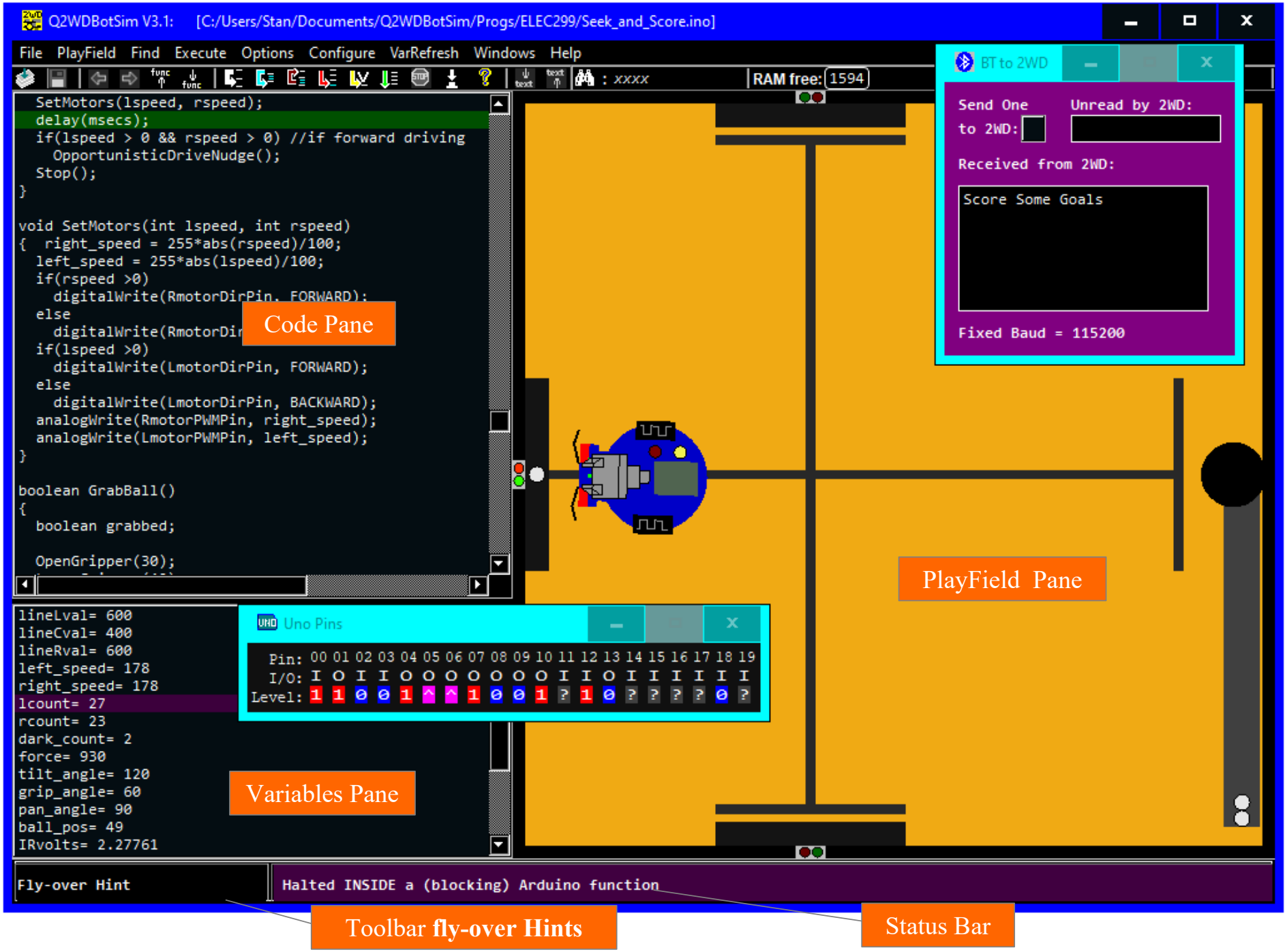
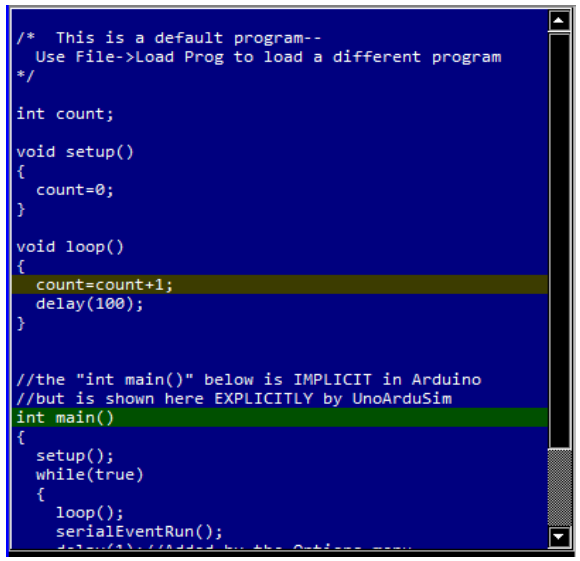
Q2WBotSimV3.1 Quick Help



