Introducing the GHv4: The Next Evolution in Lightsaber Technology

The realm of lightsaber enthusiasts and builders is about to be revolutionized with the release of the Golden Harvest v4 soundboard. As the successor to the highly acclaimed Golden Harvest v3, the GHv4 not only continues the legacy of its predecessor but elevates it to new heights. Crafted with cutting-edge technology and precision, this latest iteration promises to enhance the lightsaber experience with unprecedented features and capabilities. With the GHv4, users can expect a suite of enhancements that redefine what's possible in customization, control, and audio-visual performance. Whether you're a seasoned sabersmith or a newcomer to the galaxy of lightsaber crafting, the GHv4 is designed to ignite your creativity and bring your vision to life with remarkable ease and efficiency. This document will focus exclusively on the new firmware features introduced in the GHv4 as well as the enhancement of legacy features. For a comprehensive list that includes hardware improvements as well, please refer to the manual or visit the full feature list on our website. In the following sections, we will delve into the specific new features and improvements that set the GHv4 apart from its predecessors, showcasing why it is the ultimate tool for anyone looking to construct a truly personalized and powerful lightsaber.

Enhanced USB Speed

One of the standout new features of the Golden Harvest v4 soundboard is its enhanced USB speed. With the latest advancements in connectivity, the GHv4 offers significantly faster USB file transfer rates - up to double the speed of its predecessor. This major improvement dramatically reduces the time it takes for users to manage and update the content on their lightsabers. Editing the SD card has never been easier or quicker. Users can comfortably add new sound fonts, adjust configurations, and update their settings all through a USB connection. This means less time waiting and more time enjoying the creative process of customizing your lightsaber's audio and functional attributes. The increased speed ensures a smoother and more efficient user experience, making the GHv4 an essential upgrade for enthusiasts looking to optimize their crafting workflow.

Increased SD Card Speed and Robustness

The Golden Harvest v4 soundboard marks a significant leap forward in terms of SD card performance. The new GHv4 architecture enhances the speed of loading from and saving to the SD card by up to ten times compared to previous models. This boost not only accelerates the interaction with the soundboard but also improves the overall reliability of these operations. Moreover, the GHv4 has been engineered with a focus on robust connectivity. This enhancement minimizes the risks associated with file corruption and extends the lifespan of the SD card itself. Users can now enjoy a more stable and dependable experience, ensuring that their custom settings and sound fonts are both safely stored and readily accessible. This robustness in communication means that your lightsaber is ready to perform flawlessly, whether you are updating your library of sounds or engaging in a duel.

Enhanced SD Card Error Indicator

The Golden Harvest v4 soundboard enhances its diagnostic capabilities with an improved SD card error indicator. Building on the old system where blade LEDs and accent LEDs blink to signal an SD card issue, the GHv4 introduces an additional auditory warning to make diagnosing issues even clearer. Whenever there is a problem with the SD card - such as the card being absent, improperly inserted, or malfunctioning - the traditional visual indicators will continue to function as before. However, in the GHv4, these visual alerts are now accompanied by an explicit auditory message that states "No SD card detected." This vocal cue provides immediate and unambiguous confirmation of the nature of the issue, allowing users to quickly identify and rectify the problem.

WiFi Connectivity

The Golden Harvest v4 soundboard introduces seamless WiFi connectivity, enabling wireless file transfers between a computer or a smartphone and the soundboard's SD card. This feature is designed to provide users with the utmost convenience in managing their lightsaber's content without the need for cumbersome cables. Access to the SD card is facilitated through a sophisticated file manager via a browser, enhancing user interaction by allowing not just file management but also remote control of the lightsaber. Notably, the GHv4 is equipped with an onboard antenna that is fully approved for WiFi use, eliminating the need for any external antennas. This integrated design ensures a sleek and efficient setup. For those concerned about power consumption, the WiFi functionality has been optimized to have minimal impact on the battery life of the device. This allows users to enjoy the benefits of wireless connectivity without compromising the lightsaber's performance or runtime. For added flexibility, the WiFi feature can be disabled at any time, catering to the preferences and needs of all users.

WiFi Connectivity Modes

The Golden Harvest 4 soundboard enhances its versatility with three distinct WiFi connectivity modes, allowing users to choose the optimal setup for their specific needs. Each mode is designed to provide flexibility and ease of access to the board's settings and content via WiFi.

Mode 1: Connect to Saved WiFi Network

In this mode, the GHv4 automatically connects to the WiFi network whose SSID and password are stored in the general.txt file or the override-general.txt file, with the latter taking precedence if both are present. Once connected, which will be indicated by a sound, the content of the SD card can be accessed through a web browser at ghv4.local or ghv4.mshome.net. If these URLs do not work, it may be necessary to directly enter the board's IP address, which could indicate that your device does not support mDNS. You can obtain the IP address by holding the power button for 2 seconds. A voice will then read out the IP address.

