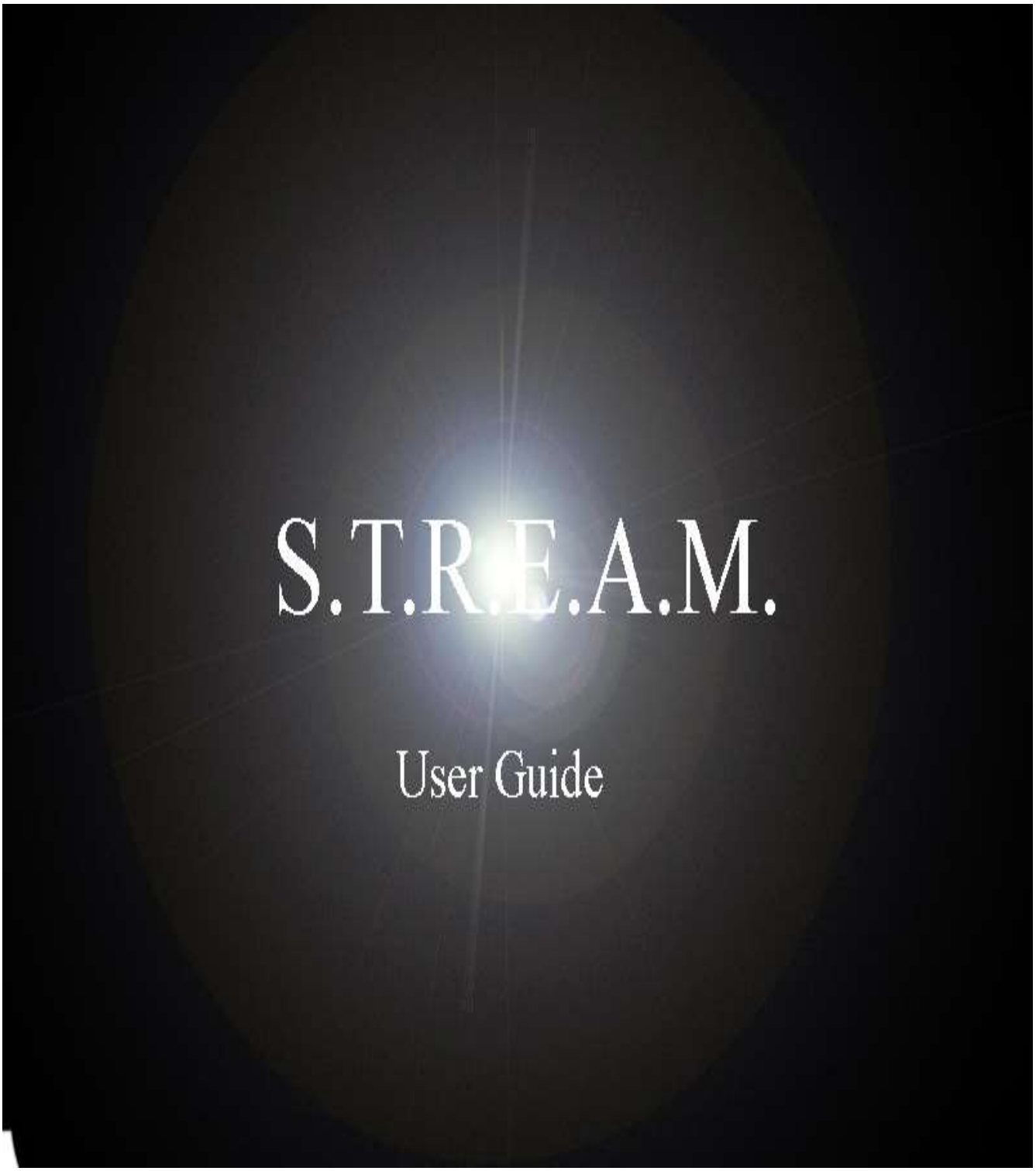


Version 1.51

Table of Contents

Introduction

The Saber Transmit, Receive, Editing, and Management (S.T.R.E.A.M.*TM*) software consists of two components: 1) A graphical user interface (GUI) which runs on a Windows PC, and 2) a firmware component which runs on an Atmel 328p 16MHz microcontroller. The firmware is specifically designed to operate on the *DIYino Prime*™ (version 1), *DIYino Stardust*™ (version 3), and *STREAM Core* ™ (version 1) FX prop boards produced by ***Protowerkstatt*** (https://www.protowerkstatt.com/). Brewboard™ produced by Saber Republic is also officially support as of version 1.51.

