ERASynth: An Open Source, Arduino-Compatible RF Signal Generator with Wi-Fi Connectivity

FIRMWARE UPDATE INSTRUCTIONS

ERASynth has three types of firmware that can be updated:

- Arduino Due Code
- ESP8266 Code
- ESP8266 HTML DATA

1) First one is the firmware of the main MCU (ATSAM3X8EA-CU) of the device. This MCU is the same as in the Arduino Due board. Arduino IDE can be used to upload firmware into ERASynth same as uploading to the Due board thanks to using the same MCU family.
   This MCU controls all peripherals, serial commands and also a wireless module, named ESP8266. ESP8266 module is used as a wireless serial bridge in order to control the device without any cable requirement via Wi-Fi enabled devices such as mobile phones, laptops, tablets etc. There is no need to update 2nd and 3rd firmware if the wireless control option is not used.
2) Second one is the firmware of the MCU inside the ESP8266 module. This Arduino based firmware can be uploaded via same Arduino IDE. This firmware is used to send the messages between ATSAM3X8EA-CU and web GUI. This can be done thanks to a running web server inside the ESP8266 module. The firmware configures this server.
3) Third and the last one is simply a web server html data. This data determines how the web GUI looks like. When a new feature is added that changes the web GUI, this html data must be updated.

✓ If all three firmware will be updated, please do this one by one in this order.
✓ ERASynth must be powered via a stable, short and high-quality micro-USB cable. A power bank or a mobile device charger that can supply 5V and at least 1.5A of current can be used as a power supply.
✓ Mini-USB cable must be used while uploading the firmware's.
✓ Versions of the firmware's are shown on the web GUI and Windows GUI at diagnostic tab.
✓ We recommend you to check the latest versions on our GitHub page and keep your device up to date.

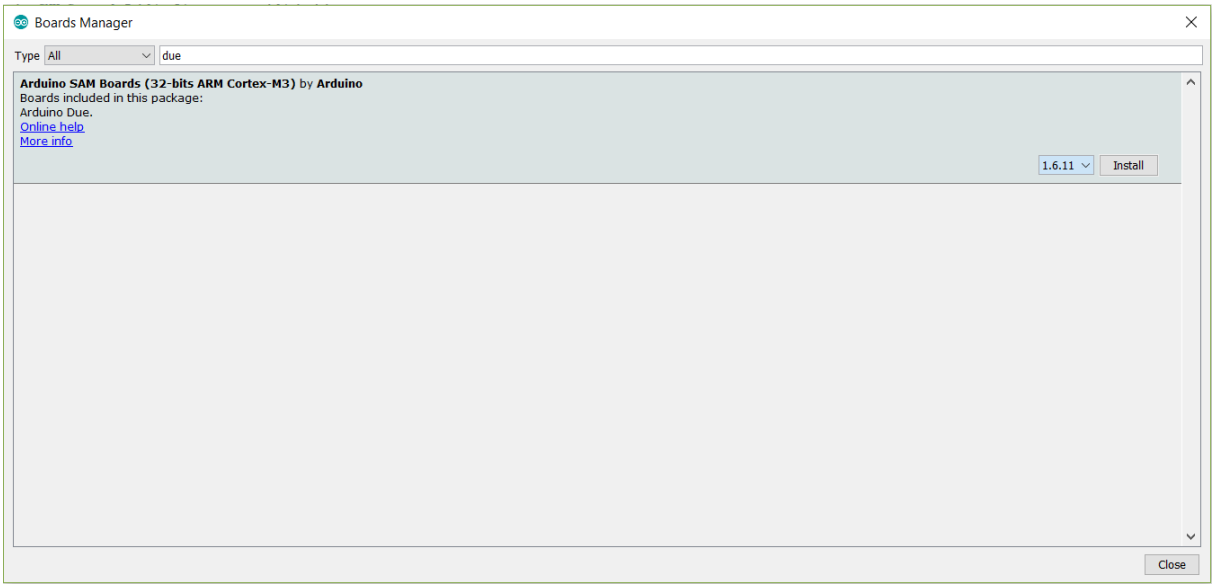
1. Arduino Due Code

1.1. If it is not installed before, download the latest Arduino IDE from https://www.arduino.cc/en/Main/Software and install.

