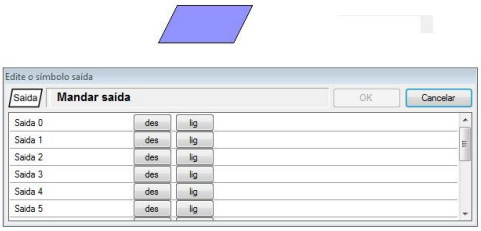
Sucuri Studio Software Reference Manual

Drag Flowchart Blocks to the Workspace

To build your flowchart, drag the blocks in the left toolbar to the workspace. When a block is placed, a command box opens at the bottom of the Sucuri Studio screen.



Control boxes

Click the buttons in the command box to complete the block instructions.
When the contents of the block are correct, click ok in the command box to apply the changes to the flowchart.

Main Blocks

The left toolbar shows the tiles that can be dragged to the desktop. To keep the toolbar clean and organized, only the tiles that are currently relevant are shown. The use of variables is an example of this. If you want to assign a value to a variable, first add the variables to the States Pane by clicking the button .

Start/Stop/Sub Block

Use the **Start Block** at the beginning of the flowchart program. Multiple Start tiles can be placed. Your programs will run in parallel.
Use the **Stop Block** to end the program, or use the Stop Block to end a Subroutine.
Use the **Sub Block** to start a Subroutine. Note that you will need to define the subroutine before it is called in the main program.

Exit Block

Use the **Output Block** to leave a digital output on or off, or to make an engine rotate forward or backward. Scenario simulation engines and some interfaces can also have their speed set as a percentage.

Block wait

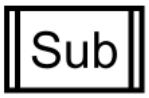
The **Block Wait** pauses the flowchart process for a certain number of seconds.

Block Set

A **Define Block** assigns a numeric value to a variable. To use variables in the flowchart, first click the button to add variables to the States Panel.

Subroutine Call Block

This block will execute a Subroutine. When the Subroutine is complete, the program returns to the Subroutine call block. Usually subroutines are called directly, but this block may repeat the subroutine more than once. Before you use a subroutine call block, define your subroutine with a .



Decision Block

Use the **Decision Block** when you need to add a condition to your flowchart. If the condition is true (if **Yes**), a certain task will be executed, if it is false (if **No**), another task will be executed. The Decision block can check the input status of a key (Is input1 on?), or an analog sensor (Temperature > 50°C?). A decision block can also be used to check the value of a variable (A variable *x* = 10?). Every decision block must have both the YES and the NO conditions for its execution.

Tools

Text tool

The text tool is used to add a label to the flowchart. Click and drag the ***T*** to the desktop to add a label. Use the keyboard to set the text.

Edit tool

When the **Edit Tool** is chosen, you can select blocks, lines, and labels by clicking on the flowchart. Individual items can be selected by clicking on them. Additional items can be included or removed from the selection by holding the key to select items.
A selected block can be edited via the command box. To edit a label, double-click it.
Tiles and labels can be moved around by clicking and dragging them across the desktop. When a block is moved, the lines will follow it.
Use the appropriate toolbar buttons to cut, copy, or paste the selected items.

Line Tool

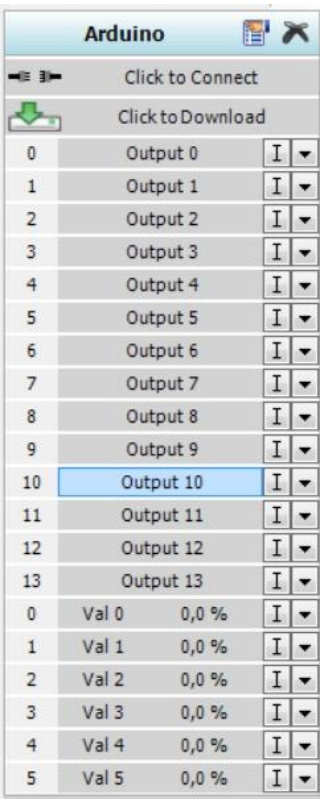
Use the **Line Tool** to connect the blocks by joining them together and define the flow of the program. All blocks, except for a **Stop block**, need a line starting from them to define what will be done next. Every **Decision** block must have a **YES** line and a **NO line**.
To add a row, select the Row tool in the toolbar. Once done, click on the tile where you want the flow line and it will turn green.

Flowchart Execution

To run the flowchart, click the **Run button** in the lower left corner of the screen. The execution will start from the Start block, going through all the blocks. Click the **Stop Button** to stop the execution.
To adjust the flowchart execution speed, drag the speed slider left to decrease and right to speed up. Move the slider to the middle to return to normal speed.
Use the **Pause button** to pause the run, and then use the **Next Block button** to advance the flowchart to the next block. If the flowchart does not run when you click the Run button, make sure that the pause button is not selected.