Code Pane:

Step or Run using , , , **or** . To **Halt at a specific program line** , first click to highlight that line, and then click **Run-To** . To **Halt when a specific variable is written to,** first click on it to highlight it, and then click **Run-Till** .



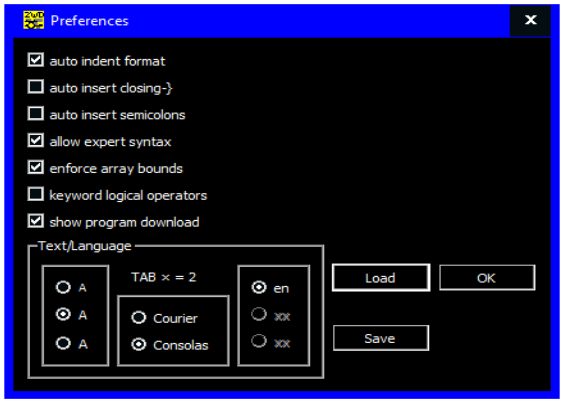
Navigate the call-stack using and , or **jump between functions** by clicking anywhere, then use **PgDn** and **PgUp.**

Set search text with , and then **jump to that text** using and

Move between `'#include'` files using .

Preferences:

Configure | Prereferences

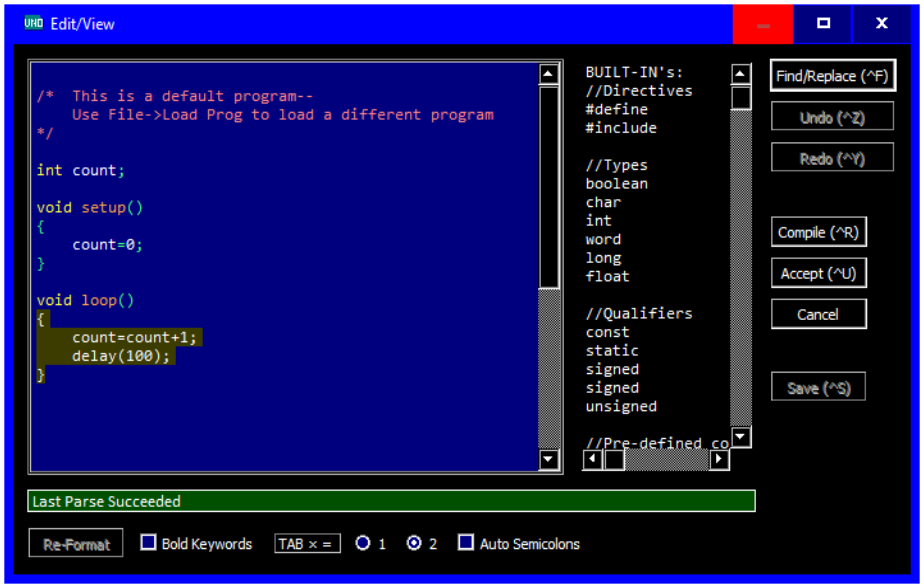


to set, save ,and load user choices.

Edit/View:

To open at a specific line, ***double-click*** on that line n the **Code Pane** or use **File | Edit/View** (and it opens at the last highlighted line)

Tab-indentation will be automatically done if that preference is chosen from **Configure | Prereferences** – you can also single or double-size the Tab width.



Add or delete tabs to a group of lines using **right-arrow** or TAB, and **left-arrow** (after first selecting a group of 2 or more consecutive lines)**.**

To add an item (after the caret) **from the right-hand list of Built-ins,** double click on it .

Find (use ctrl-F)**, Find/Replace** (use ctrl-H), **Undo** (ctrl-Z)**, Redo** (ctrl-Y)

Use ALT-right-arrow to request auto-completion choices for built-in **global variables,** and for ***member*** **variables and functions.**

Compile and leave open (ctrl-R), or **Accept** (ctrl-U) or **Save** (ctrl-S) to close.

Find a **matching brace-**pair partner by double-clicking on it – both braces, plus all text between, become highlighted (as in the image above).

