VRbot with ROBONOVA-I
(rev. 1.2)

VRbot Module

The VRbot module provides voice recognition functions for built-in Speaker Independent (SI) commands and up to 32 user-defined commands (Speaker Dependent (SD) trigger or commands, Voice passwords (SV)).
A simple and robust serial protocol can be used to access these functions from the user's microcontroller boards.
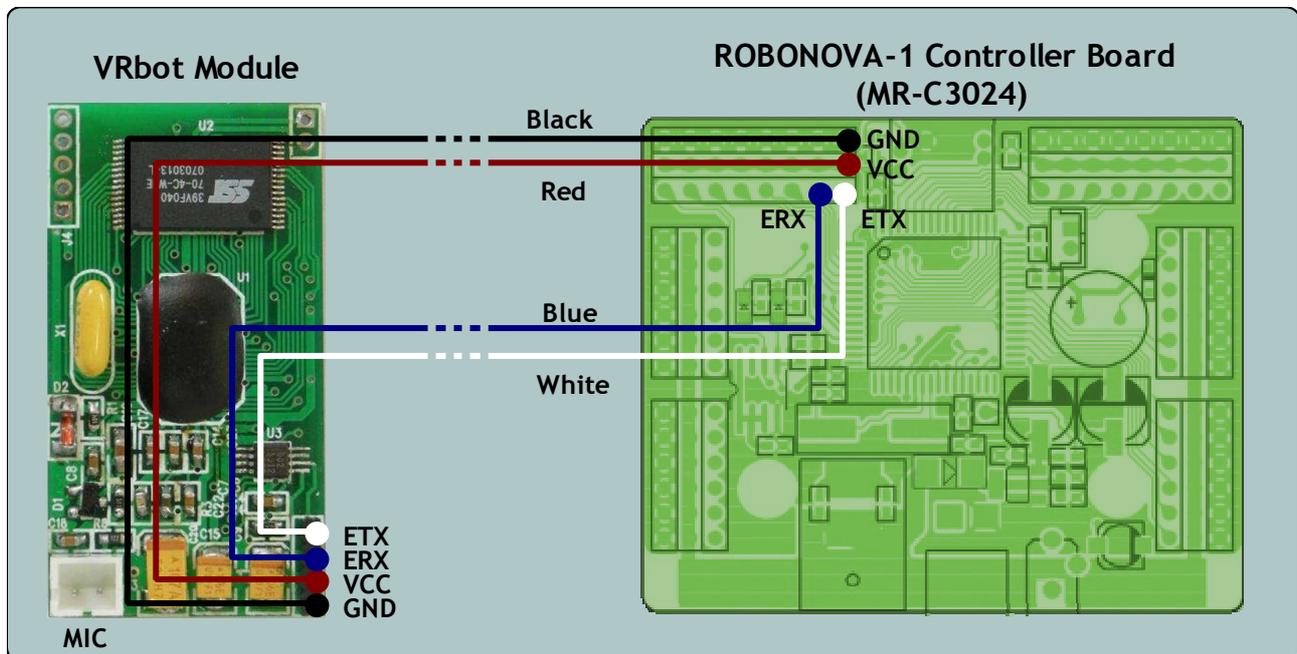
Pinout

1 – GND
2 – VCC (5V)
3 – ERX (serial input)
4 – ETX (serial output)

⚠️ **Vocal commands should be given from about 60cm from the microphone but you can try at greater distances by using a louder voice**

Hardware setup

With the robot switched off, connect the VRbot module to the ROBONOVA board as in the following diagram. Connect the microphone to the white MIC connector.

VRbotGUI Software

The VRbotGUI software can be used to easily connect the PC to the VRbot module, without the need of additional adapter boards, but simply by using the microcontroller host board with the provided "bridge" program.

To start using the VRbot GUI software, connect the robot to your PC and turn on your ROBONOVA.

Select the serial port to use (the same as in *RoboBasic Editor*) from the toolbar or the "File" menu, then go with the "Connect" command.