Using S.T.R.E.A.M. GUI

The S.T.R.E.A.M. GUI consists of several screens that allow you to configure your saber's operating parameters.

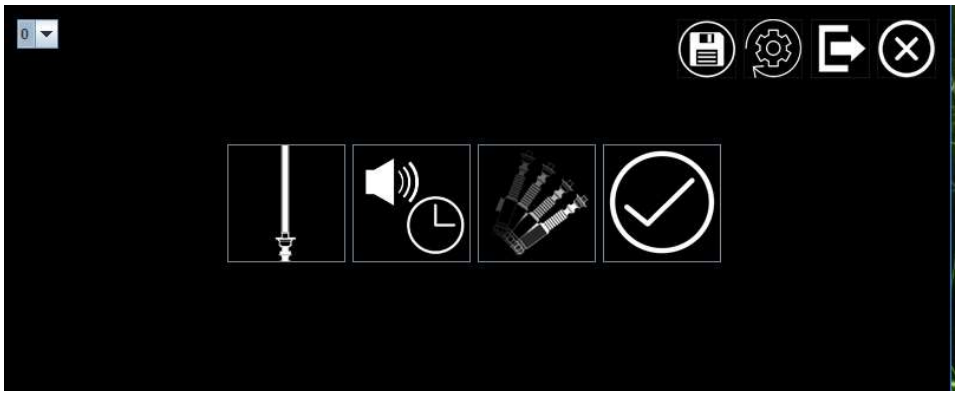
Note: Before using the GUI, complete wiring your saber's speaker, power (if not capable of USB power), and activation button. **The activation button must be wired to Arduino digital pin 12**. Pin 12 should be available for user sketches in all target hardware platforms, however, if the documentation for the microcontroller board disagrees, then the microcontroller board documentation takes precedence. **If Arduino pin 12 is not a wired to a normally-open momentary switch, then you can NOT operate S.T.R.E.A.M.** For details about wiring your microcontroller board to a speaker and power, see the manufacturer's documentation.

Starting a Session

To connect the S.T.R.E.A.M. GUI to your saber, follow these steps.

1. Connect USB cable to both the saber's microcontroller board and your PC.
2. Ensure the microcontroller board is powered.

3. Start the S.T.R.E.A.M. GUI from the distribution directory by double-clicking on the **StartSTREAM.bat** file. This will bring up the **Connect Screen**.
4. Select the appropriate COM port from the pull-down menu then press the **Connect** button. *Note: Your saber may reboot at this time and play the boot sound. This is normal.*
5. Press and hold the activation switch on your saber. Release the button when the voice prompt says “STREAM Mode”.
6. Shortly after releasing the button, the blade will blink several times while the firmware negotiates a connection with the PC software. After a short time, the saber voice prompt “connected” should be heard. The GUI **Home Screen** will appear. You are now connected and ready to configure your saber.
7. If this is your first session, you should load default settings or your saber my not operate properly. To do this, see **Loading Default Settings** section of this document.



Loading Default Settings

To load default settings, from the Home Screen, follow these steps:

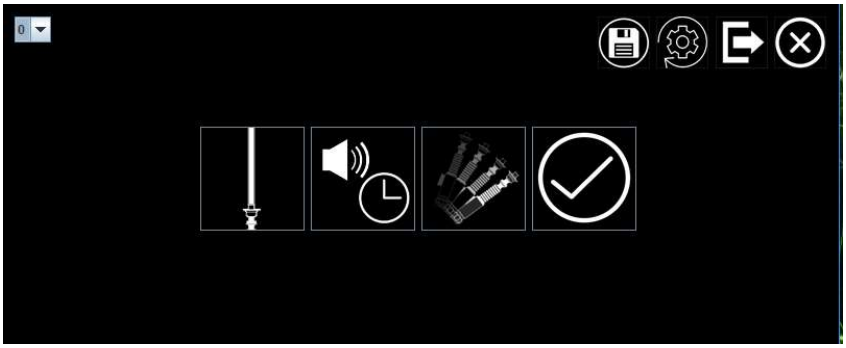
1.  Click the **Load Factory Defaults** icon
2. Wait 5 seconds
3.  Click the **Save to Saber** button.