Mode 2: Connect to New WiFi Network

This mode initiates a hotspot named "GHv4" from the board itself. Users can connect to this hotspot using a smartphone or computer, which will then trigger a captive portal to display available WiFi networks. Users can select a network, enter the required password, and the details will be saved to the override-general.txt file. After rebooting, the board will connect to the selected network, and access to the SD card is available via ghv4.local or ghv4.mshome.net. If these URLs do not work, it may be necessary to directly enter the board's IP address, which could indicate that your device does not support mDNS. You can obtain the IP address by holding the power button for 2 seconds. A voice will then read out the IP address.

Mode 3: Create a Hotspot

In this mode, users must first create a hotspot named "GHv4" with the password "lightsaber" from their computer or smartphone. It is important to ensure that the hotspot name is exactly "GHv4," with "GH" capitalized and "v" as a lowercase letter. The GHv4 board will search for and connect to this network. Once connected, users can manage files and settings directly through their browser by navigating to via ghv4.local or ghv4.mshome.net. If these URLs do not work, it may be necessary to directly enter the board's IP address, which could indicate that your device does not support mDNS. You can obtain the IP address by holding the power button for 2 seconds. A voice will then read out the IP address.

WiFi Feature Control

The WiFi feature can be managed on the fly using the Saber Editor or manually by editing the config files. The parameters in the following table control the WiFi settings. They are stored in the config files.

Parameter	Value
wifi=0	0: Disables WiFi 1: Enables Mode 1 2: Enables Mode 2 3: Enables Mode 3
wifi_ssid=ssid	Specifies the SSID for the WiFi network, settable via captive portal in Mode 2 or manually
wifi_pass=password	Specifies the WiFi network password, settable as above
wifi_setup_edit_mode=1	0: Disables access to WiFi setup in the Saber Editor 1: Enables access to WiFi setup in the Saber Editor
wifi_setup_twist_speed=100	Controls the sensitivity for rotating the saber to switch WiFi modes in the Saber Editor

These settings offer comprehensive control over the WiFi capabilities of the GHv4, making it exceptionally user-friendly and adaptable to various user preferences and technical environments. Regardless of which WiFi mode is selected, the WiFi feature can be disabled by pressing the power button, which sets the wifi parameter to 0. To re-enable WiFi, you can either use the Saber Editor or manually adjust the wifi parameter to the desired value in the general.txt file or the override-general.txt file.

Bluetooth Connectivity

The Golden Harvest v4 soundboard introduces robust Bluetooth connectivity, enhancing the way users can remotely control their lightsaber. This feature is specifically designed to offer seamless interaction without the physical constraints of wires. Users can effortlessly adjust settings, change sound fonts, and command their lightsaber directly from a smartphone or other Bluetooth-enabled device through the ForceSync app, a dedicated platform designed to maximize the capabilities of the GHv4. It is available both for Android and iOS:

- Android: https://play.google.com/store/apps/details?id=com.forcesync.saber.forcesync.lite&hl=en_US
- iOS: https://apps.apple.com/us/app/forcesync/id1439683611

When Bluetooth is enabled (see below), the board automatically establishes a connection to the app. Similar to its WiFi capabilities, the GHv4 incorporates an onboard antenna approved for Bluetooth use, which means no external antennas are necessary. The Bluetooth functionality is also designed to be

energy-efficient, having a minimal impact on the saber's battery life, thus allowing enthusiasts to enjoy prolonged use without performance degradation. For those who prefer a direct manual approach, the Bluetooth function can be easily disabled, providing flexibility depending on the user's preferences or specific needs. This adaptability makes the GHv4 a versatile choice for both casual fans and serious collectors aiming to enhance their lightsaber experience with modern technology.

Bluetooth Feature Control

The Bluetooth feature can be managed on the fly using the Saber Editor or manually by editing the config files. The parameters in the following table control the Bluetooth connectivity. They are stored in the config files.

Parameter	Value
ble=0	0: Disables Bluetooth
	1: Enables Bluetooth
ble_setup_edit_mode=1	0: Disables access to Bluetooth setup in the Saber Editor
	1: Enables access to Bluetooth setup in the Saber Editor
ble_setup_twist_speed=100	Controls the sensitivity for rotating the saber to enable or disable Bluetooth

After the Bluetooth connection was established, the Bluetooth feature can be disabled by pressing the power button, which sets the ble parameter to 0. To re-enable Bluetooth, you can either use the Saber Editor or manually adjust the ble parameter to the desired value in the general.txt file or the override-general.txt file.