(ERASynth is tested with 1.8.5 version of Arduino)

1.2. Open the Arduino IDE and install "*Arduino SAM Boards*" from Board Manager (*Tools>Board…>Board Manager…*).

Type "*due*" to search bar, select the latest version and install.



1.3. After doing the configuration above, your system should detect the driver automatically when you plug the ERASynth via mini-USB cable. If it doesn't, please follow next instruction.

1.4. No driver necessary for Linux and MacOS

For Windows:

- Open device manager
- Find the tab "Other Devices"
- You will see a device named "Arduino Due Prog. Port"
- Right-click and select "Search automatically for updated driver software"
- If it doesn't detect any driver, repeat the process and select "browse my computer for driver software"
- Navigate to the folder with the Arduino IDE you downloaded and unzipped earlier. Locate and select the "Drivers" folder in the main Arduino folder (not the "FTDI USB Drivers" sub-directory). Press "OK" and "Next" to proceed.
- After installing successfully, you should see your device under Ports (COM & LPT) tab in Device Manager

1.5. Download the latest ERASynth firmware from GitHub.
https://github.com/erainstruments/erasynth-firmware

1.6. ERASynth project has a dependency. Download the library https://github.com/ivanseidel/DueTimer . Copy the **unzipped** file to **Arduino IDE library folder**. It is in the Arduino IDE installation folder.

1.7. Open **ERASynth.ino** file with Arduino IDE.

1.8. Ensure that a definition for ERASynth is correct for your ERASynth model. It is defined in "*definitions.h*" file in 19th line. This definition must be

0 for ERASynth model

1 for ERASynth+ model

2 for ERASynth++ model

1.9. Go to *Tools>Board>Arduino DUE (Programming Port).* This will change the board to "*Arduino DUE (Programming Port)*".

1.10. Go to *Tools>Port* and select the device you plugged (COM1,2,3, etc.).

1.11. Click *upload* or click *Sketch>Upload*

Arduino IDE will compile the project and upload a .bin file to the device. This will takes a while, so please be patient while uploading.

2. ESP8266 Code

2.1. If it is not installed before, download the latest Arduino IDE from https://www.arduino.cc/en/Main/Software and install.

(ERASynth is tested with 1.8.5 version of Arduino)

2.2. Open *File>Preferences*

2.3. http://arduino.esp8266.com/stable/package_esp8266com_index.json

Copy and paste the URL above to "*Additional Boars Manager URLs*".