Use **ctrl-PgDn** and **ctrl-PgUp** to jump to next (or previous) empty-line break**.**

Variables Pane:

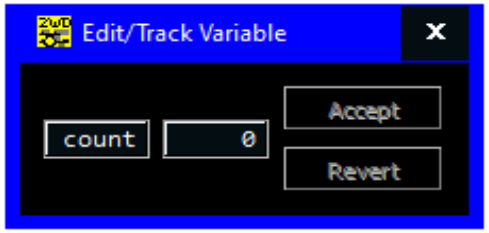
```
LED_pin= 5
angle= 135
i= 3
k= 6
notefreq= 1046
dur= 0.12500
beats= 160
wholenote= 1500
quarternote= 375
msecs= 375
RingTones[](-)
  RingTones[0](-)
    RingTones[0].frequency= 1046
    RingTones[0].duration= 0.12500
```

Click on `(+)` to expand, or on `(-)` to contract arrays and objects.

Use the **VarRefresh** menu to control update frequency when executing.

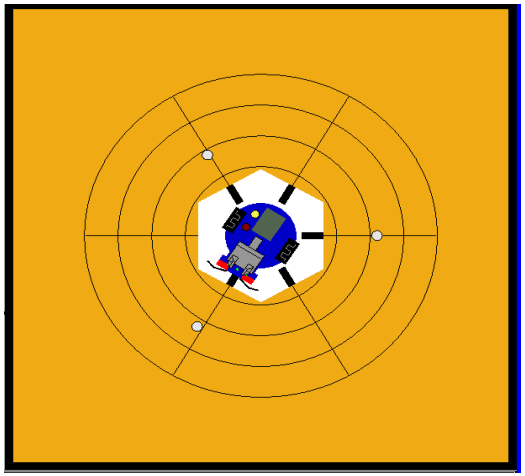
Double-click on any variable to track its value during execution, or to change it to a new value in the middle of (halted) program execution:

Or ***single-click*** to highlight any variable (or object-member, or array-element) , then use **Run-Till** to advance execution up to the next ***write-access*** to that variable or location.



Playfield Pane:

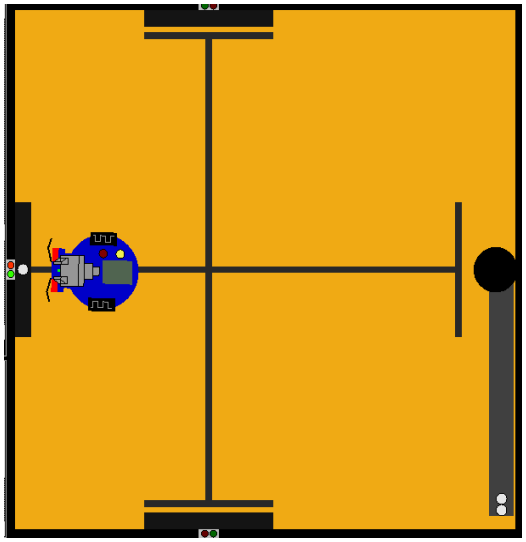
Pivot and Throw:



Left-click between (and hold) to "hand" a ball into the robot's closing gripper jaws.

The tossed/dropped ball's flight and floor roll will be displayed.

Seek and Score:



Click on a ledge's beacon to place a ball there (this also activated the beacon's periodic transmissions of its position as the ASCII character '0', '1', or '2'. The Bot can approach a ledge ball and pick it up using its gripper (at the proper height). The Bot can use black floor lines for navigation, and approach the goal and drop a ball in.

Balls can also be picked up (and dropped) manually using the mouse.

Balls dropped onto a ledge, the goal, or even onto the Bot itself, will behave realistically. The ledges have a shallow central bowl-like depression just below their beacon, and a ball placed there will stay. Outside that bowl, the ledges have a slight downward slope (toward the play-field interior), so balls dropped onto their surface will roll off of it.

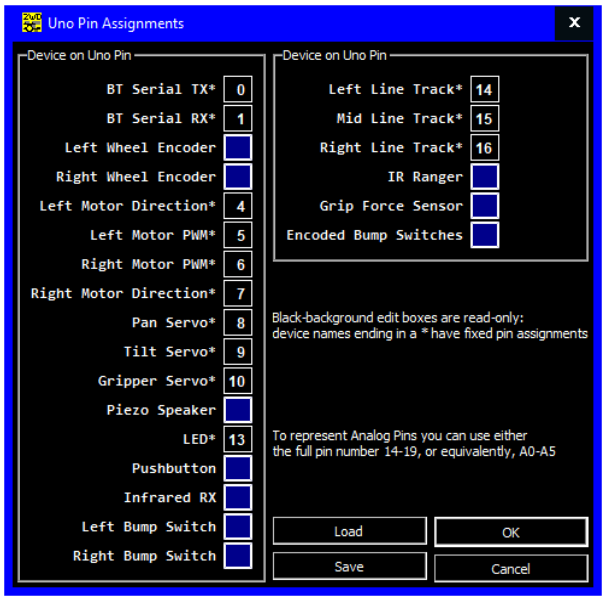
Left-click ***on the Bot*** and hold, then use the mouse to drag it to a new position on the PlayField.