Ending a Session

To end your session, follow these steps:

1.  If you want to save your changes, click the **Save to Saber** button, otherwise skip to the next step.
2.  Click the **Quit** button. The S.T.R.E.A.M GUI will vanish.
3. Take your saber out of S.T.R.E.A.M. mode by pressing the activation button once. The blade may blink momentarily and the boot sound will play shortly after.
4. Disconnect the USB cable from your microcontroller board.

Home Screen

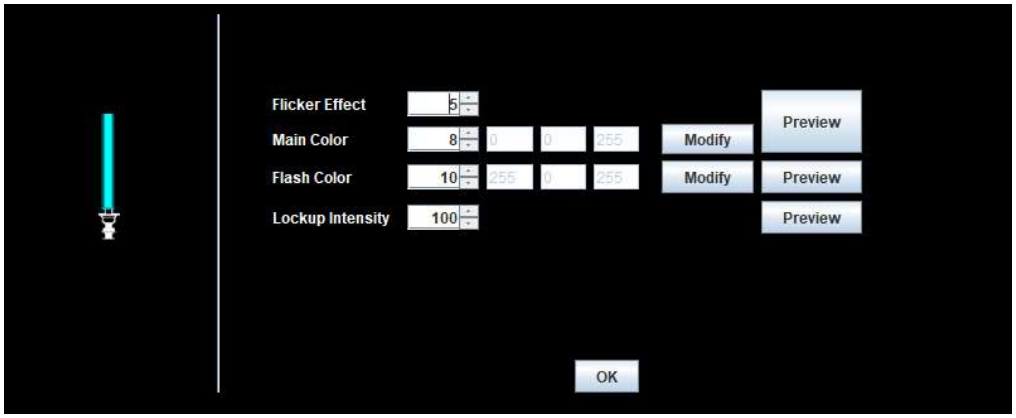


The home screen allows access to all STREAM configuration settings via the icons. Each icon is clickable. Hover your mouse over icons to see a hint displayed at the bottom of the Home Screen about what each does.

The following functions are available:

- To switch profiles (sound font) select a profile from the pull-down menu in the upper left. NOTE: If you have not saved your settings for the current profile, your changes will be lost unless you first click the Save icon! The STREAM GUI only loads one profile at a time.
- To open the Blade Configuration screen, click the blade icon
- To open the Sound screen, click the Sound icon
- To open the Options screen, click the Options icon.
- To save settings for the current profile, click the Save icon
- To reload factory defaults for ALL profiles, click the Load Factory Defaults icon.
- To Disconnect, click the Disconnect icon.
- To exit the STREAM GUI, click the Exit icon.

Blade Configuration Screen



The Blade Configuration screen allows for modification of the blade settings.

Controls are supplied to modify the Flicker Effect, Main Color, and Flash Color.

Setting	**Meaning**
Flicker Effect	How the blade oscillates or “shimmers” when the saber is on.
Main Color	The normal color of the blade when not in a lockup, blaster block, or clash event.
Flash Color	The color the blade will change to during lockup and momentarily during a clash or blaster block event.
Lockup Color Intensity	Adjust the intensity of the flash color during the lockup blade effect.
Lockup Flicker Intensity	Adjust the amplitude of the flicker during the lockup blade effect.
Lockup Frame Period	Adjust the speed of the lockup blade effect. Lower numbers will increase the speed, higher numbers will decrease the speed.