2.4. Open Board Manager from Tools tab (*Tools>Board…>Board Manager…*) and type "*esp*" in the search bar.

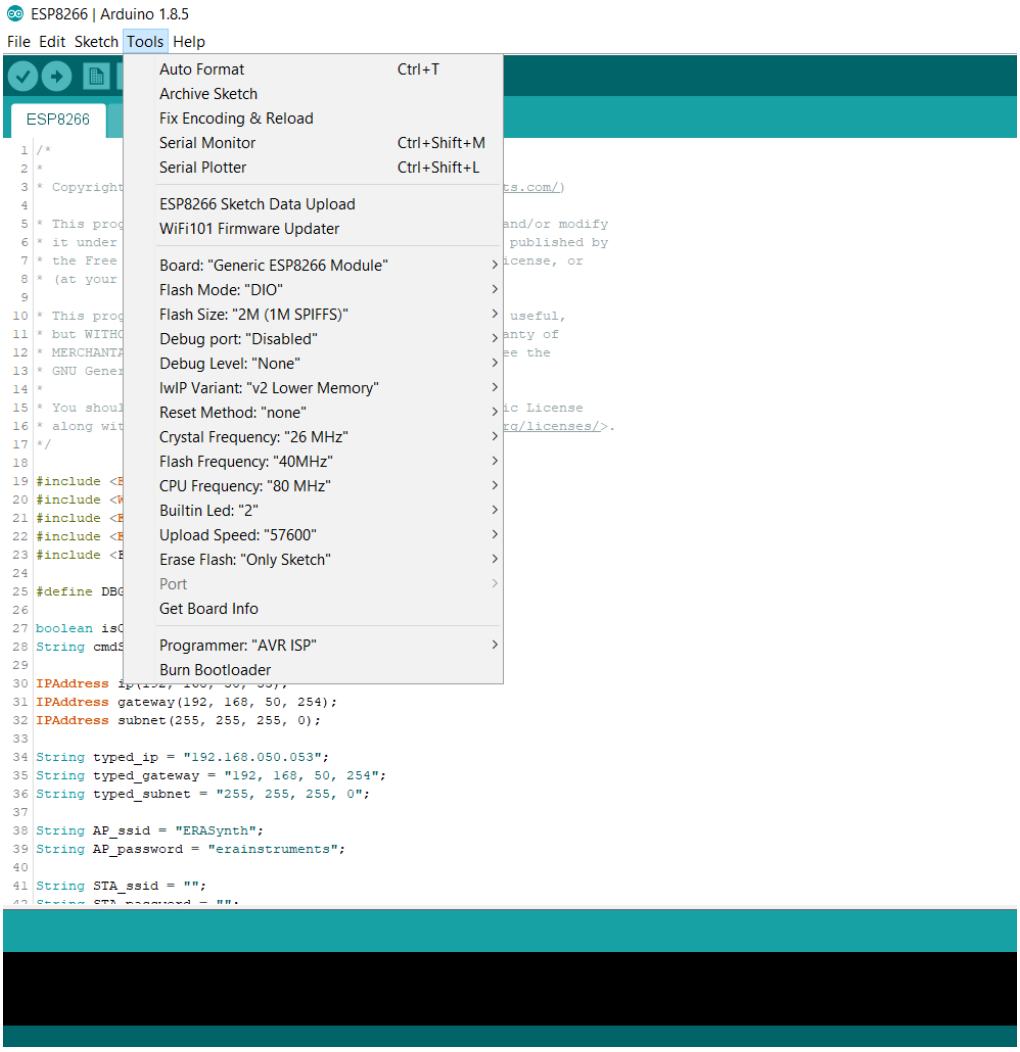
2.5. If it is not installed before, install the latest version of "*esp8266*" board package which is created by "*ESP8266 Community*".

(ERASynth is tested with 2.4.2 version)

2.6. **Restart** Arduino IDE.

2.7. If it is not done before, download the latest ERASynth firmware from GitHub. https://github.com/erainstruments/erasynth-firmware

2.8. Open the *ESP8266.ino* file with the Arduino IDE installed before and **change all settings** as shown in the image below:



