RoboJackets Training Firmware Setup Guide

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v1.1

Contents

Revision History

Revision	Date	Author(s)	Description
1.0	9/22/23	Andrew Roach	Created
1.1	10/6/23	Andrew Roach	Removed section on Verifying CH340 drivers, added section on updating Arduino Nano bootloader.

1 Installing the Arduino IDE

We will be using the legacy version of the Arduino IDE (version 1.8.19). Follow the installation instructions based on your platform.

1.1 Windows and Mac

1. Go to https://www.arduino.cc/en/software and scroll down to "Legacy IDE (1.8.X)". Download the binary corresponding to your platform.
2. Run the installer. Allow the installer to install everything, including drivers.

1.2 Linux

1. Go to https://www.arduino.cc/en/software and scroll down to the "Legacy IDE (1.8.X)". The Linux Arduino IDE should download as a `tar.xz` file.
2. Run the following commands, replacing `<arduino-ide>` with the name of the downloaded file.

```
tar -xJvf <arduino-ide>.tar.xz -C /home/$(whoami)
cd /home/$(whoami)/<arduino-ide>
sudo ./install.sh
```

2 Installing CH340 Drivers

MacOS and Linux users should have the correct drivers already, so no further action is needed. However, Windows users have to install an older driver version.

2.1 Installing CH340 Drivers on Windows

At the time of writing, the most recent version of the USB-SERIAL CH340/CH341 driver is v.3.8.2023.2. **You must install v.3.5.2019.1!** The v.3.8.2023.2 version of the driver is incompatible with the Arduino Nanos we have! Download the driver at:

https://deviceinbox.com/drivers/1571-winchiphead-usb-serial-ch340-ch341-driver.html

Unzip the files and run `Setup.exe`. The windows that pops up should look like **Figure 1**. First, hit the "Uninstall" button to uninstall the v.3.8.2023.2 drivers, then hit the "Install" button to install the v.3.5.2019.1 drivers.

Figure 1: USB-SERIAL CH340/CH341 Installation on Windows 11, version 3.5.2019.1.

3 Updating the Arduino Nano's Bootloader

This section is only relevant for RoboJackets trainers. Update the Arduino Nano's bootloaders in advance to avoid issues during Firmware Training.

Most offbrand Arduino Nanos have old bootloaders. To maximize compatibility, you should update their bootloaders using an Arduino Uno as a programmer.

3.1 Setting up the Arduino Uno as a Programmer

The following setups will set up the Arduino Uno with the `ArduinoISP` example program.

1. Plug an Arduino Uno R3 into your computer using a USB Type B cable.
2. Open up the `ArduinoISP` example sketch under `File > Examples > ArduinoISP`.
3. Ensure the settings under `Tools` are as follows:
   - Board: `Arduino Uno`
   - Port: select the port the Arduino Uno is plugged into.
     - On Windows, check the "Ports" section in Device Manager.
     - On Linux, check for devices starting with `/dev/ttyACM*` or `/dev/ttyUSB*`.
   - Programmer: `AVPISP mkII`
4. Upload the `ArduinoISP` to the Arduino Uno.

3.2 Wiring the Arduino Nano to the Arduino Uno Programmer

Connect the Arduino Uno to the Arduino Nano as shown in **Figure 2**. Note that you can also connect to the Arduino Nano's ICSP pins.

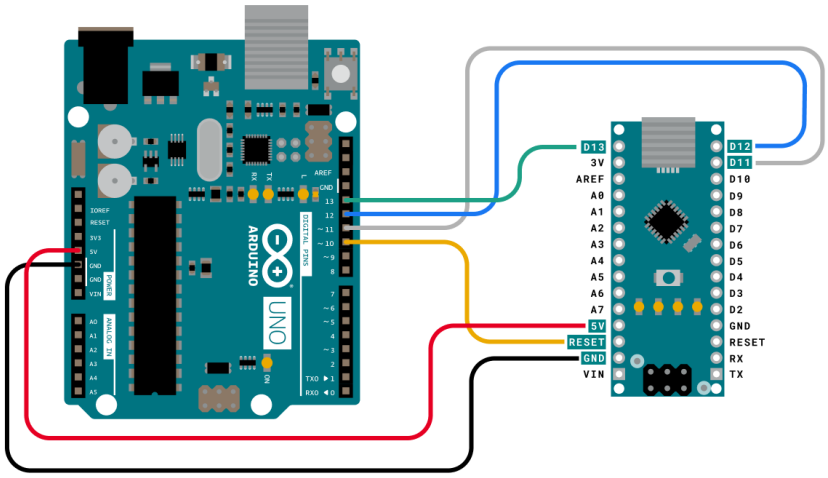

Figure 2: Wiring Diagram for an Programming Arduino Nano's Bootloader using an Arduino Uno.

3.3 Burning the Arduino Nano's Bootloader

Once the Arduino Uno is wired to the Arduino Nano, follow these steps.

1. **Plug in the Arduino Uno into your computer**. Do NOT plug in the Arduino Nano!
2. Ensure the settings under `Tools` are as follows:
   - Board: `Arduino Nano`
   - Processor: `ATmega328P`
     - this setting determines which bootloader is burned onto the Arduino Nano
   - Port: select the port the Arduino Uno is plugged into.
     - On Windows, check the "Ports" section in Device Manager.
     - On Linux, check for devices starting with `/dev/ttyACM*` or `/dev/ttyUSB*`.
   - Programmer: `Arduino as ISP`
3. Under `Tools`, click `Burn Bootloader`. Lights on the Arduino Uno and the Arduino Nano should flash to indicate the burning process is underway. Upon completion, the Arduino IDE should say "Done Burning bootloader".

Congratulations! The Arduino Nano now has the updated bootloader. You should be able to program the Arduino Nano by plugging it into the computer normally using the following settings:

- Board: `Arduino Nano`
- Processor: `ATmega328P`
- Port: select the port the Arduino Uno is plugged into.
- Programmer: `AVPISP mk`II