Companion Unit For The

Arduino UNO R3

30 Oct 2024

Description

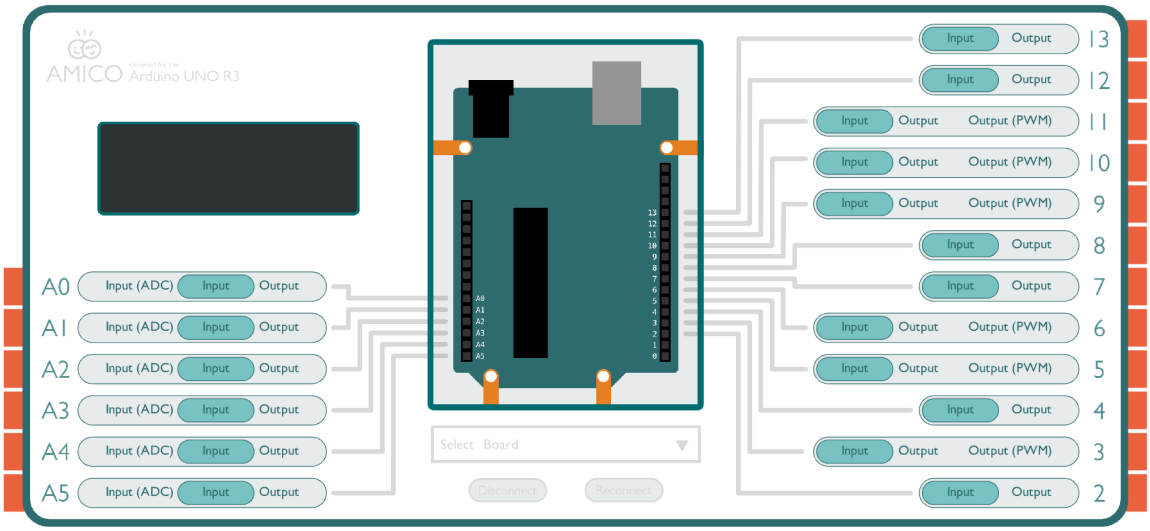
The Arduino UNO R3 is the perfect board to get familiar with electronics and coding. This versatile development board is equipped with the well-known ATmega328P and the ATMega 16U2 Processor.

The Amico companion unit for the Arduino UNO R3 expands on the capabilities of the Arduino by connecting it into the ecosystem of Alchemy Units.

For more information about the Arduino UNO R3, please see the official documentation at https://docs.arduino.cc/hardware/uno-rev3/

Target areas

Maker, introduction, industries, automation, computer control



Contents

Set Up

Prerequisites

To use the Arduino UNO R3 board companion uint, you will first of course need an Arduino UNO R3 board. You will also need to connect this board to your computer. It is recommended that at this point you test that connection by loading onto it the “Blink” sketch.

For a guide on getting started with the Arduino UNO R3 itself, please see this tutorial https://docs.arduino.cc/tutorials/uno-rev3/getting-started/

Loading Firmata Onto The Board

In order for the Amico companion unit to communicate with the Arduino board, we must first load the “Standard Firmata” sketch onto the Arduino board. This program is available in your Arduino IDE.

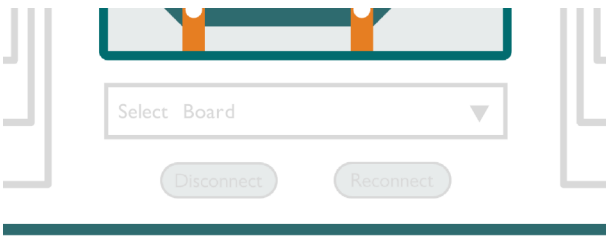
Firmata is an open-source protocol for communicating with microcontrollers from software on a host computer.

The “Standard Firmata” sketch found in your Arduino IDE implements this protocol for Arduino and Arduino-compatible devices. It is used by the Amico companion unit to communicate with and control the Arduino board.

