to execute when you release the button.
set repeat delay	Sets the button repeat delay in milliseconds. When you hold a button pressed, it will first repeat after this delay. Default is 0 (don't repeat)
set repeat period	Sets the button repeat period in milliseconds. When you hold a button pressed, it will first repeat after delay, then after period. Default is 0 (don't repeat)
set local / set remote	Changes button action type from remote to local, from local to remote. Default is remote.

Local actions

action	description
“iface n” or “interface n”	select the nth interface. (n from 0 to 7)
“echo abc”	will simulate the receiving of “abc” command.
“send abc”	will send “abc” (followed by command ending) to the remote device.
“disconnect”	disconnect from the remote device
“connect rfcomm 11:22:33:44:55:66 1” or “connect rfcomm 112233445566 1”	connect over Bluetooth RFCOMM to the remote device with address 11:22:33:44:55:66 and port 1.
“connect rfcomm e 112233445566 1”	Also use encryption.
“connect rfcomm 112233445566 d”	Connect using the default UUID
“connect rfcomm 112233445566 f”	Connect using the first UUID
“connect tcp 192.168.0.5:9876”	Connect over TCP/IP to the remote device with IP 192.168.0.5 and port 9876.
“connect udp 192.168.0.5:9876”	Connect over UDP. Packets will be sent to the port 9876 of the remote device with IP 192.168.0.5 Phone / tablet will listen for packets on port 9876.
“connect usb 115200”	Connect over USB using BaudRate 115200.

Note: Starting with version 1.9.1, local action can contain **multiple commands**, separated by command ending. For example:

- set command ending to “\n”
- add a text log
- add a button, set it local
- set its press action to “**echo sending abc\nsend abc**”

Now when you press the button, “sending abc” will appear in the text log and “abc” will be sent to the remote device.

Slider edit options

option	description
set id	Sets the slider id string. For example if id is "s1" and you move the slider to the value 100 and command ending is "\n", it will send "s1 100\n" (id followed by space followed by value followed by command ending).
set label	Sets the text string to appear under the slider. You can use the slider value inside the label. Also you can set the decimal count for the value that appears in the label. Examples for slider with value 100: label "speed = #*0.1" will show "speed = 10.0" label "x = #*-5+10 cm" will show "x = -490 cm"
set min	Sets the minimum value, default is 0.
set max	Sets the maximum value, default is 255.
send when moved / send when released	Sets the slider send mode, default mode it to send when released.
set color	Sets the slider color.
send space / don't send space	Select if you want the slider to send space character after id or not.
auto return / don't auto return	Select if you want the slider to return to its center when released or not.
set return value	Set the return value to be used for auto return when released. You can enter an integer, or min/mid/max. Default is mid.
set repeat period	Set the repeat period (in ms) for slider. 0 = don't repeat (default). When repeat enabled, the slider will also send its data periodically, in addition to normal operation.

Led edit options

option	description
set id	Sets the led id string.
set on command	Sets the led on command, default is "1".
set off command	Sets the led off command, default is "0".
set label	Sets the text string to appear under the led
set color	Sets the led color.
set on timeout	Set the timeout after which led will turn off if it does not receive on command. You can program your remote device to periodically send a command to turn on an led, and set the on timeout so that you will see the led will turn off if the connection is lost.
set off timeout	Set the timeout after which led will turn on if it does not receive off command.

Led examples

Led id	led	ledA	ledB
Led on command	1	on	#>=10
Led off command	0	off	#<10
Interface command ending	\n	;	ok
To turn the led on, microcontroller must send	led 1\n	ledA on;	ledB 10ok or ledB 11ok etc.
To turn the led off, microcontroller must send	led 0\n	ledA off;	ledB 9ok or ledB 8ok etc.

Level indicator edit options

option	description
set id	Sets the level indicator id string. For example if id is “batt” and command ending is “\n”, you can set its level to 100 by sending “batt 100\n” from microcontroller.
set label	Sets the text string to appear under the level indicator. You can use the level indicator value inside the label. Also you can set the decimal count for the value that appears in the label. Examples for level indicator with value 100: label “temp. = #*0.5-10 °C” will show “temp. = 40.0 °C” label “batt. #*1%” will show “batt. 100%”
set min	Sets the minimum value, default is 0.
set max	Sets the maximum value, default is 255.
set color	Sets the level indicator color.

Text log edit options

option	description
set id	Sets the text log id string. For example if id is “dbg” and command ending is “\n”, you can append the message “qwerty” to the text log by sending “dbg qwerty\n” from microcontroller.
set label	Sets the text string to appear under the text log.
set text size	Sets the font size for the text.
log to file*	Lets you choose a file where you want to log the data that is received by this text log. For each received string, it will first append a prefix, then the string. Default prefix is “\n” (new line) so that each received string will be written to the file in a new line. You can change the prefix. Multiple items can log to the same file. *available only in RoboRemo Full version.