Connecting to a Control Unit

Sucuri Studio supports a variety of Sucuri Control Units. Refer to the section at the end of this document for details of each Control Unit with any special characteristics they may have.



When a Control Unit is selected, it is displayed in the States Panel.

Control Unit Options

Some Control Units have options that can be set. Click the Options button to view and modify these options.

An important option is **connection**. This is the port (Serial or USB) that connects to your interface. To have your interface connected, select the connection from the list in the Options dialog box.

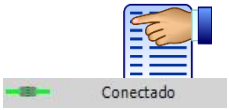
Connecting

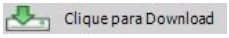
Click the connection icon to instruct Sucuri Studio to make a connection to your Control Unit.

Once the connection has been made, the icon turns green. Click again to disconnect from the Control Unit.

Download for Control Unit

The Sucuri Control Units have a built-in microcontroller, than Can run a Sucuri flowchart Studio, downloaded, remotely. If this is the case, the download button will be active. Click this button to compile and download the flowchart for Connected Control Unit.





Entries

Digital inputs (initially called x Outputs) are switches and can be turned on or off. Analog inputs (initially called Val x) are sensors that report the numerical reading. When the Control Unit is disconnected, click on the inputs to toggle its state, and change the analog value by dragging the mouse right and left. When the Control Unit is connected, the states of the inputs are shown on the Control Unit (on or off).

Analog sensors can be of various types, including light sensor, temperature sensor, and sound sensor. When the mouse pointer is over the states pane, drop-down arrows appear to the right of the analog readings. Click this drop-down arrow to choose which sensor is turned on and calibrate the reading.

Exits

Digital outputs (initially called x-output) are lights, beeps, motors, or other actuators that can be turned on or off.

Renaming Entries and Exits

Once you have linked your project to the control unit, it is useful to rename the inputs and outputs appropriately. Once they are renamed, it will no longer be necessary to remember which pin of the Control Unit it is connected to.When the mouse pointer is over the states panel, the rename icon will appear to the right of the inputs/outputs that can be renamed. Click this icon to give a convenient new name to the inputs/outputs (e.g. Engine 1 or Turn Left).

Sound Block (not available for Linux beta)

Sound can give extra realism to control situations. For example, consider the siren over the headlight, the audible warning on railroads, or sounds to help the visually impaired.

Add Sound and Voice to the flowchart

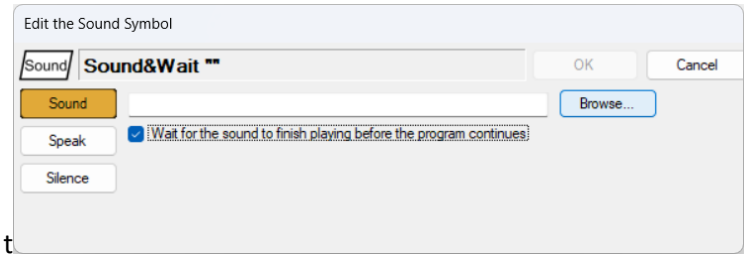
To use the Sound Block, you'll need to add it to your desktop:

1. Click the **More...** in the upper left of the flowchart, above the states pane.
2. Choose the **Sound & Speech** icon, and then click **OK.**

Once this is done, the Sound Block will be available in the toolbox. Insert it into your flowchart.

Play a sound file

Drag a Sound Block to the desktop, choose **Sound** from the command box, and then browse to the desired destination for the sound file (WAV format). Drag the Sound Block to the desktop.



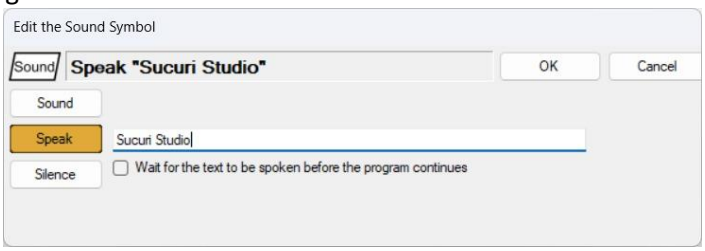
Already t

If the 'Wait for the sound to finish playing' box is enabled during execution, the flowchart will be stopped in the Sound Block until the sound file is finished playing. Otherwise, the flowchart execution will continue with the sound playing in the background.

Spoken text

Modern computers have the ability to Speech Synthesis as part of their Operating System (Windows or Mac OS X). Sucuri Studio uses the Text-to-Speech system as a device to synthesize the human voice from texts.

Drag a Sound Block to the desktop, choose **Speak** in the command box, and type the text shown in the image below:



Silence

If you have any kind of sound playing in the background, the **Silence option** will mute the sound. Graphics

Any real-world control system will have to be monitored. Monitoring is essential to verify the correct operation and verify the efficiency of the system.