⚠ **Any software using the same COM port must be closed before selecting "Connect" in VRbot GUI**
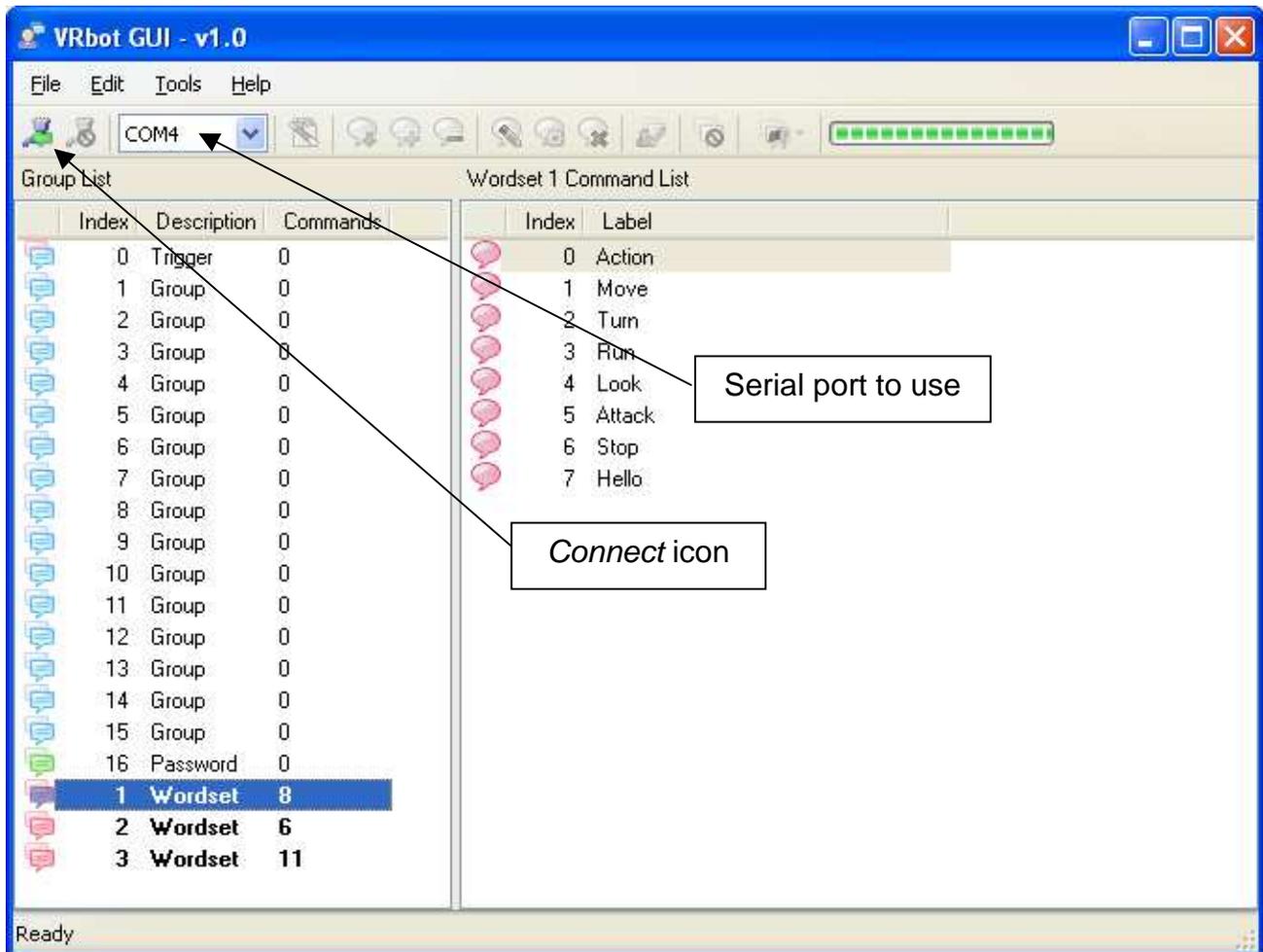

Figure 1

Once connected to the robot, the VRbotGUI software automatically downloads the RoboBasic "bridge" program to the controller board, if not already present, and switches to its "programming" mode.

The "bridge" program, that runs on the microcontroller, allows the user to work with the robot and the set of SI commands the VRbot provides: once the bridge program has been downloaded on the robot, you can disconnect the GUI, detach the serial cable and immediately start using the robot with the built-in SI vocal commands (see Figure 2).

For example, you can say "Robot" (the LED will turn on), then after a little pause say "Move" and, after the LED blinks, say "Forward": the robot will move forward for a while.