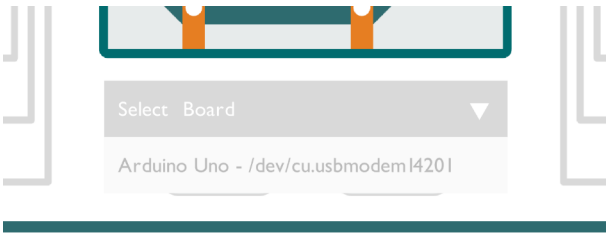
This setup step only needs to be performed once for a board.

Connecting

Once the board has been set up, open Alchemy and create a new Amico Arduino UNO R3 unit. Look to the bottom of the created unit for the “Select Board” dropdown. Clicking here will show a list of all connected Arduino devices. From this list, select the device you would like to work with.

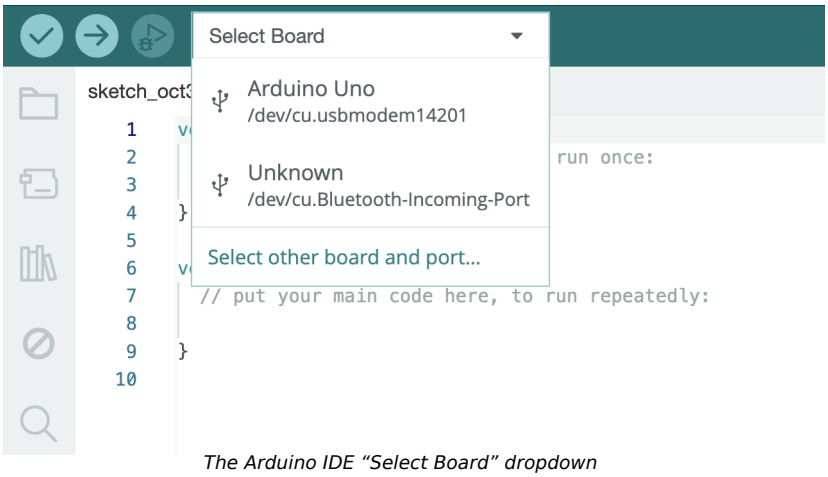


The closed dropdown



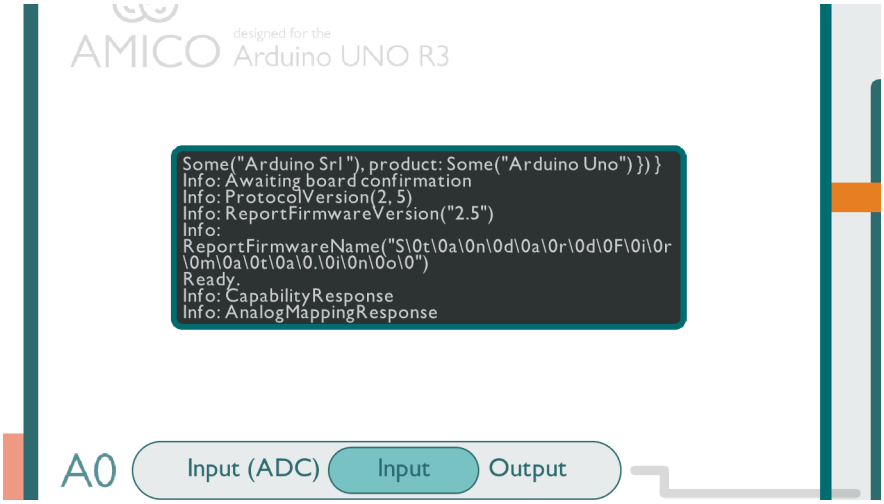
The open dropdown, showing one Arduino board as an option

If you do not know which connection to choose, compare this list with the one presented by the Arduino IDE “Select Board” dropdown.



