

# Pyr0-Piezo MCU Update Procedure

## Tools and components:

- Pyr0-Piezo Unit
- USB-UART bridge ~or~ Pyr0-Piezo Program Interface Board
- ICSP Programmer or ArduinoISP
- Soldering Iron
- Wire
- 10K resistor
- 100pF – 0.1uF Capacitor (ceramic is preferred)
- Arduino IDE (optional)
- avrdude
- MCUDude's MiniCore
- Pyr0-Piezo git project

## Links:

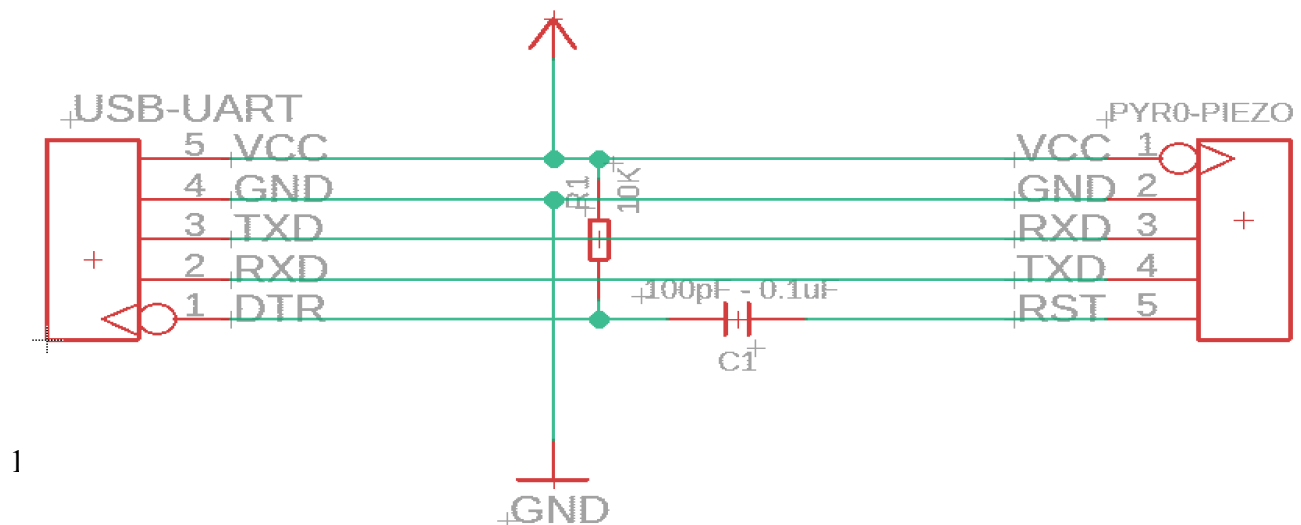
Arduino IDE: <https://www.arduino.cc/en/main/software>

avrdude: <https://download.savannah.gnu.org/releases/avrdude/>

Pyr0-Piezo GitHub: <https://github.com/pyr0ball/pyr0piezo>

## Hookup:

In order for serial (UART) programming to work, a capacitor must be placed in line between the Pyr0-Piezo RST pin, and the UART's DTR pin, and a 10k pullup resistor between DTR and +5v. ICSP programming requires no extra passive components. TXD/RXD pairs are inverted between sender and receiver



## Programming With Arduino IDE

- Download and install the Arduino IDE, clone or download the Pyr0-Piezo project (git clone is recommended to ensure updates are pulled) to a folder of your choosing.
- Open firmware/AVR-Source/ and open the firmware ino file related to the board you're updating.
- Install MCUDude's MiniCore
  - Open File > Preferences, and add the MiniCore json to the "Additional Board Manager URL's" Field:  
[https://mcutdude.github.io/MiniCore/package\\_MCUdude\\_MiniCore\\_index.json](https://mcutdude.github.io/MiniCore/package_MCUdude_MiniCore_index.json)
  - Click on Tools > Board > Boards Manager, use the search box to find "MiniCore", and click the "install" button
- Choose the MCU used in your sensor
  - Click on Tools > Board > Select Atmega88 for Rev.1.x.x boards, Atmega328 for Rev.2+ boards. All other settings will be the same
  - Under Tools, set the following:
    - Bootloader: Yes
    - Clock: 8Mhz Internal
    - BOD: anything 2.7v or lower
    - Compiler LTO: Disabled
    - Variant: \*8P/PA
- Set the programmer type to Programmer: AVRISP mkII
- Choose the COM port of your USB-UART bridge
- Make any adjustments to the top section of variables
- Click on "upload"
- Done!

