

# UnoArduSimV1.6.3 Quick Help

The screenshot displays the UnoArduSim v1.6.3 software interface. The title bar shows the file path: [C:\Users\Stan\Documents\UnoArduSim\UNOTests\IOTest\DemoProg1.ino]. The menu bar includes File, Find, Execute, Options, Configure, VarUpdates, Windows, and Help. The toolbar contains icons for file operations, execution, and configuration. The main workspace is divided into several panes:

- Code Pane:** Displays the Arduino C++ code for a wheel encoder simulation. The code includes a loop that increments a counter and checks for a full revolution (4 ticks) to reverse the direction of rotation.
- Variables Pane:** Shows the current values of variables: backval= 50 = '2', count= 52 = 0x34, tics= 79 = 0x4f, digital\_level= 0 = 0, analog\_level= 767, numchars= 4 = 0x4, and angle= 140.
- Lab Bench Pane:** A central area representing the Arduino Uno board. It includes a digital display showing the value 10, a potentiometer, and various pins labeled SCL, SDA, AREF, GND, and digital pins 0-13. The ATMEGA328 microcontroller is also visible.
- Peripheral Modules:** Surrounding the Lab Bench are various modules for simulation: SERIAL (TX chars, Baud: 300), SPISLV (MOSI, MISO, DATA, Recv), SERVO, MOTOR (Pwm, Enc), LED (RYG), PIEZO, STEPR (P1, P2, steps), PULSER (Pulse, Period), FUNCGEN (A2, Period), and two +5V power supplies.

At the bottom of the interface, a status bar displays the message "TEMPORARY BREAKPOINT HIT".

Labels pointing to specific interface elements:

- Code Pane
- Lab Bench Pane
- Variables Pane
- Toolbar fly-over Hints
- Status Bar

## Code Pane:






```
/* Use File->Load Prog to
load a different Program
*/



int count;

void setup()
{
  count=0;
}



void loop()
{
  count=count+1;
  delay(100);
}

//the "int main()" below is IMPLICIT in Arduino
//but is shown here EXPLICITLY by UnoArduSim
int main()
{
  setup();
  while(true)
  {
    loop();
    serialEventRun();
  }
}
```

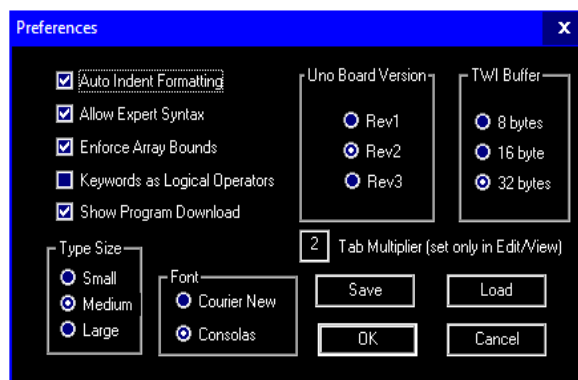
Step or run execution using , , , or . Halt at a specific program line by first clicking to highlight that line, and then click **RunTo** .