Accelerometer edit options

option	description
x config.	Opens the configuration window for x axis. There you can set the id for x axis, the gain, the output type (float / int), the min. and max. values and enable / disable the value limiting option. Accelerometer will periodically send the id followed by a space character (or not), followed by the processed acceleration value for that axis. You can disable an axis by setting the id to empty string. The value is processed as follows: The data from the accelerometer sensor is multiplied by gain, then it is mapped from (-9.8, 9.8) to (min, max), then it is limited (or not) to [min, max].
y config.	Opens the configuration window for y axis.
z config.	Opens the configuration window for z axis.
set repeat period	Sets the repeat (refresh) period in ms for accelerometer. Default is 20.
send space / don't send space	Select if you want the accelerometer to send space character after ids or not.

Text field edit options

option	description
set id	Sets the id for the text field. For example if id is "text1" and command ending is "\n", you can change the text to "abc" by sending "text1 abc\n" from microcontroller.
set text	Sets the text to be displayed inside text field
set text size	Sets the size of the displayed text

Note: if you want an item to be displayed on top of text field, copy the item, then remove it, then paste it.

Plot edit options

option	description
set id	Sets the plot id string. For example if id is “x” and command ending is “\n”, you can add a new sample with value 100 to the plot by sending “x 100\n” from microcontroller.
set label	Sets the text string to appear under the plot. You can use the plot's last value inside the label. Also you can set the decimal count for the value that appears in the label. Examples for plot with last value 100: label “temp. = #*0.5-10 °C” will show “temp. = 40.0 °C” If you want it to show “temp. = 40 °C”, set the decimal count to 0. label “batt. #*1%” will show “batt. 100%”
set min	Sets the minimum value, default is 0.
set max	Sets the maximum value, default is 255.
set length	Sets the length (number of samples) to fit in one frame, default is 256. Maximum length is 10000.
set display mode	Sets the display mode for the plot. Scrolling (default) – plot scrolls from right to left, new data appears on the right. Oscilloscope – plot doesn't scroll. Data appears from left to right. When it reaches the end, it waits for trigger event, then starts again from the left.
set trigger	Sets the trigger threshold and edge (rising / falling / both / none). If none edge selected, then the trigger is off, so it will not wait for trigger event. For scrolling display mode there is no trigger (The trigger settings are ignored).
Don't repaint / repaint	Disables / enables the UI repaint when new sample is received.
log to file*	Lets you choose a file where you want to log the data that is received by this plot. For each received value, it will first append a prefix, then the value. Default prefix is “\n” (new line) so that each value will be written to the file in a new line. You can change the prefix. Multiple items can log to the same file. *available only in RoboRemo Full version.

Image edit options

option	description
set id	Sets the image id string. For example if id is “img” and image format is “auto” and command ending is “\n”, you can display an image by sending “img [len]\n” followed by the image data from microcontroller. [len] must be the size in Bytes of the image data that follows. The “auto” format accepts jpg, png and bmp data.
set label	Sets the text string to appear under the image.
keep / don't keep ratio	Sets if the image should keep the original w/h ratio, or should it fill the entire image item.
filter / don't filter	Sets if the image should be filtered or not when scaled.
set image format	Sets the image format. Default format is “auto” and accepts jpg, png and bmp data. For raw image format, you can choose “RGB_888(w,h)”, “GRAY_8(w,h)”, “GRAY_4(w,h)”, “GRAY_2(w,h)” or “GRAY_1(w,h)”, where you have to replace w and h with numbers (width and height in pixels). The pixels are scanned from left to right, lines from top to bottom. RGB_888 uses 3 bytes per pixel (the levels for red, green and blue). GRAY_8 uses 1 byte per pixel (has 256 gray levels). GRAY_4 uses 4 bits per pixel (1 byte for 2 pixels) and has 16 gray levels. GRAY_2 uses 2 bits per pixel (1 byte for 4 pixels) and has 4 gray levels. GRAY_1 uses 1 bit per pixel (1 byte for 8 pixels) and has 2 gray levels (0 is full black and 1 is full white)
import	Import an image from the SD card. The image is stored in the RoboRemo interface. It is recommended to use small images (up to 100KB).
set as background	All other items will be displayed on top of the image. The image item is locked from editing. You can unlock it from menu → interface → unlock edit all.

Touchpad edit options

option	description
set press id	Sets the id for press event. For example if press id is “pressed” and command ending is “\n”, when the user touches the touchpad, it will send “pressed [x] [y]\n”, where [x] and [y] are the point coordinates. For example: “pressed 316 244\n”
set drag id	Sets the id for drag event. Same as press id, but for drag events.
set release id	Sets the id for release event. Same as press id, but for release events.
set label	Sets the text string to appear under the touchpad.
set x min	Sets the x coordinate corresponding to the left border of the touchpad. Default is 0.
set x max	Sets the x coordinate corresponding to the right border of the touchpad. Default is 640.
set y min	Sets the y coordinate corresponding to the top border of the touchpad. Default is 0.
set y max	Sets the y coordinate corresponding to the bottom border of the touchpad. Default is 480.