Better monitoring is done with a Control Unit connected to Sucuri Studio.

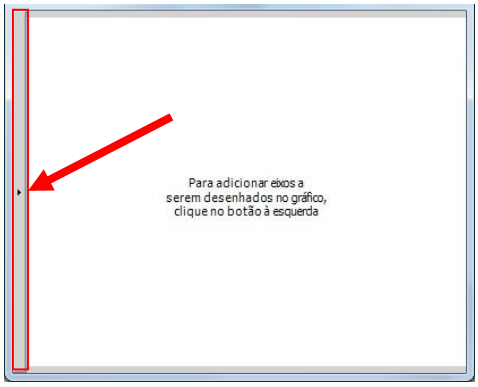
Turn on analog sensors appropriate for your model and calibrate the reading to the appropriate units by selecting the correct sensor from the drop-down list in the State Panel. For example, using a temperature sensor to measure the air temperature inside a greenhouse.

Opening and Adding Axes to a Graphics Window

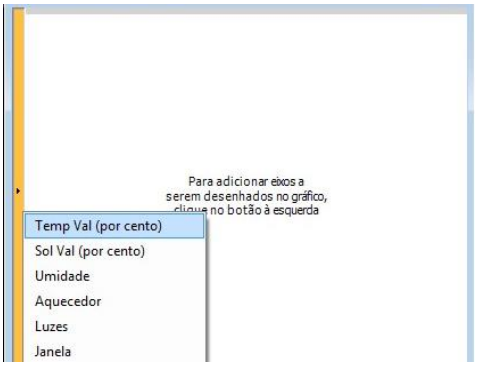
1. Click on the More... button 

at the top right of the screen.
2. Choose Chart in the **Add New Resource window**.

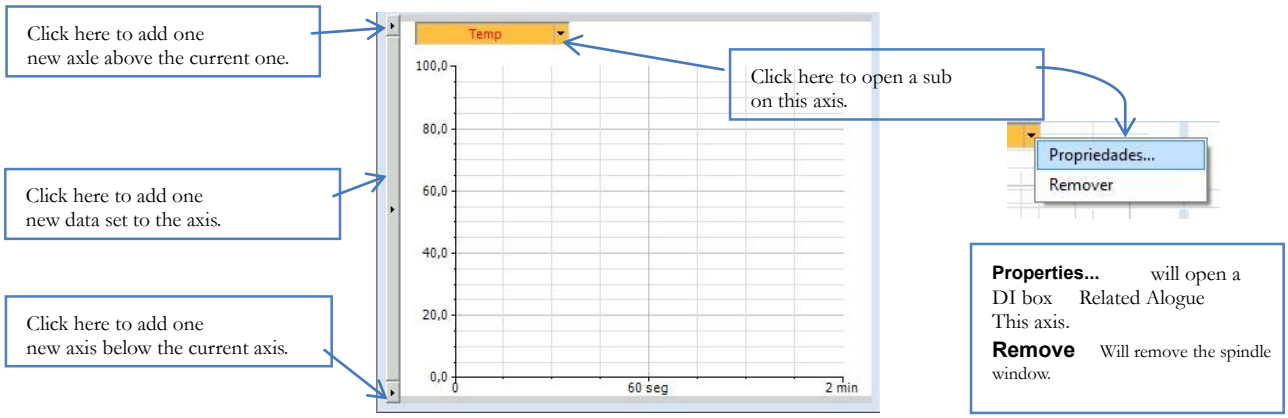
3. When the chart window opens, click on the left margin (which turns orange) to open the menu of available axes. In the greenhouse example, I've marked Val1 in and out Val2.

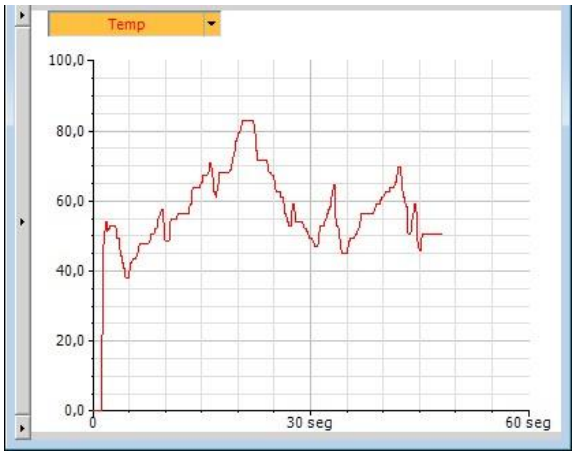


4. Choose an analog sensor from the menu to create an axis.



The chart window will look like this:





To start logging the data, click the Run button in the bottom left corner of the Sucuri Studio screen. By default, the spindle will record 2 minutes of data, after it exceeds this time the spindle will double to 4 minutes and the program will discard all other recorded data. The reading for the logging interval will also double.