2.9. Go to *Tools>Port* and select the device you plugged (COM1,2,3, etc.)

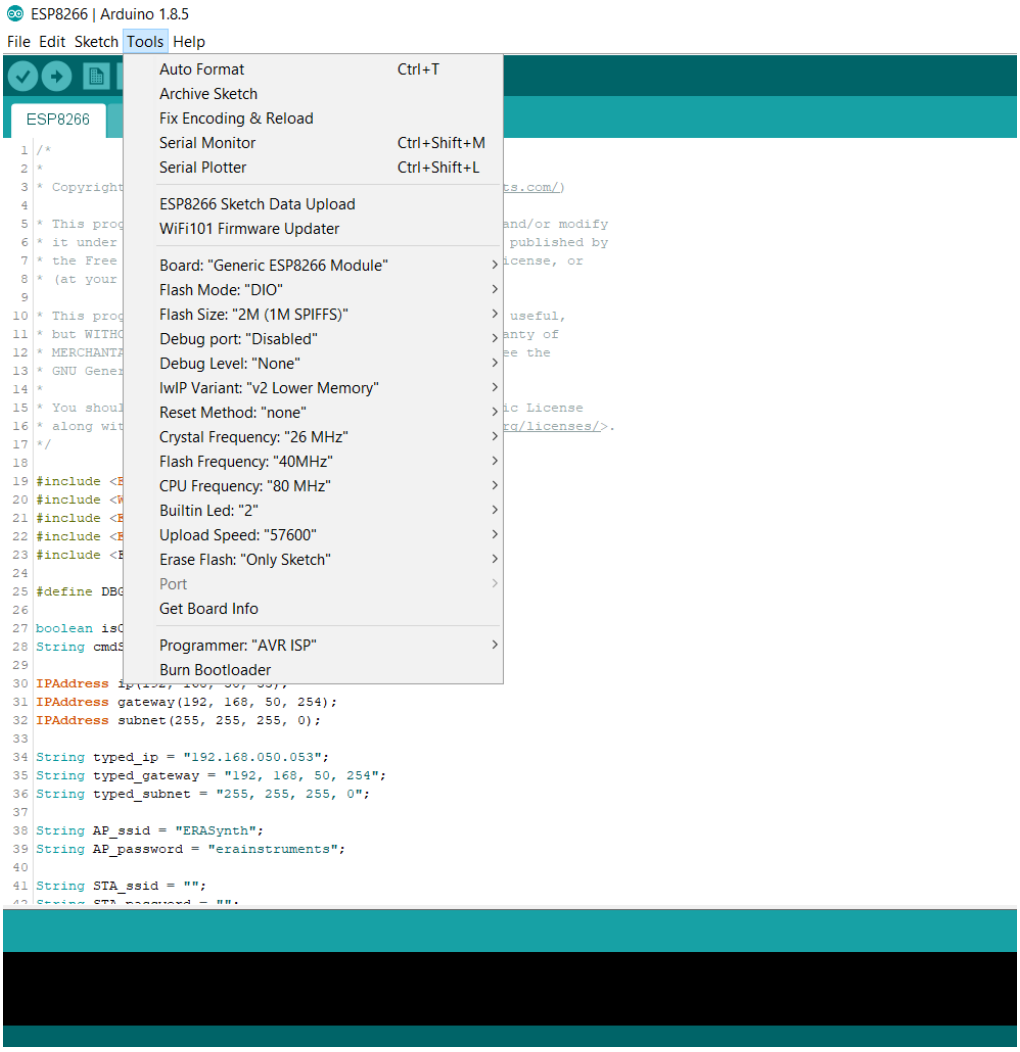
2.10. Before uploading code to ESP8266, you must open PC GUI or any serial terminal emulator program and send ESP8266 upload mode command (**>U with carriage return**). This command is under *settings* tab on PC GUI.

Baud rate must be **115200 bps**, when using serial terminal emulator.

After sending ESP8266 upload mode command, the device will return this message: “The ESP8266 can be programmed! Please close the COM Port”.

Don’t forget to close com-port after sending upload mode command.

2.11. Be sure that all settings are configured as shown in the image below:



2.12. Click *upload* or click *Sketch>Upload*

Arduino IDE will compile and upload code to module. If any error occurs such as "*espcomm_upload_mem failed*", restart the device, try every step again and be sure the COM port of the device is not used by any other programs and closed.

2.13. **Restart** the device.

3. ESP8266 HTML DATA

3.1. If it is not installed before, download the latest Arduino IDE from https://www.arduino.cc/en/Main/Software and install.

(ERASynth is tested with 1.8.5 version of Arduino)

3.2. Open *File>Preferences*

3.3. http://arduino.esp8266.com/stable/package_esp8266com_index.json

Copy and paste the URL above to "*Additional Boars Manager URLs*".

3.4. Open Board Manager from Tools tab (*Tools>Board…>Board Manager…*) and type "*esp*" in the search bar.

3.5. If it not installed before, install the latest version of "*esp8266*" board package which is created by "*ESP8266 Community*".