Kbd connector edit options

option	description
set id	Sets the id for the kbd connector. (see examples below)
set label	Sets the text string to appear under the kbd connector..
set local / remote	Sets if the kbd connector should send the commands back to the interface, or should it send to the remote device. (see examples below)
send while typing / send at enter	Sets if the kbd connector should send each character separately or should it wait for enter key. (see examples below)

Kbd connector examples

Assuming command ending is “\n”

id	local / remote	send while typing / send at enter	user is typing	Result
“kbd”	remote	while typing	ab[enter]	Remote device receives: “kbd a\nkbd b\n kbd \n\n”
“kbd”	remote	at enter	ab[enter]	Remote device receives: “kbd ab\n”
“” (empty string)	remote	while typing	ab[enter]cde	Remote device receives: “ab\ncde”
“” (empty string)	remote	at enter	ab[enter]cde	Remote device receives: “ab\n” (and at next [enter] will receive “cde\n”)
“echo”	local	while typing	abc	Local interface receives “a\nb\nc\n”
“echo”	local	at enter	abc[enter]	Local interface receives “abc\n”
“” (empty string)	local	at enter	echo abc[enter]	Local interface receives “abc\n”

Heartbeat sender edit options

option	description
set id	Sets the string that will be sent periodically to the remote device.
set label	Sets the text string to appear under the item.
set repeat period	Sets the time interval (in ms) at which the heartbeat signal should be sent. Default is 1000.

Touch stopper edit options

Touch stopper does not have any special edit options.

Vibrator edit options

option	description
set id	Sets the vibrator id string. For example if id is “vib” and command ending is “\n”, you can make it vibrate for 200 ms by sending “vib 200\n” from microcontroller. If you send only “vib\n”, it will use the default duration that is set with “set duration”. Sending “vib 0\n” will make it stop.
set label	Sets the text string to appear under the item.
set duration	Sets the default duration (in ms) for the vibration. Default is 500.
set off timeout	Set the timeout after which vibrator will turn on if it does not receive off command. (Off command means “vib 0\n” for a vibrator with id “vib” on an interface with command ending “\n”). Default is 0 (timeout disabled).

Menu options

option	description
connect / disconnect	Connects to a remote device / disconnects from a remote device. To connect to a Bluetooth remote device, it has to be paired. To pair with a Bluetooth device, open Android settings → Bluetooth → search for devices. Pin code for Bluetooth to serial adapter is usually “1234” or “0000”. Select port 1 (if port selection is set to manual from RFCOMM settings). To connect over internet or WiFi, data connection or WiFi has to be activated from Android settings. Then in RoboRemo app choose menu → connect → internet and select the ip and port. You can also use the domain name instead of ip.
edit ui / don't edit ui	Enters / exits the interface edit mode.
interface	Opens interface menu.
help	Shows help link.
about	Shows info about the app.
undo	Undo the last modification in the current interface.
enable / disable autoconnect	Enables / disables the auto connect option. If enabled, the app will try to connect to the last connected device at next app start, if the user did not select disconnect before closing app. (App disconnects automatically when closed).
lock / unlock autorotate	Locks / unlocks the screen autorotate function for the app.
keep / don't keep screen on	Used to disable the automatic screen lock.
set char delay	Slow microcontrollers need time to process each character received over serial port. You can set the char delay so that RoboRemo will wait after each character sent.
RFCOMM settings	Change RFCOMM settings. RFCOMM is the name for the Bluetooth Serial protocol. Default settings are: automatic port selection, without encryption.

RFCOMM settings

port (channel) selection	manual = will ask each time fixed(1) = will use port 1 auto = will select automatically
UUID (for automatic)	Used only if port selection = auto. Ignored otherwise. default = use the well known UUID for Bluetooth to Serial modules, which is 00001101-0000-1000-8000-00805F9B34FB first = use first UUID of the remote device, from the local cache
encrypted	Use / don't use encryption.

Note: Some devices may fail to connect with certain settings. In this case it is recommended to try different settings.

Interface menu options

option	description
select	Select other interface. RoboRemo has 8 interfaces, numbered 0 to 7.
rename	Rename the current interface.
set connect action	Set a command string to be send to the remote devices after connecting.
set command ending	Change the command ending for the current interface. The default is “\n”. Command ending can also be set to empty string, but it is not recommended.
import	Import an interface from file. Interfaces are stored in the roboremo folder on the SD card. The folder is created automatically at first app start.
export	Export the current interface to a file. Interfaces are stored in the roboremo folder on the SD card. The folder is created automatically at first app start.
unlock edit all	Unlock all items that were locked with lock edit.
clear	Clear the current interface.

