

1. **Download Arduino 1.8.7 from here:**

<https://www.arduino.cc/en/main/OldSoftwareReleases>

We are intentionally using an older release. Someone tried compiling with a newer one and some of the libraries didn't work. We know this one works on both Mac and PC. Install Arduino and run it once so it saves config files.

2. **Download TeensyDuino 1.47**

For Windows: https://www.pjrc.com/teensy/td_147/TeensyduinoInstall.exe

For Mac: https://www.pjrc.com/teensy/td_147/TeensyduinoInstall.dmg (except Catalina)

Install Teensyduino, including all of the example files and libraries.

3. **Increase buffer memory available to serial ports on the Teensy.**

On Windows:

C:\Program Files (x86)\Arduino\hardware\teensy\avr\cores\teensy3\serial1.c

NOTE: On Windows, you need to change permissions on the .c files to edit / save them. Right click on the file, select Properties > Security then change user to write (All permissions). Originally it's Read and Execute

On Mac ▶ Applications ▶ Arduino.app ▶ Contents ▶ Java ▶ hardware ▶ teensy ▶ avr
▶ cores ▶ teensy3 ▶ serial1.c replace this line:

`#define SERIAL1_RX_BUFFER_SIZE 64.`

with

`#define SERIAL1_RX_BUFFER_SIZE 8192`

to increase the serial buffer bytes from 64 to 8192.

Do this with serial1.c, serial2.c, serial3.c and serial4.c

4. **Download the Arduino code and libraries needed from our Github repository:**

<https://github.com/flyonspeed/OnSpeed-Gen2>

On the page above click on the green Clone or Download button and then Download Zip file.

Unzip the file into a temporary folder and then copy the contents of the Software/Arduino folder to the Documents/Arduino folder on your computer. This includes the Arduino code for both chips and all the libraries needed to compile them.

5. Set up the ESP32 board in Arduino

Start Arduino, go to Preferences and add this line to the board manager URLs:

https://dl.espressif.com/dl/package_esp32_index.json

Then go to Tools -> Board <- Board Manager Type in ESP32, install esp32 by Espressif Systems version 1.0.4.

Now you have the Arduino environment set up.

6. *Program the chips:*

A. Wifi chip:

Remove the Wifi chip from its socket. The very first time you need to program this chip with a USB cable. All subsequent firmware updates on this chip can be done via Wifi as described later below.

The first time you need to connect to the ESP32 chip via USB to program it (After that you can load the new firmware via Wifi.).

Open the OnSpeedWifi.ino file with Arduino. Select Tools -> Board -> ESP32 Pico Kit

Select Tools -> Port -> /dev/cu.SLAB_USBtoUART (on Mac, something similar on a Serial port on PC)

Sketch -> Upload

Once you are done the Wifi hotspot named OnSpeed will show up. Connect to it (password: angleofattack) and then go to onspeed.local in a browser (on Mac) or 192.168.0.1 (on Windows)

Next time you can load new firmware from this Wifi interface. No need for USB or removing the chip. Compile it with the Arduino using Sketch -> Export compiled binary. A new .bin file will show up in the folder next to the OnSpeedWifi.ino file. In the Wifi interface go to Tools -> Upgrade Wifi module and then load the .bin file. It will reboot after a few seconds and you're on the new firmware.

B. Teensy chip:

The Teensy can be programmed in place. Plug into the microUSB.
Open the OnSpeedTeensy.ino file

Select Tools -> Board -> Teensy 3.6 Select Tools -> Port -> Port with Teensy 3.6 Serial in its name

Select Tools -> CPU Speed 180Mhz

Sketch -> Upload

After the chip reboots go to Tools -> Serial Monitor to open the serial monitor and you'll see a command console help text.

Go back to the Wifi interface -> Tools menu and format the SD card.