Right-click ***in front of the Bot*** and hold, then use the mouse to drag it to a new angular rotation (at the same play-field location).

Connecting Pins

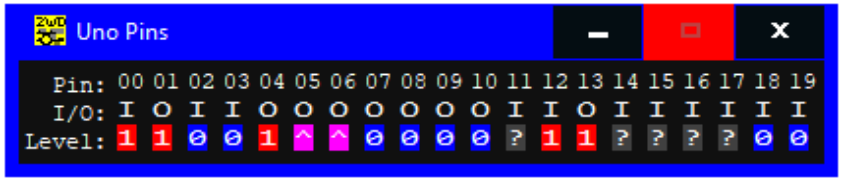
Attach pins to sensors using the Configure->Wire Up Pins menu command to open a dialog from which to set/load, or save. Digital pins 2-13 are also specified as simulator pins 2-13, but analog pins 0-5 appear as simulator pins 14-19. To access an analog pin value in your program using **`analogRead( )`**, you can refer to the pin number by using one of three equivalent sets of numbers: 0-5; 14-19; or A0-A5 (A0-A5 are simply program aliases for 14-19 established by internal #defines). To access pins 14-19 in your program using **`digitalRead( )`**, you can simply refer to that same pin number, or you may use the A0-A5 aliases instead.

The



'Uno' Pins Window:

Reflects pin directions (I or O) and digital levels (via corresponding colours: red for HIGH=1, bluew for LOW)0) Pins with active tone or PWM signals on them appear in purple with ' ^ ' instead of a 1 or 0 level (which is changing far too fast).



Left-click any pin to create (or add to) Pin Digital WaveForms:
Right-click instead on any pin to create Pin Analog WaveForm window:

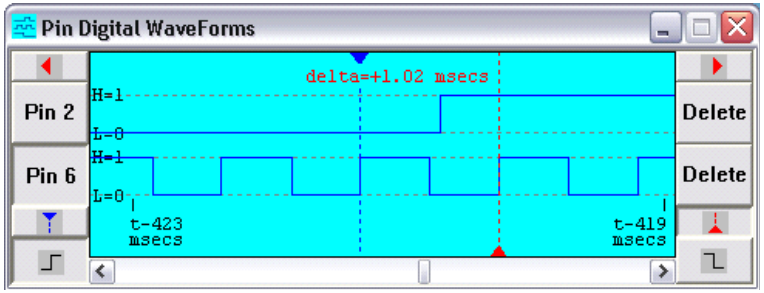
These windows show the the ***past one-second's worth of activity*** on that pin (or pins)

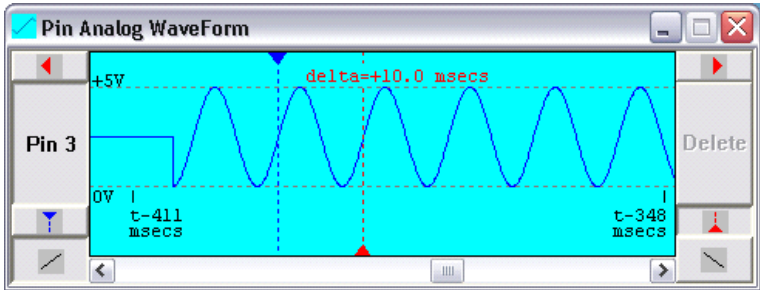
To **ZOOM IN** and **ZOOM OUT** use the mouse wheel, or shortcuts ***CTRL-up_arrow*** and ***CTRL-down_arrow***.

Left click to drop the red or blue cursor line, or jump the chosen cursor to the next (or previous) signal edge using the coloured cursor arrow buttons -- you can also click on a cursor line and drag it to the desired psoition. The time interval between the current red and blue cursor line positions is always displayed.

To "activate" a pin in the Pin Digital WaveForms window for cursor jump-to-edge focus, click on its 'Pin n' button.

