Arduino as a MIDI device

Tools

AVR ISP MKII http://www.atmel.com/tools/AVRISPMKII.aspx

Arduino UNO R3 + USB cable

Some buttons

Some potentiometers or sliders (10k)

Breadboard

Breadboarding wires

Software

Download and install CrossPack (OSX)

https://www.obdev.at/products/crosspack

Download and install the Arduino IDE

https://www.arduino.cc/en/Main/Software

Download and copy Arduino MIDI to the Arduino libraries (sketchbook/libraries)
https://github.com/FortySevenEffects/arduino_midi_library/releases/latest

Download, unzip and copy to a folder

HIDuino: https://github.com/ddiakopoulos/hiduino

Basic checks

Arduino

Run the Arduino IDE

Check that the MIDI library is correctly installed (Tools > Include Library > MIDI)

Open a terminal window then type the following command:

avrdude

Then press Enter

You should see the available avrdude options

Development cycle

To upload a sketch and convert the Arduino board to a MIDI device

1- Create your sketch in the Arduino IDE

2- Upload it to the Arduino board as usual

3- Reprogram the bootloader of the Arduino to be recognized as a MIDI device

To turn the Arduino board back to normal (USB device)

1- Reprogram the bootloader of the Arduino to be recognized as a USB device

2- Follow the steps below if you want to update your sketch

Create a MIDI device

From Arduino USB to Arduino MIDI

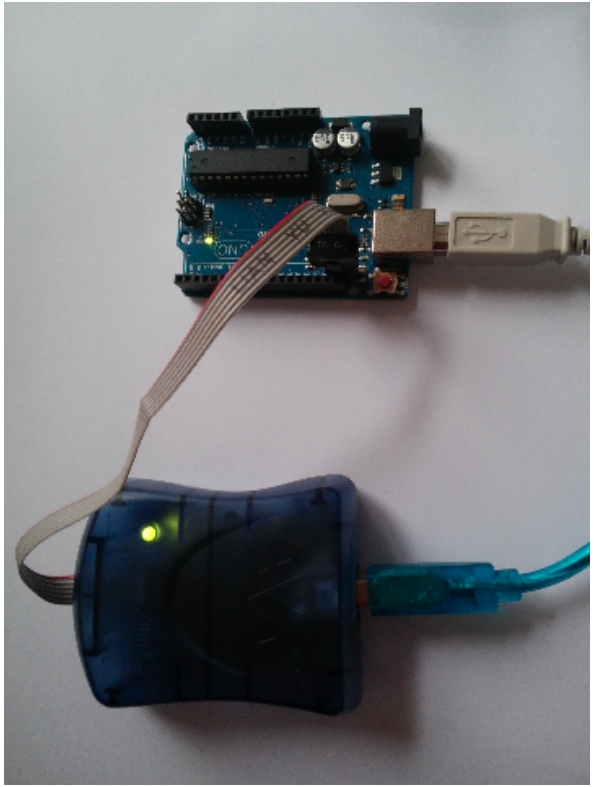
Create your sketch

Upload your sketch to the Arduino as usual

Sample sketch

```
#include <MIDI.h>

MIDI_CREATE_DEFAULT_INSTANCE();

void setup() {
  MIDI.begin();
}

void loop() {
  MIDI.sendNoteOn(42, 127, 1);
  delay(1000);
  MIDI.sendNoteOff(42, 0, 1);
  delay(1000);
}
```

From Arduino USB to Arduino MIDI



Power the Arduino board via USB (connected to your computer)

Power the AVR programmer via USB (connected to your computer)

The AVR front LED turns to red

Plug the AVR programmer cable (grey and red cable) to the Arduino bootloader chip programming pins located near the Arduino's USB plug

The AVR front LED should turn from red to green

From Arduino USB to Arduino MIDI

Open a terminal window

Navigate to "compiled_firmwares" in the HIDuino folder and run the following command