Hiding and Showing the Chart Window

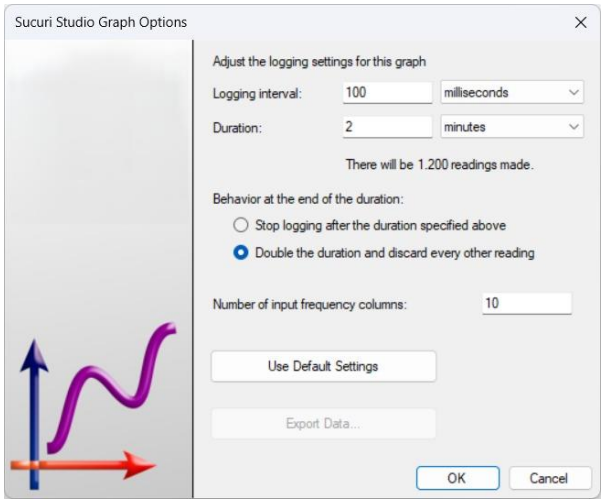
Click the close icon in the chart window to hide it. A graphical icon appears in the Chart area of the Status Pane. Click this icon to show the chart window again.

To remove the chart window, click the delete icon:

Note that this operation can be undone with the undo button.

Chart Options

Click the options button in the chart area of the status bar to view and adjust your options.



When starting data collection, the readings will be taken every 100ms for 2 minutes, after which the duration and interval are doubled and the other reading will be discarded.
Adjust the duration and interval to suit your project. Sucuri Studio can log a maximum of 20,000 readings. Click Default **settings** to return to normal program settings.
To export the recorded data as a Comma Separated Value (.csv) file, click the Export **Data...**element. CSV files can be uploaded to a database or spreadsheet (e.g., Microsoft Excel) for further analysis.
The default digital readouts are 10 per second. See below for details on how digital inputs are registered and displayed.

Digital Outputs and Drive Axles

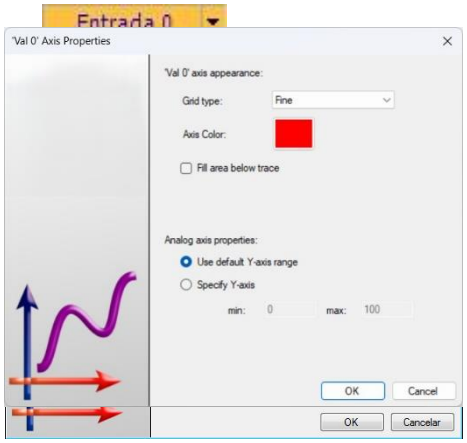
Digital outputs and engines can also be displayed in the chart window.

Consider the greenhouse model again. Two temperature sensors can be used to record temperatures inside and outside the greenhouse. A motor can be used to control a window, and a flowchart built to open the window to ventilate the greenhouse if it gets too hot. To measure the benefit of the window system, record both temperatures on one axis and window motor on the other.

Digital Input Axes

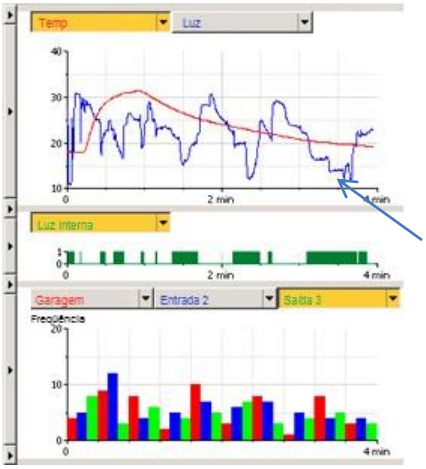
Digital inputs can also be displayed in the chart window. As a digital output, an input has a value of 1 when it is on and 0 when it is off.
Alternatively, the digital inputs can be displayed on a frequency graph. To use a frequency display:

1. Add a digital input axis to the chart using the button at the left edge of the chart window.
2. Click the arrow as in the picture at side:
3. Choose **Properties**, and then in the properties window, check the Show **Frequency Input Bar option**. Click Ok.



If more than one input frequency axis is on the same graph, then the frequency bars can be stacked. Consider a Ferris wheel, the frequency of entries used to start the tour over the course of a day shows how popular the tour was.

Multiple View Axes



The number of data and axes presented is of your choice.
When too many values are displayed on the same axis, click the title (it will turn orange) to select the information to show.
Click and drag the gray horizontal split up or down to reset the Axis Heights.
If necessary, additional chart windows can be added by clicking More... and choosing **Chart again**.