⚠ **VRbot GUI must be disconnected before using the *RoboBasic Editor* to download new programs to the robot**

VRbot GUI must be disconnected and serial cable detached before using the demo movements associated with the SI commands *Move + [left, right, forward, backward], Turn + [left, right], Run + [left, right, forward, backward]*. Some other SI commands will not originate any movement even if they are recognized because they are not implemented in the "Bridge" program: you can modify the Basic program according to your needs
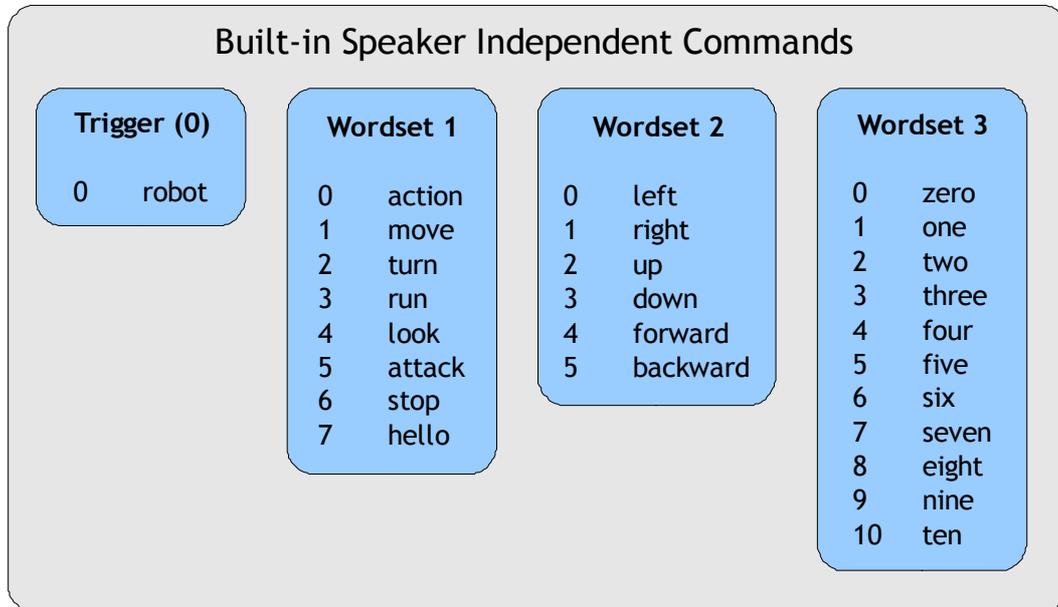
Built-in Speaker Independent Commands

Trigger (0)	Wordset 1	Wordset 2	Wordset 3
0 robot	0 action	0 left	0 zero
	1 move	1 right	1 one
	2 turn	2 up	2 two
	3 run	3 down	3 three
	4 look	4 forward	4 four
	5 attack	5 backward	5 five
	6 stop		6 six
	7 hello		7 seven
			8 eight
			9 nine
			10 ten

Figure 2

Furthermore, the "bridge" program also enables programming of the SD commands into VRbot by using the PC interface.

There are four kinds of commands in the GUI (see Figure 1 and Figure 3):

❑ Trigger - is a special group where you have the built-in SI trigger word "Robot" and you may add one user-defined SD trigger word. Trigger words are used to start the recognition process

❑ Group - where you may add user-defined SD commands

❑ Password - a special group for "vocal passwords" (up to five), using Speaker Verification (SV) technology

❑ Wordset - built-in set of SI commands (for instance in Figure 1 above, Wordset 1 is selected)

The user can define groups of SD commands or passwords and generate a basic code template to handle them.

The recognition function of VRbot works on a single group at a time, so that users need to group together all the commands that they want to be able to use at the same time.