To select a cursor, for subsequent cursor jump-to-edge operations, firstclick its coloured-cursor-line button.





Menus

File menu commands:

Load INO or PDE Prog	Allows the user to choose a program file having the selected extension. The program is immediately parsed
Edit/View (Ctrl-E)	Opens the loaded program for viewing/editing.
Save (Ctrl-S)	Save the edited program contents back to the original program file.
Save As	Save the edited program contents under a different file name.
Next (#include) file	Advances the CodePane to display the next `#include`'d file
Previous file	Returns the CodePane display to the previous file
Exit	Exits Q2WDBotSIm.

Configure menu commands:

Wire Up PIns	Opens a dialog to allow you to set on which pins you will attach sensors (that allow such freedom of choice – many are on fixed pins) which should match the real-life hardware connections you have chosen on your Bot. From this dialog you can also Save pin connections to a text file, and/or Load connections from a previously saved (or edited) text file.
Preferences	Set compilation, text size, and other preferences which will be automatically saved into file **`myQ2WDPrefs.txt`** . That preferences in this file are automatically loaded at each launch of **Q2WDBotSim**.
Wheel Speed Mismatch	Opens a dialog to allow you to model real-world differences in the speed response of your Bot;s left and right motors (real-world motors are always slightly different).

Find menu commands:

Ascend Call Stack	Jump to the previous caller function in the call-stack – the **Variables Pane** will adjust to show that functions locals
Descend Call Stack	Jump to the next called function in the call-stack – the **Variables Pane** will adjust to show that functions locals
Set Search Text (ctrl-F)	Activate toolbar Find edit box to define your next-to-be-searched-for text..
Find Next Text	Jump to the next Text occurrence in the Code Pane (if it has the active focus), or to the next Text occurrence in the Variables Pane (if instead it has the active focus).
Find Previous Text	Jump to the previous Text occurrence in the Code Pane (if it has the active focus), or to the previous Text occurrence in the Variables Pane (if instead it has the active focus).

Execute menu commands:

Step Into (F2)	Steps execution forward by one instruction, or *into a called function*.
Step Over (F4)	Steps execution forward by one instruction, or *by one complete function call*.
Step Out Of	Advances execution by *just enough to leave the current function*.
Run To	Runs the program, *halting at the desired program line* -- you must first click to highlight a desired program line before using Run To.
Run	Runs the program.
Halt	Halts program execution (*and freezes time*).
Reset	Resets the program (all value-variables are reset to value 0, and all pointer variables are reset to 0x0000).
Animate	Automatically steps consecutive program lines *with added artificial delay* and highlighting of the current code line. Real-time operation and sounds are lost.
Slow Motion	Slows time by a factor of 10.

Options menu commands:

Skip through Structors/Operators	While stepping, do not not stop execution inside a con/de/sturctor function, or inside an operator function.
Register-Allocation Modelling	Model how the real Arduino compiler would allocate variables between registers and the stack.
Error on Uninitialized	Flag as a Parse error anywhere your program attempts to use a variable without having first initialized its value.
Artificial loop() Delay	Adds 1 millisecond of delay every time `loop()` is called (in case there are no other program `delay()`'s anywhere).
Auto Beacons	If chosen, beacons will automatically stop their transmission when the Bot picks up the ball on their ledge.
Allow Nested Interrupts	Allow `interrupts()` to be called inside a user interrupt routine (to re-nable interrrupts inside that routine).

VarUpdates menu commands:

Allow Auto (-) Collapse	Allow Q2WDBotSim to collapse displayed expanded arrays/structs/objects when falling behind real-time.
Minimal	Only refresh the variables Pane display 4 times per second.
Highlight Changes	Highlight the last-changed variable value (can cause slowdown).

Help menu commands:

Quick Help File	Opens the Q2WDBotSim_QuickHelp PDF file.
Full Help File	Opens the Q2WDBotSim_FullHelp PDF file.
Bug Fixes	View significant bug fixes since the previous release..
Change/Improvements	View significant changes and improvements since the previous release.
About	Displays version, copyright.

Windows menu commands:

BT Monitor	Restores (if minimized) the BT monitor window for communication through 'Uno' pins 0 and 1 when the Bluetooth adaptor is connected on your Bot.
'Uno' Pins	Restores (if minimized) the 'Uno' Pinsr window thatshows pin activity on all 20 pins.
Restore All	Restores all minimized windows.
Prompt	To left-Click or Right-Click an 'Uno' Pin to create a Waveform window:
Digital Waveforms	Restore a minimized Pin Digital Waveforms window.
Analog Waveform	Restore a minimized Pin Analog Waveform window.