**Jump between functions** by clicking anywhere, and then using **PgDn** and **PgUp** or  and .

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

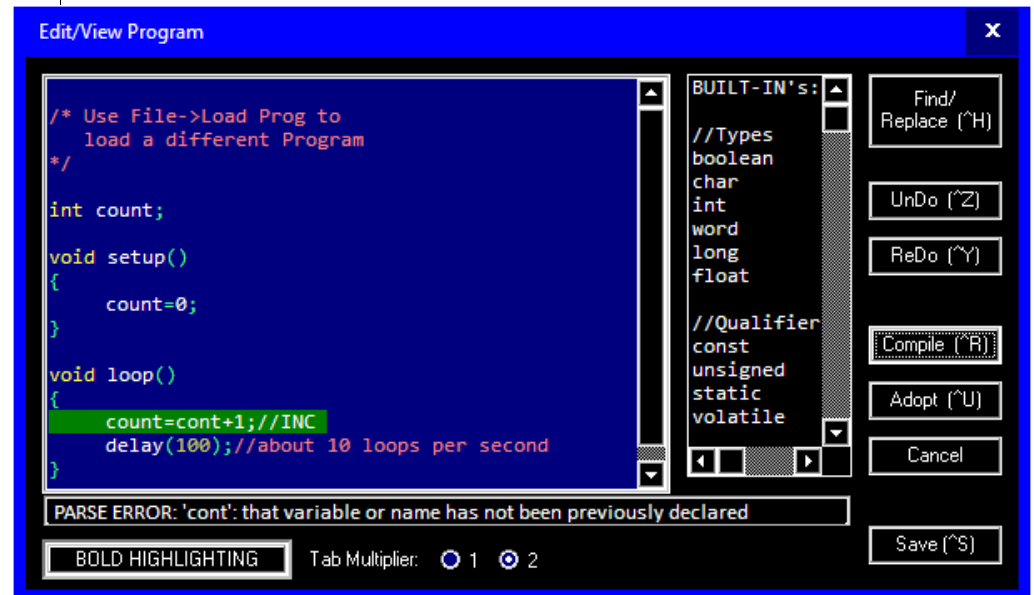
**Move between #include'd files** using  .

## Preferences:



**Config→Preferences** to set, save and load user choices

## Edit/View:



To open at a specific line **double-click** on that line in the **CodePane**, or use **File→Edit/View** (and it opens at the last highlighted line)

Will be auto-tab-indent formatted if chosen from **Config→Preferences**, and you can single-size or double-size the tab width.

**To add an item** (after the caret) **from the right-hand BUILT-INS list**, double click it .

**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).

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

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



Find a brace's **matching brace** pair partner by double-clicking on a brace – the braces and all text between them are highlighted (as in the image above).

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

## Variables Pane:

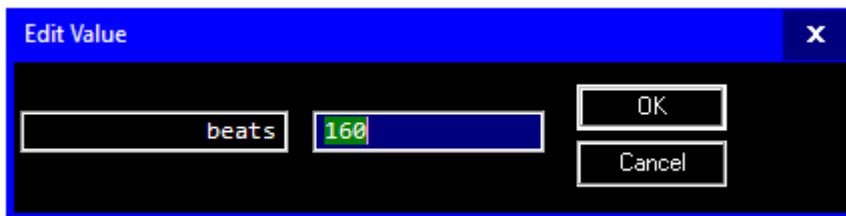
```
angle= 45
i= 8
k= 6
notefreq= 1046
dur= 0.12500
beats= 160
wholenote= 1500
quarternote= 375
msecs= 187
RingTones[0](-)
  RingTones[0].frequency= 1046
  RingTones[0].duration= 0.12500
```

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

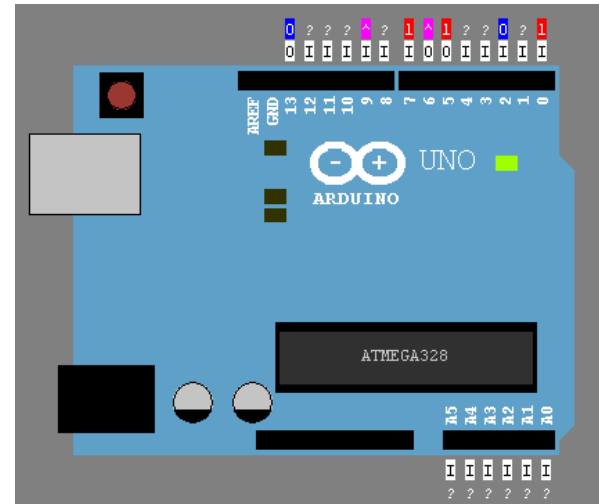
**PgDn** and **PgUp** or  and  allows you to quickly jump between variables.

Use the **VarUpdates** menu to control update frequency when **Run**-ning.