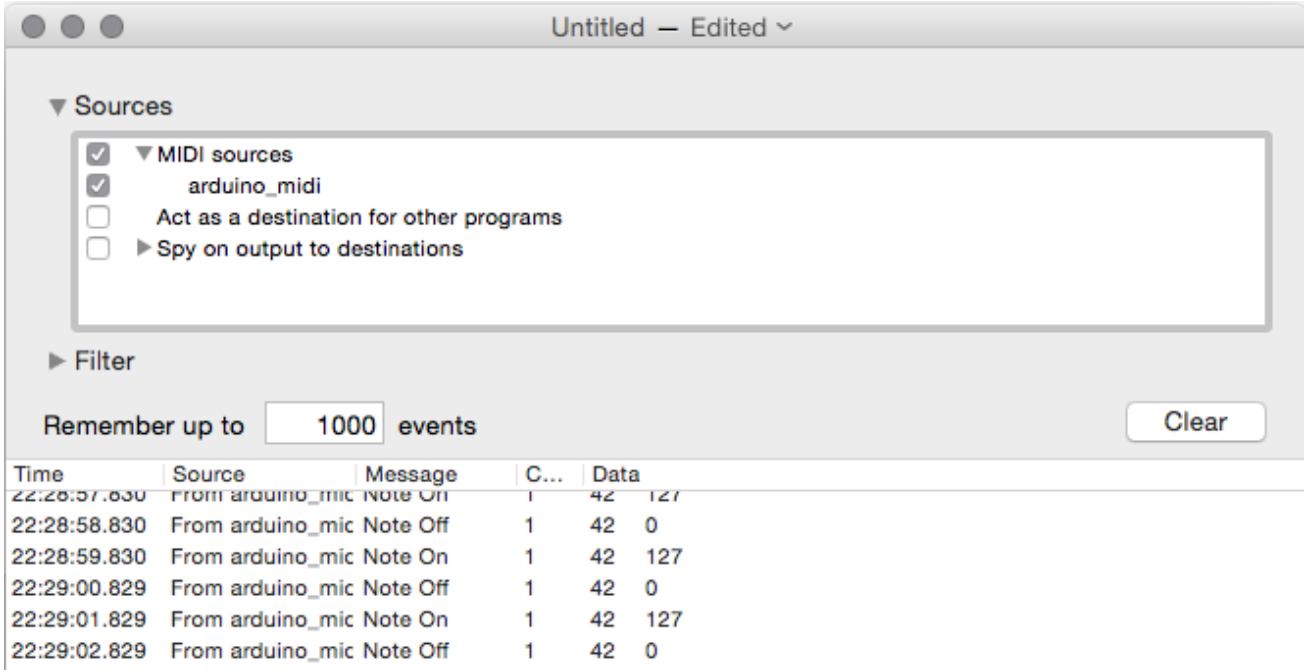
avrdude -p ATmega16U2 -F -P usb -c avrispmkii -U flash:w:arduino_midi.hex -U lfuse:w:0xFF:m -U hfuse:w:0xD9:m -U efuse:w:0xF4:m -U lock:w:0x0F:m

Check the output info on the terminal

```
Reading | ################################################## | 100% 0.00s

avrdude: verifying ...
avrdude: 1 bytes of lock verified

avrdude: safemode: Fuses OK (H:F4, E:D9, L:FF)

avrdude done.  Thank you.
```

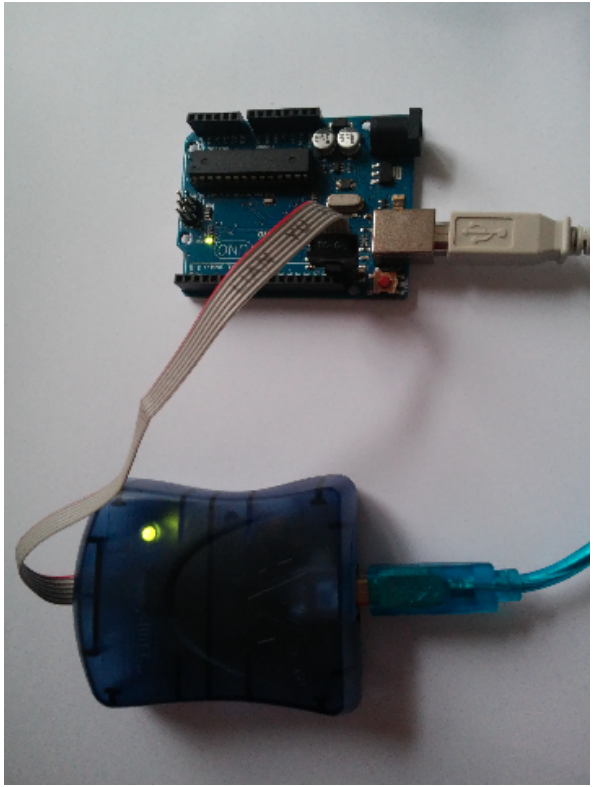
From Arduino USB to Arduino MIDI

Check if the MIDI device is visible and check the functionalities using a MIDI monitoring software



Revert changes

From Arduino MIDI to Arduino USB



Plug the AVR programmer cable (grey and red cable) to the Arduino bootloader chip programming pins (the one near the Arduino's USB plug)

The AVR front LED should turn from red to green

From Arduino MIDI to Arduino USB

Open a terminal window

Navigate to "compiled_firmwares" in the HIDuino folder and run the following command

avrdude -p ATmega16U2 -F -P usb -c avrispmkii -U flash:w:usbserial_uno_16u2.hex -U lfuse:w:0xFF:m -U hfuse:w:0xD9:m -U efuse:w:0xF4:m -U lock:w:0x0F:m