When VRbotGUI connects to the robot, it reads back all the user-defined commands and groups, which are stored into the VRbot module non-volatile memory.
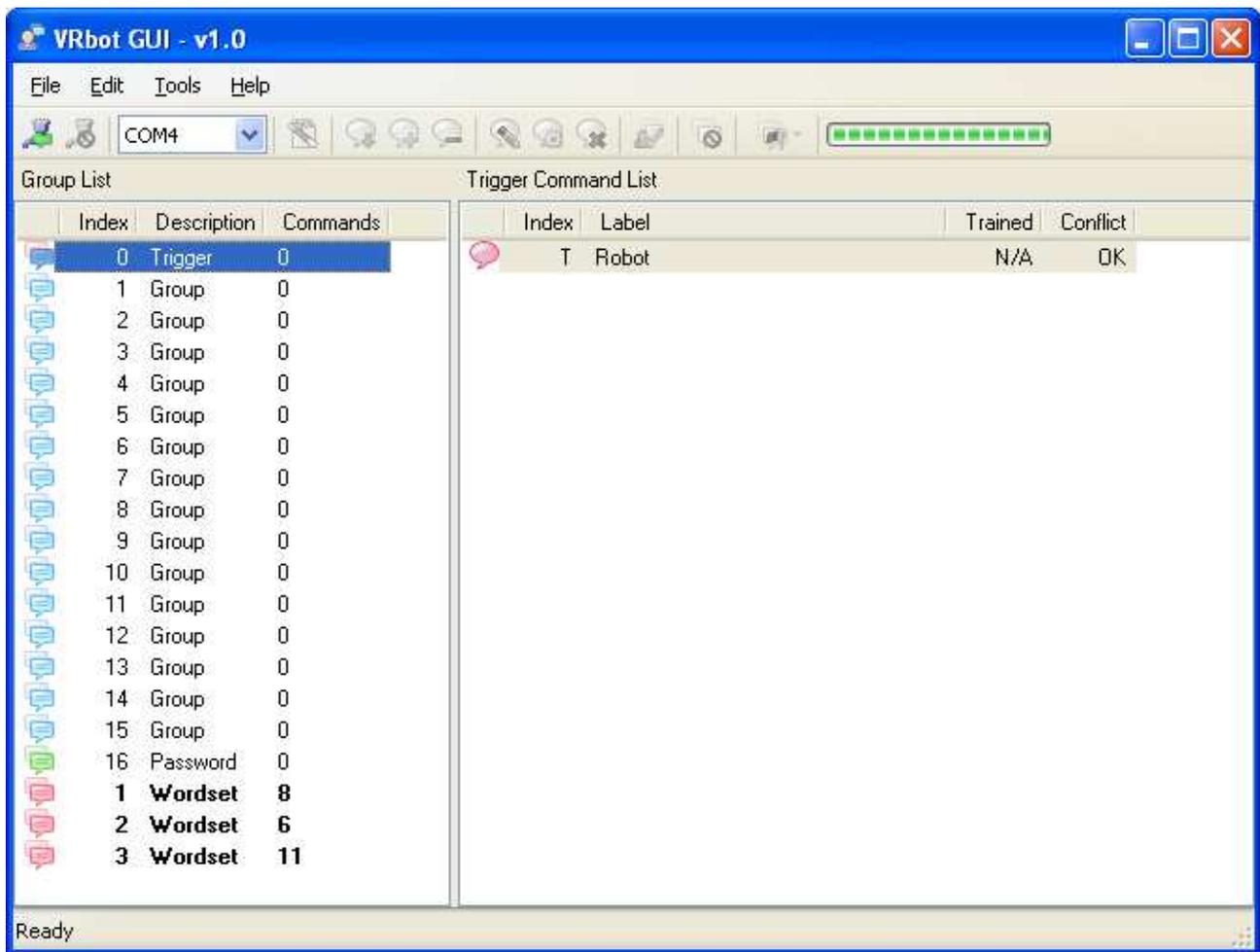
Figure 3

The user can add a new command by first selecting the group in which the command needs to be created and then using the toolbar icons or the "Edit" menu.

A command should be given a label and then it should be trained twice with the user's voice: the user will be guided throughout this process (see Figure 4) when the "train command" icon is clicked or the "train command" is selected from the Edit menu.
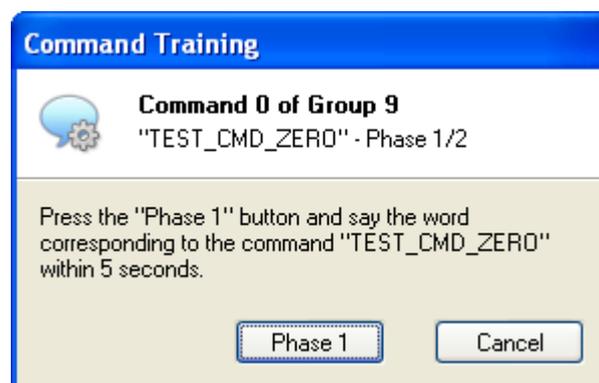

Figure 4

After clicking on *Phase 1* or *Phase 2* buttons, remember to start speaking only when you see this little window:

If any error happens, command training will be canceled. Errors may happen when the user voice is not heard correctly or when the second word heard is too different from the first. The software will also alert if a command is too similar to another one by specifying the index of the "conflicting command" in the "conflict" column.

For instance, in the following Figure 5 the command "TEST_CMD_ONE" sounds too similar to "TEST_CMD_ZERO" (i.e. they have a too similar pronunciation).