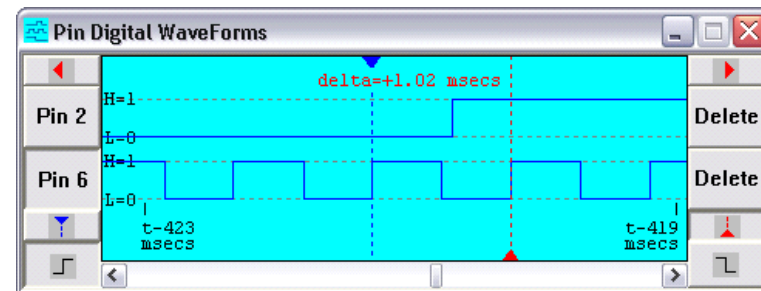
*Double-click* to change any variable to a new value in the middle of (halted) program execution:



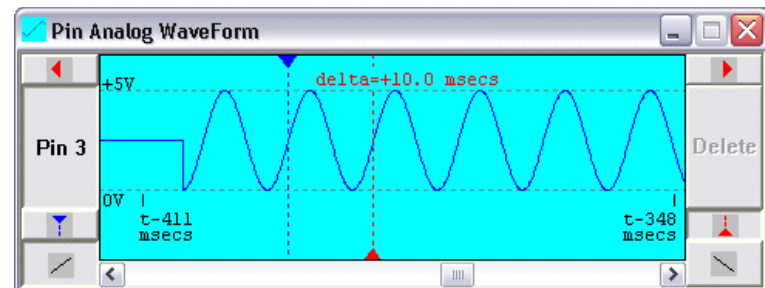
## Lab Bench Pane and Uno:



Left-click any pin to create (or add to) Pin Digital WaveForms:



Right-click any pin to create Pin Analog WaveForm window:



To **ZOOM IN** and **ZOOM OUT** use the mouse wheel, or shortcuts **CTRL-up\_arrow** and **CTRL-down\_arrow**.

## Lab Bench Pane I/O Devices

Set numbers and types of each using the **Config→ I/O Devices** menu selection. Set pins using a 2-digit value from 00 to 19.

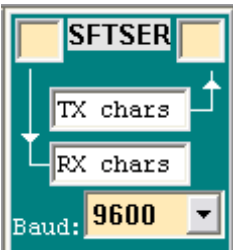
### Serial (SERIAL)



Type one or more characters in the upper (TX chars) edit box and **hit Return**.

Double-click to open **a larger window for TX and RX characters**.

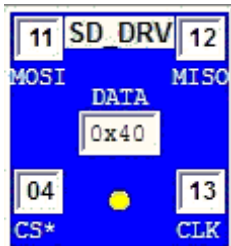
### Software Serial (SFTSER)



Type one or more characters in the upper (TX chars) edit box and **hit Return**.

Double-click to open **a larger window for TX and RX characters**.

### SD Disk Drive (SD DRV)

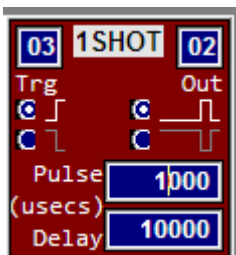


A small 8Mbyte SD drive driven from SPI signals, and mirrored in an '**SD**' **subdirectory** in the **loaded program's** directory (will be created if absent)

Double-click to open **a larger window** to see **Directories, Files, and content**

CS\* low to activate.

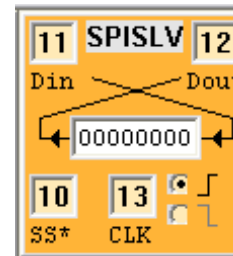
### One-Shot (1SHOT)



A digital one-shot. Produces a pulse of chosen polarity on **Out** after a specified delay from either a rising or a falling triggering edge seen on its **Trg** input. Once triggered, it will ignore subsequent trigger edges until the pulse on **Out** has been fully completed.

Pulse and Delay values are both scalable from the toolbar IO Values Scaler (if suffixed with an 'S').

### Shift Register Slave (SRSlave)

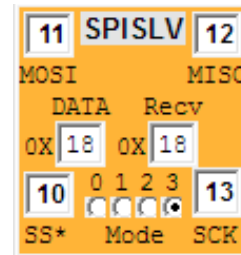


A simple shift-register device.