Check the output info on the terminal

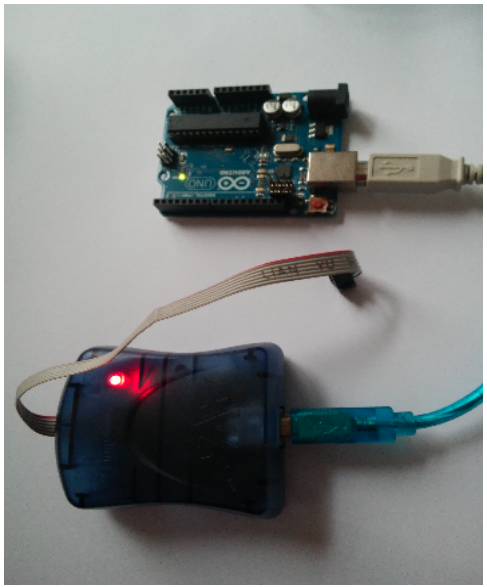
```
Reading | ################################################## | 100% 0.00s

avrdude: verifying ...
avrdude: 1 bytes of lock verified

avrdude: safemode: Fuses OK (H:F4, E:D9, L:FF)

avrdude done.  Thank you.
```

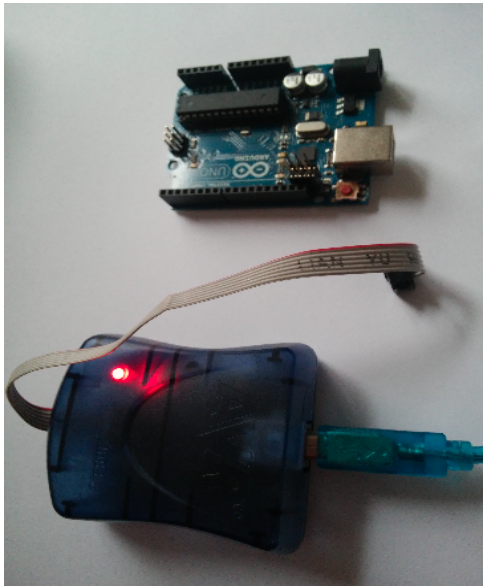
From Arduino MIDI to Arduino USB

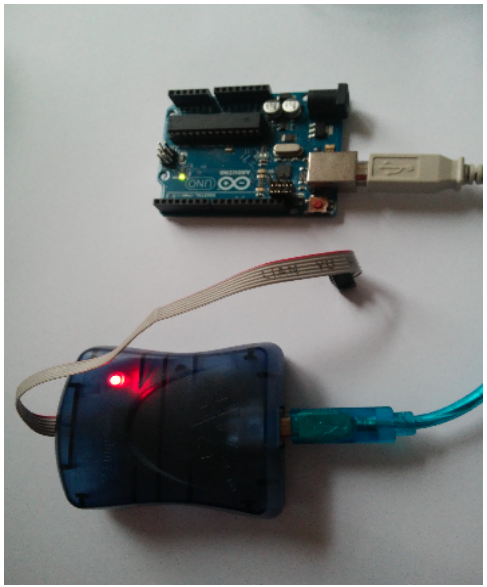
Unplug the programmer from the Arduino

Unplug the Arduino USB, wait for 2 seconds

Plug back the Arduino USB

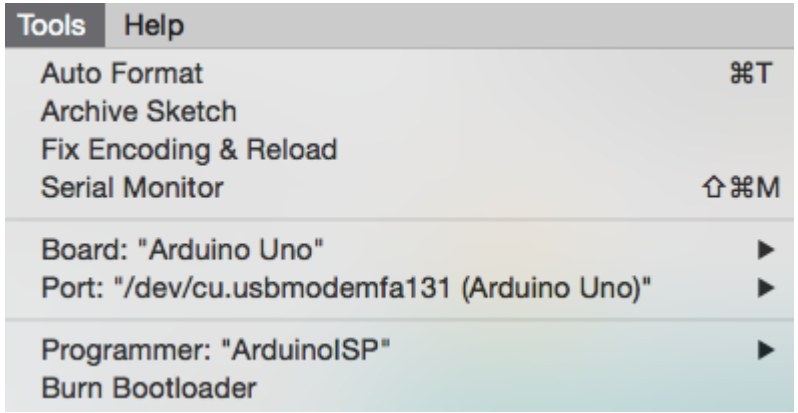






From Arduino MIDI to Arduino USB

Check that the Arduino board is visible in the Arduino IDE



Arduino code

Buttons, potentiometers etc ...

See code snippets provided for :

- buttons
- potentiometers and sliders

If you need more PINs, you can use a multiplexer :

ie : 4051 http://playground.arduino.cc/Learning/4051

Other option for digital PINs (buttons) :

ie : MCP23008 https://www.adafruit.com/products/593

ie : MCP23017 https://www.adafruit.com/products/732