## Programming with avrdude

- Download avrdude (or find avrdude installed along with ArduinoIDE: Arduino/hardware/tools/avr/bin) and extract it to a folder of your choosing.
- Copy the firmware for your board out of /firmware/Compiled-Firmware/\*.hex to the folder where you extracted avrdude
- run the following command, replacing the m88p with m328p if using a Rev.2+, and COM4 with the serial port of your USB-UART bridge

```
./avrdude.exe -c avrisp2 -p m88p -b19200 -PCOM4 -U flash:w:<firmware.filename>.hex -v
```

```
MINGW64:/c:/Program Files (x86)/Arduino/hardware/tools/avr/bin
Reading | ##### | 100% 3.95s
avrdude.exe: verifying ...
avrdude.exe: 5888 bytes of flash verified
avrdude.exe done. Thank you.

Alan@Alan_work MINGW64 /c:/Program Files (x86)/Arduino/hardware/tools/avr/bin
$ ./avrdude.exe -c avrisp2 -p m88p -b19200 -PCOM4 -U flash:w:Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex -v

avrdude.exe: Version 6.3-20171130
Copyright (C) 2000-2005 Brian Dean, http://www.bdmicro.com/
Copyright (C) 2007-2014 Joerg Wunsch

System wide configuration file is "C:\Program Files (x86)\Arduino\hardware\tools\avr\bin\avrdude.conf"

Using Port : COM4
Using Programmer : avrisp
Overriding Baud Rate : 19200
AVR Part : ATmega88P
Chip Erase delay : 9000 us
PAGEL : PD7
BS2 : PC2
RESET disposition : dedicated
RETRY pulse : SCK
serial program mode : yes
parallel program mode : yes
Timeout : 200
StabDelay : 100
CmdexeDelay : 25
SyncLoops : 32
ByteDelay : 0
PollIndex : 3
PollValue : 0x53
Memory Detail

      Polled          Block Poll          Page
MaxW  ReadBack Memory Type Mode Delay Size  Indx Paged  Size  Size #Pages MinW
-----
3600  0xff 0xff eeprom          65  20   4   0 no   512   4   0 3600
4500  0xff 0xff Flash          65   6  64   0 yes  8192  64  128 4500
4500  0x00 0x00 lfuse           0   0   0   0 no    1   0   0 4500
4500  0x00 0x00 hfuse           0   0   0   0 no    1   0   0 4500
4500  0x00 0x00 efuse           0   0   0   0 no    1   0   0 4500
4500  0x00 0x00 lock            0   0   0   0 no    1   0   0 4500
0 0x00 0x00 calibration  0   0   0   0 no    1   0   0 0
0 0x00 0x00 signature    0   0   0   0 no    3   0   0 0

Programmer Type : STK500
Description      : Atmel AVR ISP
Hardware Version: 2
Firmware Version: 1.18
Topcard         : Unknown
Vtarget         : 0.0 V
Varef           : 0.0 V
Oscillator      : Off
SCK period      : 0.1 us

avrdude.exe: AVR device initialized and ready to accept instructions

Reading | ##### | 100% 0.02s
avrdude.exe: Device signature = 0x1e930f (probably m88p)
avrdude.exe: NOTE: "flash" memory has been specified, an erase cycle will be performed
To disable this feature, specify the -D option.
avrdude.exe: erasing chip
avrdude.exe: reading input file "Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex"
avrdude.exe: input file Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex auto detected as Intel Hex
avrdude.exe: writing flash (8192 bytes):

Writing | ##### | 100% 8.25s
avrdude.exe: 8192 bytes of flash written
avrdude.exe: verifying flash memory against Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex:
avrdude.exe: load data flash data from input file Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex:
avrdude.exe: input file Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex auto detected as Intel Hex
avrdude.exe: input file Pyr0_Piezo_Sensor_v1.0.2.with_bootloader.hex contains 8192 bytes
avrdude.exe: reading on-chip flash data:

Reading | ##### | 100% 3.95s
avrdude.exe: verifying ...
avrdude.exe: 8192 bytes of flash verified
avrdude.exe done. Thank you.
```