New features and fixed bugs

App. version	New features	Fixed bugs
1.2	<ul style="list-style-type: none"> - accelerometer support - Internet / WiFi connectivity - option for sliders to return to center when released. 	N/A
1.3	<ul style="list-style-type: none"> - option to change command ending - string inputs from user are interpreted for escape characters ('\t', '\b', '\n', '\r', '\f'). For '\ character, enter '\\. 	<ul style="list-style-type: none"> - fixed interface import / export for interfaces with non-ASCII characters. - fixed text wrapping and auto scrolling when resizing text logs.
1.4	<ul style="list-style-type: none"> - local action “interface n” same as “iface n” where n is the interface number (0 to 7) - auto connect option - local actions for connecting and disconnecting by pressing buttons. - removed ”exit” from menu (app can be closed by pressing back key). 	<ul style="list-style-type: none"> - fixed the bug with “\r\n” string in interfaces. - fixed a bug where app crashed if n was not an integer in “iface n” or “interface n” local action.
1.5	<ul style="list-style-type: none"> - option to use the slider or level indicator value inside their labels - made slider with "send when moved" send only when the value changes - option to change on and off commands for leds - removed the dialog showing error when sending a non-integer value to a level indicator - undo option in interface editor. 	<ul style="list-style-type: none"> - fixed a bug in processing received commands. Now if there are more items with same id, all of them will respond to it.
1.6	<ul style="list-style-type: none"> - added option to set repeat period for sliders - added text fields - added plots - improved touch processing algorithm so that it will send touch events only to interactive items (now you can have buttons / sliders hidden under leds, plots, etc) - added menu option to change RFCOMM settings 	<ul style="list-style-type: none"> - fixed a bug in sliders where slider with auto return enabled did not send data when it was the same value as before return.
1.7	<ul style="list-style-type: none"> - added option to set text size for text fields and text logs - added option to set id for text field so that user can change the text remotely 	<ul style="list-style-type: none"> - when command ending is empty string, do not apend “\n” at the end in text logs - fixed a bug where autoconnect

	<ul style="list-style-type: none"> - added image item in RoboRemo Full version - reduced TCP connect timeout from 90000ms to 5000ms - improved menus (now they are scrollable) - added touchpad item - added option to keep screen on - added kbd connector item 	<p>dialog could not be cancelled after screen orientation change</p> <ul style="list-style-type: none"> - interface → clear now also resets the command ending and connect action
1.8	<ul style="list-style-type: none"> - added item option to lock edit and interface option to unlock edit all - added option to set return value for slider - added option to set led on/off timeout - added option to import image from SD card and store it in RoboRemo interface - added items: heartbeat sender, touch stopper - changed default RFCOMM settings to automatic port selection - added option to start a TCP server - can connect to domain name - added option to use plot's last value inside the label 	N/A
1.9	<ul style="list-style-type: none"> - added image option to set as background - added USB connectivity - added “don't repaint” option for plots - hw menu button also opens menu 	<ul style="list-style-type: none"> - fixed bug with text size on text log and text field items - fixed bug with pasting an item after lock edit - fixed small menu bug - fixed touchpad bug where it was sending data even if id was empty string
1.9.1	<ul style="list-style-type: none"> - added UDP connectivity - added “log to file” option (in RoboRemo Full version) for text log and plot. - added vibrator item in RoboRemo Full version - added option for accelerometer to set gain, output type (float / int), min. and max. values and enable / disable the value limiting (replaced “set x/y/z id” with “x/y/z config.“). - added local action “send” - now local action can contain multiple actions, separated by command ending - added option in slider, level indicator and plot items label to set the decimal count. - slider and level indicator items now accept 	<ul style="list-style-type: none"> - fixed bug in USB connection where data sent too fast from microcontroller was not received correctly by the app. - fixed USB autoconnect and connect by local action. - fixed text log bug where it was stalling on some devices after receiving about 10000 characters. - clearing an interface now clears the interface name too. - fixed float numbers in exported interface files. - fixed a bug where app was crashing when trying to connect over USB on devices that don't have USB API.

	<p>setting min. value greater than max. value and behave as expected.</p> <ul style="list-style-type: none"> - improved some user interface (in RFCOMM settings, image import, plot set trigger). - now the options that are available only in RoboRemo full version, are shown (disabled) in RoboRemoFree too. - added “100% FREE” mark on the icon of RoboRemoFree 	<ul style="list-style-type: none"> - on slider item, now selecting autoreturn or changing the return value updates the position of the handle. - fixed default aspect ratio of heartbeat sender item.
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