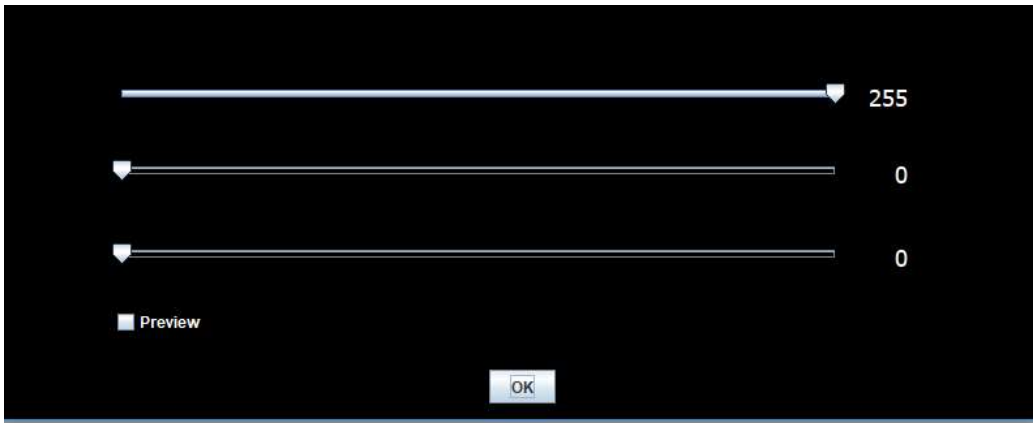
When modifying the blade color settings, you may select from 12 presets by using the controls. The LED channel PWM values are displayed next to the selection. These PWM values are integers from 0 to 255 that represent the power level of that channel. 0 means off, 255 means on at maximum. Color mixing is achieved by varying these channels to mix a desired color.

You may modify the color presets by pressing the Modify button to open the **Blade Color** screen.

You may preview the main color and flicker settings, flash color, or lockup effect by pressing the **Preview** buttons.

Press the OK button to return to the **Home Screen**.

Blade Color Screen



The blade color screen allows you to modify a color preset.

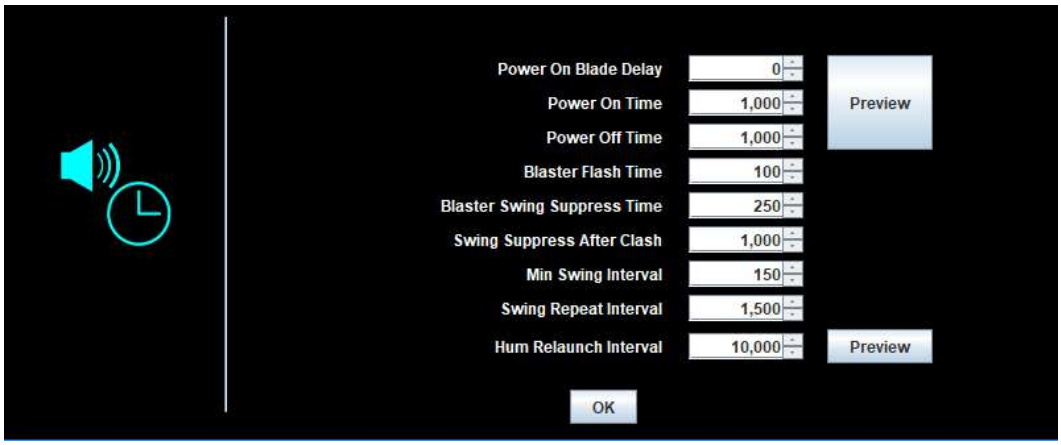
To change the intensity of each LED channel, click and drag the sliders. Drag to the left to decrease intensity or to drag to the right to increase intensity of a color channel. To view your changes live, click the “Preview” check-box so that it is checked. To disable live preview, deselect the Preview check-box option at any time.

To exit the Blade Color screen and return to the Blade Configuration screen, click the **OK** button

NOTE: Live preview will automatically end when the Blade Color screen is closed.

NOTE: Color presets are shared between all profiles. If you change for example color preset 1, all users of color preset 1 will get the change. Keep this in mind when making manual adjustments to your color settings. There are a total of 12 global color settings at all times.

Sound Screen



The Sound screen allows for adjustment of various timings used by the saber to coordinate with the sound effects and user preferences. Some settings can be previewed by using the Preview buttons to play the sound and show the blade effect live with your connected saber. All times are in milliseconds unless otherwise noted in the table below.