Edge transitions on CLK to trigger shifting.

SS\* low, drives MSB onto Dout.

### SPI Slave (SPISLV)

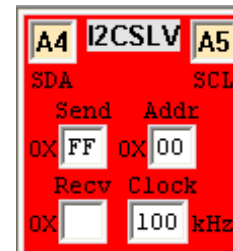


A mode-configurable SPI slave device (MODE0, MODE1, MODE2, or MODE3)

Double-click to open **a larger window** to set/view hex **TX and RX bytes**.

SS\* low, drives MSB onto MISO.

### Two-Wire I<sup>2</sup>C Slave (I2CSLV)



A *slave-mode-only* I2C device.

Double-click to open **a larger window** to set/view hex **Send and Recv bytes**

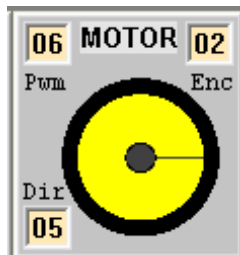
### Stepper Motor (STEPR)



Accepts control signals **on either 2 or 4 pins**.

Use `#include <Stepper.h>`.

### DC Motor (MOTOR)



Accepts PWM signals on Pwm pin, level signal on Dir, and outputs 8 highs and 8 lows per wheel revolution on Enc.

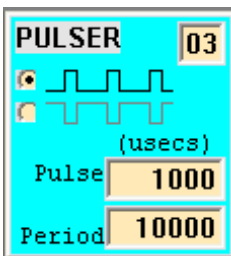
Full speed is approximately 2 revs per second.

### Servo Motor



Accepts pulsed control signals on specified pin.

### Digital Pulser (PULSER)

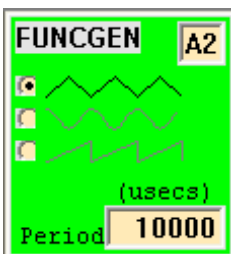


Generates digital waveform signals on specified pin.

Minimum period is 50 microseconds, minimum pulse width 10 microseconds. Both values are scalable from the toolbar IO Values Scaler (if suffixed with an 'S').

Choose positive-going pulses (0 to 5V) or negative-going pulses (5V to 0V).

### Analog Function Generator (FUNCGEN)



Generates analog waveform signals on specified pin.

Minimum period is 100 microseconds, scalable from the toolbar IO Values Scaler (if suffixed with an 'S').

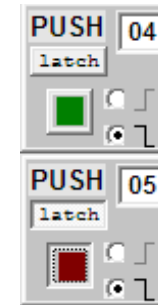
Sinusoidal, triangular, or sawtooth waveforms.

### Piezoelectric Speaker (PIEZO)

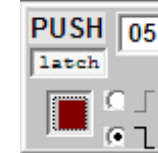


"Listen" to signals on any chosen Uno pin.

### Push Button (PUSH)

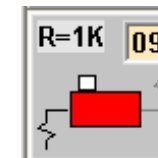


A normally-open **momentary** pushbutton to +5V or ground



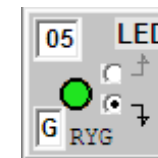
A normally-open **latching** pushbutton to +5V or ground (depress "latch" button too get this mode)

### Slide Switch Resistor (R=1K)



A 1 k-Ohm pull-up to +5V OR a 1 k-Ohm pull-down to ground.

### Coloured LED (LED)



R, Y, or G LED between any chosen Uno pin and either ground or +5V.





### Analog Slider



A slider-controlled potentiometer. 0-5V to drive any chosen Uno pin.