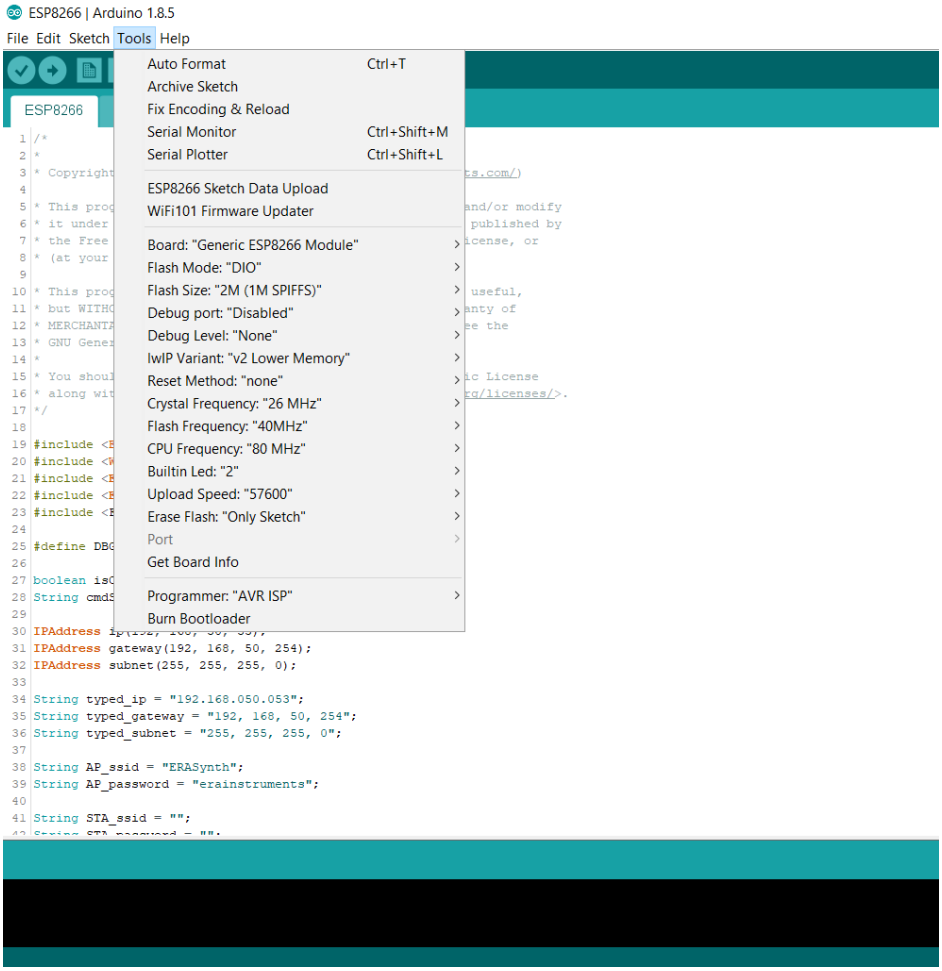
(ERASynth is tested with 2.4.2 version)

3.6. Restart Arduino IDE.

3.7. Download *Arduino ESP8266FS* tool and install it as instructed in GitHub. (https://github.com/esp8266/arduino-esp8266fs-plugin)

3.8. If it not done before, download the latest ERASynth firmware from GitHub. https://github.com/erainstruments/erasynth-firmware

3.9. Open the *ESP8266.ino* file with the Arduino IDE installed before and **change all settings** as shown on the image below:.



3.10. Go to *Tools>Port* and select the device you plugged (COM1,2,3, etc.)

3.11. Before uploading, you must open PC GUI or any serial terminal emulator program and send ESP8266 upload mode command (**>U with carriage return**). This command is under *settings* tab on PC GUI.

Baud rate must be **115200 bps**, when using serial terminal emulator.

After sending ESP8266 upload mode command, the device will return a message: “The ESP8266 can be programmed! Please close the COM Port”.

Don’t forget to close com-port after sending upload mode command.

3.12. Click *Tools>ESP8266 Sketch Data Upload*

3.13. Arduino IDE will compile and upload code to module. If any error occurs such as “*espcomm_upload_mem failed*”, restart the device, try every step again and be sure the COM port of the device is not used by any other programs and closed.

3.14. **Restart** the device.