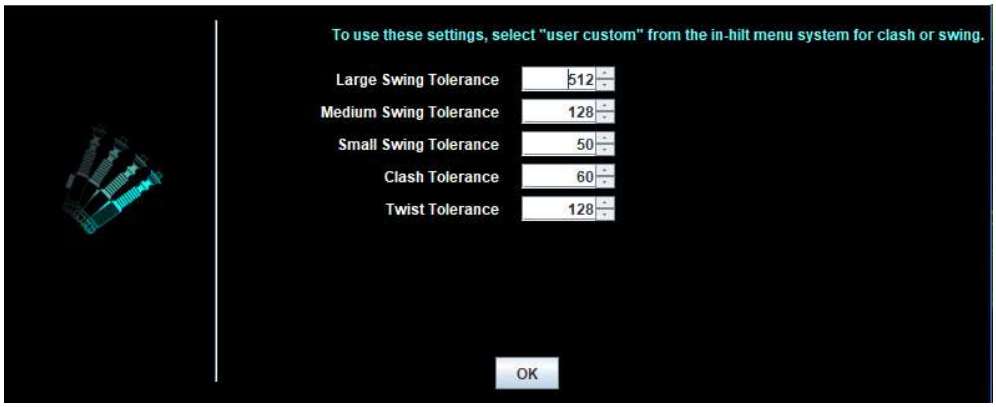
The **Save** and **Load** buttons (not pictured) allow for saving/loading the sound timing settings to a file on your local PC hard disk. This is useful for multiple installs of the same font or for swapping between favorite fonts periodically on the SD card so the timing does not have to be manually tuned again. Note that this saves the timings to disk, but NOT to the saber; to save to the saber you must use the icon on the **Home Screen**.

Setting	**Meaning**
Power On Blade Delay	Delay between when the power up sound starts playing and when the blade starts to ramp up to full power.
Power On Time	The amount of time that the blade's power-up animation will take to go from fully off to fully on.
Power Off Time	The amount of time that the blade's power-down animation will take to go from fully on to fully off.
Blaster Flash Time	How long the blade will stay the Flash color during a blaster-block event.
Blaster Swing Suppress Time	Time after a blaster event before another motion-activated blaster event can happen. (This helps remove some jitter if additional tuning is necessary.)

Swing Suppress After Clash	Interval after a clash event before a swing sound can play. This allows for the entire clash sound to play without being interrupted by a swing sound. A good rule of thumb for this setting is to set it to the length of your longest clash sound to guarantee that clash sounds will be allowed to play fully.
Min Swing Interval	Minimum time between back-to-back swing events. This setting can help smooth swing detection when sensitivity settings are high.
Swing Repeat Interval	How often swing sounds should repeat during sustained motion (twirling or spinning).
Hum Relaunch Interval	How long the saber should wait after a clash or swing before automatically playing the hum. (This setting should be at least a few milliseconds less than your hum extension length used when converting the sound fonts.)

To exit the Sound screen, press the **OK** button to return to the **Home Screen**.