## Menus






### File menu commands:

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








### Configure menu commands:

|                           |                                                                                                                                                                                                                        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>I/O Devices</u></b> | Choose desired number of each type of device (8 large, and 16 small, I/O devices are allowed)                                                                                                                          |
| <b><u>Preferences</u></b> | Choose auto-indent formatting, font typeface, optional larger type size, expert syntax, keyword logical operators, enforcing array bounds, showing download, tab size multiplier, Uno board version, TWI buffer length |

### Find menu commands:

|                                                                                                                              |                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Find Next Function/Var</u></b>      | Jump to the next Function in the Code Pane (if it has the active focus), or to the next variable in the Variables Pane (if instead it has the active focus).                       |
| <b><u>Find Previous Function/Var</u></b>  | Jump to the previous Function in the Code Pane (if it has the active focus), or to the previous variable in the Variables Pane (if instead it has the active focus).               |
| <b><u>Set Search Text (ctrl-F)</u></b>    | Activate toolbar Find edit box to define your next-to-be-searched-for text..                                                                                                       |
| <b><u>Find Next Text</u></b>              | 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).         |
| <b><u>Find Previous Text</u></b>          | 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:

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

## Options menu commands:

|                                             |                                                                                                                                                 |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Step Over Structors/Operators</u></b> | Fly right through constructors, destructors, and operator overload function during any stepping (i.e. it will not stop inside these functions). |
| <b><u>Register-Allocation Modelling</u></b> | Assign function locals to free ATmega registers instead of to the stack..                                                                       |
| <b><u>Added loop() Delay</u></b>            | Add 200 usec. (by default) to each call to <code>loop()</code> (in case user has not added any delays anywhere)                                 |
| <b><u>Error on Uninitialized</u></b>        | Flag as a Parse error anywhere your program attempts to use a variable without having first initialized its value.                              |
| <b><u>Show Program Download</u></b>         | Show program download to the Uno board (with attendant delay).                                                                                  |

## Configure menu commands:

|                           |                                                                                                                                                                                                                        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>I/O Devices</u></b> | Choose desired number of each type of device (8 large, and 16 small, I/O devices are allowed)                                                                                                                          |
| <b><u>Preferences</u></b> | Choose auto-indent formatting, font typeface, optional larger type size, expert syntax, keyword logical operators, enforcing array bounds, showing download, tab size multiplier, Uno board version, TWI buffer length |

### VarUpdates menu commands:

|                                       |                                                                                                                                                                                                                                             |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Allow Auto (-) Collapse</u></b> | Allow UnoArduSim to collapse displayed expanded arrays/structs/objects when falling behind real-time.                                                                                                                                       |
| <b><u>Allow Reduction</u></b>         | Allow reduced frequency of display updates in the Variables Pane to avoid flicker or reduce CPU load when falling behind real-time– then values shown are only updated periodically, <b><i>but also whenever the program is halted.</i></b> |
| <b><u>Minimal Updates</u></b>         | Only refresh the variables Pane display 4 times per second.                                                                                                                                                                                 |
| <b><u>HighLight Updates</u></b>       | Highlight the last-changed variable value (can cause slowdown).                                                                                                                                                                             |

### Help menu commands:

|                                   |                                                                       |
|-----------------------------------|-----------------------------------------------------------------------|
| <b><u>Quick Help File</u></b>     | Opens the UnoArduSim_QuickHelp PDF file.                              |
| <b><u>Full Help File</u></b>      | Opens the UnoArduSim_FullHelp PDF file.                               |
| <b><u>Bug Fixes</u></b>           | View significant bug fixes since the previous release..               |
| <b><u>Change/Improvements</u></b> | View significant changes and improvements since the previous release. |
| <b><u>About</u></b>               | Displays version, copyright                                           |

### Windows menu commands:

|                                     |                                                                                       |
|-------------------------------------|---------------------------------------------------------------------------------------|
| <b><u>Serial Monitor</u></b>        | Add Serial IO device (if none) and pull up a larger Serial monitor TX/RX text window. |
| <b><u>Restore All</u></b>           | Restore all minimized child windows.                                                  |
| Prompt                              | Left-Click or Right-Click an Uno Pin to create a Waveform window:                     |
| <b><u>Pin Digital Waveforms</u></b> | Restore a minimized Pin Digital Waveforms window.                                     |
| <b><u>Pin Analog Waveform</u></b>   | Restore a minimized Pin Analog Waveform window.                                       |