The Arduino IDE “Select Board” dropdown

When you select the device, the unit will being attempting to connect to the board. You can see this work happening in the Text Log on the top left of the unit. Any issues the unit encounters will also be presented here.

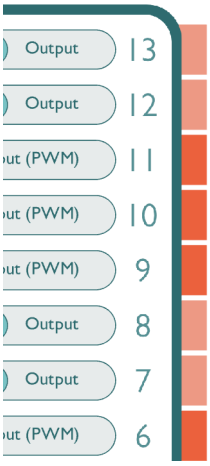


A successful connection has been made

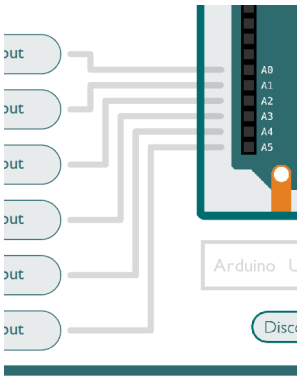
Operation

The Arduino UNO R3 has 14 digital input/output pins (of which 6 can be used as PWM outputs) and 6 analog inputs. Its important to note however that digital pins 0 and 1 are used to communicate with the computer, so these are not accessible.

The companion unit presents all these pins in a way that matches as close as possible their positions on the board. The unit ports are labeled with their corresponding pin numbers, and you can also following the guide lines on the unit to see which pins they correspond to on the board.



The pin numbers of each port



Connection markings leading from the ports to the Arduino pins

Reading Boolean Input

All pins are capable of reading boolean signals. To do so, set the pins mode to “Input” - the default mode of all pins - using the corresponding radio slide.

In this mode, any change made to the pins of the Arduino board will be reflected as output from the corresponding ports of the companion unit.

Writing Boolean Output

All pins are capable of writing boolean signals. To do so, set the pins mode to “Output” using the corresponding radio slide.

In this mode, any change made to the ports of the companion unit will be reflected as output from the corresponding pins of the Arduino board.

Reading from ADC Pins

ADC = Analogue to Digital Converter

Pins A0 to A5 are capable of reading analogue signals. To do so, set the pins mode to “Input (ADC)” using the corresponding radio slide. The unit’s ports will change to the Voltage variety.

In this mode, any change made to the pins of the Arduino board will be reflected as output from the corresponding ports of the companion unit.

Writing to PWM Pins

PWM = Pulse Width Modulation

Pins 3, 5, 6, 9, 10 and 11 are capable of writing PWM signals. To do so, set the pins mode to “Output (PWM)” using the corresponding radio slide. The unit’s ports will change to the Voltage variety.

In this mode, any change made to the ports of the companion unit will be reflected as output from the corresponding pins of the Arduino board.

Disconnection And Reconnection

While connect to an Arduino board, it is possible to select a different one from the dropdown menu, causing the unit to disconnect from the attached board, and connect to the newly selected one. Pin modes are preserved between these changes, though the signals sent/received may flicker.

You can also choose to disconnect from the attached board using the “Disconnect” button and reconnect to a selected but not connected board using the “Reconnect” button.

The Disconnect button in its active state.

The Reconnect button in its active state.

These buttons can be very helpful in the event of a improperly functioning connection.

Log Window

Aside from pin signal and mode changes, every action the companion unit performs and every message it receives from the Arduino is logged into the text log on the top left of the unit.

This includes issues the companion unit may encounter. As such, it can be vey useful for troubleshooting issues with the connection or board.

Thank you

We thank you for using the Arduino UNO R3 Companion Unit and hope that you find it very useful in whatever projects you have.

Though we have tried to make the Arduino UNO R3 Companion Unit as robust and capable as possible, the unit is not perfect and can encounter any number of issues in its use. You should first look to the Text Log for any error messages which may help you in fixing the problem. If you are unable to remedy the situation, please feel free register the issue with the Alchemy team who can pass it on to us.

Happy hacking!