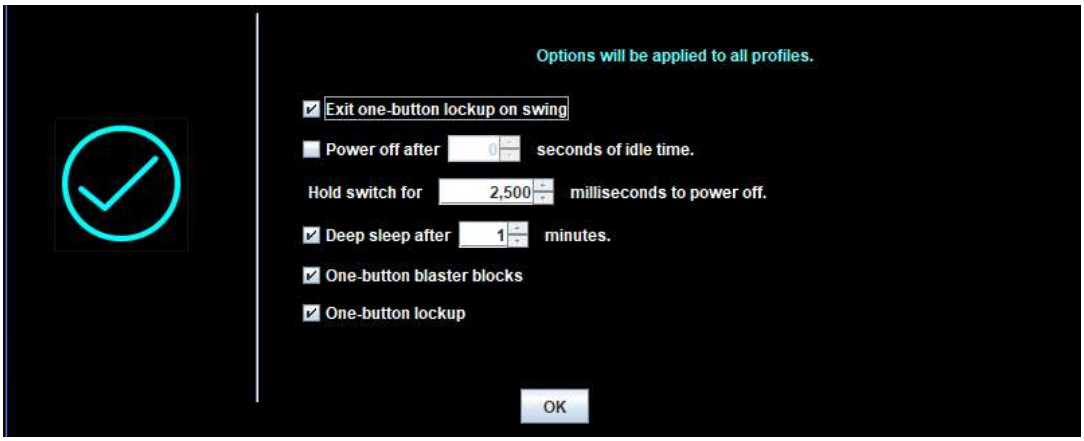
Motion Screen



The Motion screen allows for fine tuning of the motion engine parameters. The settings on this screen take effect when the “User Custom” option is selected for clash or swing sensitivity from the in-hilt menu system. Otherwise, they are ignored.

NOTE: This screen is intended for advanced users and troubleshooting only. The STREAM firmware comes equipped with 9 sensitivity presets for clash detection and 9 for swing detection. It is strongly recommend that one of the presets be used.

Options Screen



This screen allows for adjustment of various global options.

NOTE: The options on this screen apply to ALL profiles.

NOTE: Settings do not take effect until they are saved to saber.

Setting	Meaning
Exit one-button lockup On Swing	Automatically exit the one-button lockup state when a swing is detected.
Power off after xx seconds of idle time	When the saber is on, automatically power down the saber after no motion is detected for a certain amount of time. Setting can be disabled thereby allowing the saber to stay on forever or until the battery goes dead.
Hold Switch for xx milliseconds to power off	Change the amount of time you must hold the activation button when the saber is on to power off the saber.
Deep sleep after xx minutes	Optionally enter a power saving mode after being powered off for a period of time. *NOTE: The benefits of this power saving mode depend on your hardware. Consult your microcontroller board"s documentation to see if it supports deep sleep power saving features.*
One-button blaster blocks	Enables or disables the motion-activated one-button blaster block mode that is entered by rapidly pressing the main activation button.
One-button lockup	Enables or disables the one-button lockup mode

	entered by holding the main activation button then striking the saber.
Blade Length	Sets the number of pixels in the blade for pixel blades. Use this setting to ensure the firmware is configured for the length of your blade. *Note: This setting is ignored for RGB in-hilt LED sabers and has no effect in that case.*

Wiring and Pinouts

The microcontroller pinout configuration depends on the hardware used. See the tables below for more details about the pins. For details about wiring, consult the documentation for your microcontroller board.

The pin names shown are the Arduino pin names, NOT the AVR pin numbers. Pins mapped internally by the DIYino Prime or DIYino Stardust are not shown; only external pins used by the firmware are listed in the tables below.

Note that the **Activation Switch** pin is set with the internal pull-up resistor such that the switch is activated when pulled to ground. A normally-open momentary switch should be wired between the **Activation Switch** pin and ground to control saber functions such as turning on the saber and entering S.T.R.E.A.M. mode.

A 220 Ohm resistor is typially recommended on the Pixel Data Pin when using pixel blades. Refer to your pixel strip and microcontroller board documentation for details.

DIYino Prime V1		
Pin	**Mode**	**Meaning**
3 (LS1)	Output	Blade LED Channel 1 / Pixel Blade Power Negative
4	Input	Auxiliary Switch
5 (LS2)	Output	Blade LED Channel 2 / Pixel Blade Power Negative
6 (LS3)	Output	Blade LED Channel 3 / Pixel Blade Power Negative
11	Output	Accent LED
12	Input	Activation Switch
13	Output	Pixel Data Pin (Pixel blade version only)

DIYino Stardust V3 / STREAM Core V1		
Pin	**Mode**	**Meaning**
5 (LS1)	Output	Blade LED Channel 1 / Pixel Blade Power Negative
6 (LS2)	Output	Blade LED Channel 2 / Pixel Blade Power Negative
9 (LS3)	Output	Blade LED Channel 3 / Pixel Blade Power Negative
11 (SW2)	Input	Axillary Switch
12 (SW1)	Input	Activation Switch
13 (DP)	Output	Pixel Data Pin (Pixel blade version only)
A0 (ACC)	Output	Accent LED

Brewboard		
Arduino Nano Pin	**Mode**	**Meaning**
3 (LS1)	Output	Blade LED Channel 1 / Pixel Blade Power Negative
4	Input	Auxiliary Switch
5	Output	Blade LED Channel 2 / Pixel Blade Power Negative
6	Output	Blade LED Channel 3 / Pixel Blade Power Negative
12	Input	Activation Switch
13	Output	Pixel Data Pin (Pixel blade version only)
A0 (14)	Output	Accent LED

Basic Operation

This section assumes you have installed and configured the firmware making your saber ready for use.