⚠️ *TEST_CMD_ZERO* **and** *TEST_CMD_ONE* **are just examples of labels, you should use label names that reflects the real command that you are going to train**
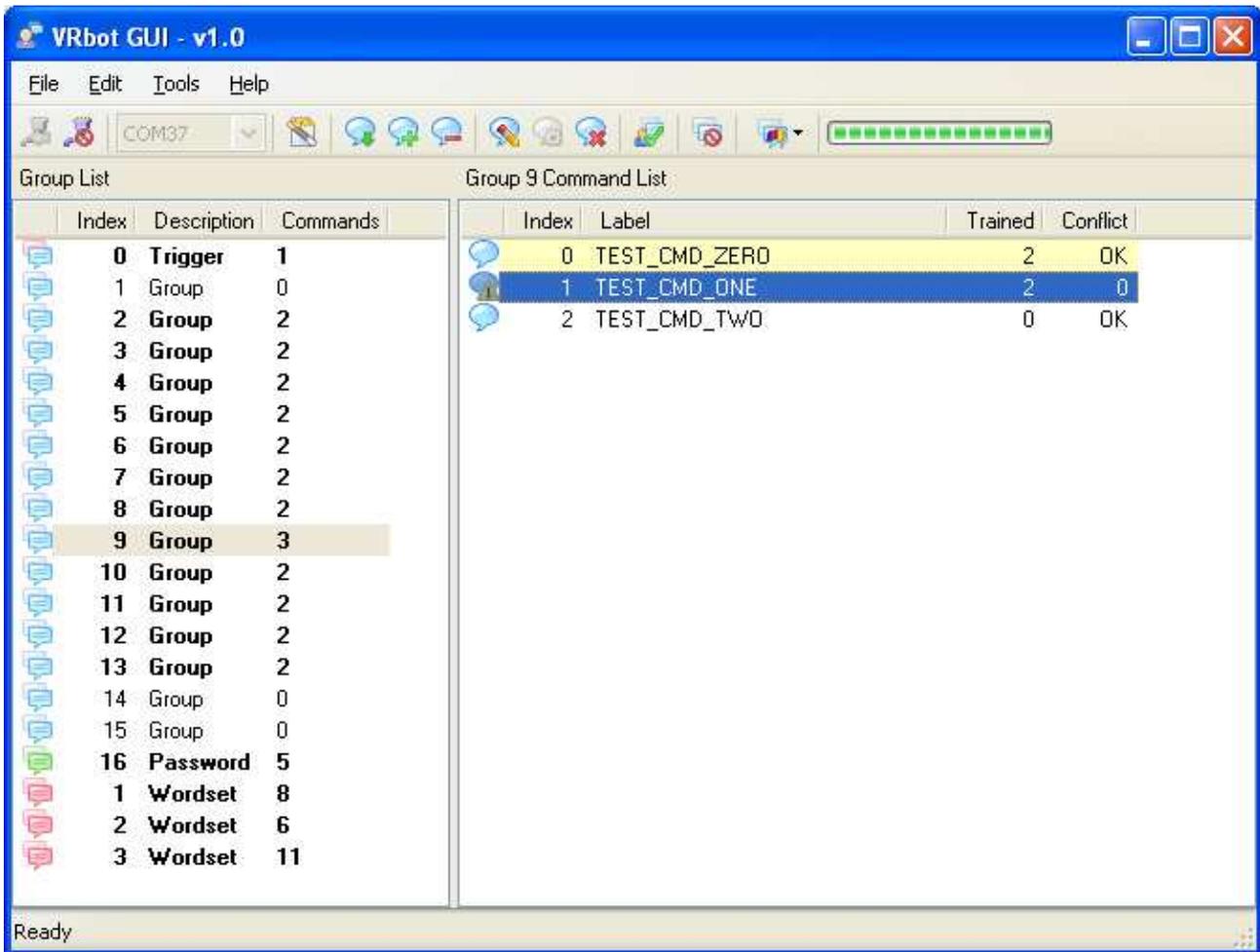

Figure 5

The current status is displayed in the VRbotGUI list view where groups that already contain commands are highlighted in bold.

The selected group of commands can also be tested, by using the icon on the toolbar or the "Tools" menu, to make sure the trained commands can be recognized successfully.

⚠️ **If you want to re-train a command you have to erase the previous training first**

Once you have created and trained all your desired commands, you can generate the basic template program, by using the icon on the toolbar or the "File" menu.
Then disconnect VRbotGUI, open the file with the *RoboBasic Editor*, make the required changes to customize the behavior, and finally download and run it on the ROBONOVA controller.

⚠ **_"Vocal passwords"_(group 16) are much more sensitive to environment noise and distance from the microphone: be sure to train and give the password in similar conditions**