Activation/Deactivation

With the saber off (blade is dark, sound is not playing), quickly press and release the activation button. The blade will illuminate and the sound will start playing. When you are done using your saber, press and hold the activation button to turn it off.

Blaster Mode

To enter one-button blaster mode, with the saber on, quickly press and release the activation button. The blaster sound will play and the blade will flash. The saber is now in blaster mode. Swing the saber to hear the blaster sound repeat. To exit blaster mode, quickly press and release the activation button. *Note: Some of these behaviors are influenced by settings and may change according to your selections.*

If your saber is equipped with an axillary button, quick press it to trigger a single blaster-block with each press. If the saber is in blaster-block mode as triggered by the above paragraph, a quick press of the axillary button will end blaster block mode after triggering final a blaster sound.

Lockup Mode

To enter one-button lockup mode, press and hold the activation button then strike the saber. The lockup sound will play and the blade color will change. The saber is now in lockup mode. To exit lockup mode, quickly press and release the activation button, or swing the saber quickly. *Note: Some these behaviors are influenced by settings and may change according to your selections.*

If your saber is equipped with an axillary button, hold it in to trigger lockup. Release the axillary button to end the lockup. If the saber is in lockup-mode as triggered by the above paragraph, a quick press of the axillary button will end lockup mode.

Menu Mode

The firmware supports the ability to change some settings without connecting to the S.T.R.E.A.M. GUI. You may change things like motion sensitivity and select from configured blade colors in this way.

Entering Menu Mode

To enter the in-hilt menu, press and hold the activation button. Wait until the voice prompt “Menu Mode” is announced, then release the button. The saber is now in menu mode.

Changing Settings

Once in Menu mode, voice prompts will announce what setting is currently being altered. To accept a

setting, press and hold the activation button until the next voice prompt is announced. To change a setting, quickly press and release the activation button. The available settings are accessed in a ring fashion so if the desired setting is accidentally scrolled past, keep quickly pressing and releasing the button and it will come around again.

If your saber is equipped with an axillary button, pressing this button will cycle through available menu options in reverse order.

Exiting Menu Mode

Once all settings have been accepted, Menu mode will automatically exit. The boot sound will play and the saber will return to the normal off state and be ready for use.

Switching Profiles (Sound Fonts)

To switch to an alternate profile, with the saber powered but off (blade is off, no sound is playing), hold the activation button then strike the saber hard enough to trigger a clash. The name of the newly selected sound font will play and the settings for the corresponding profile will be loaded.

If your saber is equipped with an axillary button, a long press of the axillary button will advance to the next sound font.

Firmware Features

- 3-channel LED color-change support
- Power on/off blade ramp
- Impact flash
- Swing and Clash response
- One-button motion-activated blaster-block mode
- One-button impact-activated lockup-mode
- Aux-button blaster-block (quick press)
- Aux-button lockup (press and hold)
- 4 Sound Fonts
- Switch-on-Smash™ profile (sound font) selection
- Aux-button profile (sound font) selection
- 12 color presets
- 7 blade flicker settings
- Lockup blade effect
- Deep sleep
- Accent LED
- Configuration menu
  - Sound volume
  - Main blade color
  - Flash blade color
  - 9 + 1 Swing sensitivity settings
  - 9 + 1 Clash sensitivity settings
- STREAM configuration via USB

Sound Map

Sound	Position (base zero)	Quantity
Font ID	0	1
Power-up	1	1
Swing	2 – 9	8
Clash	10 – 17	8
Lockup	18	1
Blaster-block	29 – 22	4
Hum	23	1
Power-down	24	1
Boot	25	1

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