Enhanced Firmware Update Feature

The Golden Harvest v4 soundboard introduces an enhanced firmware update process designed to significantly increasing reliability. Similar to the GHv3, users can easily update their soundboard's firmware by simply dropping the new firmware file onto the SD card. The name of the firmware file now also includes the version number. To safeguard against potential issues such as power loss during an update - a concern that could previously lead to system failures that required to reinstall the old firmware version manually - the GHv4 now incorporates a robust fallback safety mechanism. If the update process is interrupted or fails for any reason, the board automatically detects the issue and signals the failure with a sound. This immediate feedback allows users to recognize the problem without guessing what might have gone wrong. Furthermore, after indicating a failed update, the soundboard automatically reverts to the last working version of the firmware. This safety feature ensures that the lightsaber remains operational and stable, preventing the device from being rendered unusable due to a corrupted update. The fallback mechanism provides peace of mind, making firmware updates worry-free and more secure.

Firmware Version Indicator File

The Golden Harvest v4 soundboard introduces a practical new feature aimed at improving user experience and simplifying system management: the firmware version indicator file. This innovative functionality involves the creation of a specific file on the SD card, automatically generated by the board, which includes the currently installed firmware version in its name. This file serves as a straightforward reference for users to quickly verify the firmware version installed on their lightsaber without the need to connect to software or navigate through complex settings. Each time the firmware is updated, the board updates this file to reflect the new version, ensuring that users always have accurate and accessible information about the system's status. The presence of this file on the SD card

makes it easier for users to manage their device, particularly when troubleshooting or consulting support forums. It provides a clear and immediate way to confirm that updates have been successfully applied or to ascertain the firmware version when assessing compatibility with other software or new features.

Onboard Status LED

The Golden Harvest v4 soundboard includes an enhanced diagnostic tool with its onboard status LED, a feature designed to provide clear and intuitive indications of the board's operational status. This LED not only complements other diagnostic signals but also adds several useful indicators to help users understand the state of their device at a glance.

Indicating SD Card Issues

In line with the visual and auditory signals for SD card problems, such as "No SD card detected," the onboard status LED also participates by blinking when an SD card issue is detected. This synchronized signaling helps ensure that users are alerted to potential problems, no matter their focus during operation.

Indication of Operation

The status LED remains constantly lit to signify that the board is powered and functioning correctly. This continuous illumination provides a quick and easy visual cue that the lightsaber is operational, enhancing user confidence during use.

Firmware Update Indicator

During a firmware update, the behavior of the onboard status LED further aids in communication with the user. It exhibits a breathing effect, slowly pulsing to indicate that the update is in progress. As the update nears completion, the pulsing gradually speeds up, giving users a visual representation of the update progress. This feature not only adds to the aesthetic experience but also keeps users informed about the status of critical operations. Additionally, the accent LEDs connected to the LED5 - 10 pads will display the same breathing effect as the onboard status LED, providing a consistent and synchronized visual indication of the firmware update status.

Onboard Status LED Control

The onboard status LED is controlled by the parameter in the following table. It is stored in the config files.

Parameter	Value
status=0	0: Disables Onboard Status LED
	1: Enables Onboard Status LED

OLED Display Support

The Golden Harvest v4 soundboard now includes support for OLED displays, significantly enhancing the user interface with high-quality visual feedback. This feature supports the popular SSD1306 model OLED display, which offers a resolution of 128 x 32 pixels, perfectly suited for crisp and clear imagery.

Static Image Display

The board can display static images that are input as .bmp files with dimensions exactly matching 128 x 32 pixels. These images are shown as static displays on the OLED screen, allowing for custom graphics like logos, icons, or text to be presented in a visually appealing way.

Animated Displays

For more dynamic visual effects, the board supports animations. Users can input .bmp files sized at 128 x (n x 32) pixels, where 'n' indicates the number of frames in the animation sequence. The OLED display cycles through each 128 x 32 pixel slice, treating it as a single frame of the animation. This creates a seamless animated sequence that continuously loops. The speed of the animation is adjustable, allowing users to customize the display rhythm to their preference.

Text Display Capabilities

The OLED display is not limited to images and animations; it can also show text information. This is particularly useful for displaying current settings such as blade style, color profile, on top effect, sound font names, and assists in navigating through the saber editor. This feature makes it easier for users to see and adjust their settings directly on the saber.

Content Rotation

An additional functionality is the ability to rotate the entire display content by 180°. This feature is useful for ensuring the display is correctly oriented regardless of how the saber is held or mounted, enhancing readability and user experience. The integration of OLED display support into the Golden Harvest v4 soundboard brings a new level of interaction and customization, allowing users to visually enhance their lightsaber experience with detailed graphics and useful information displays. The following table provides an overview of the parameters that control the OLED display features.

Parameter	Value
oled=1	0: Disables OLED
	1: Enables OLED
oled_orientation=0	0: Standard orientation
	1: Rotate content of the display by 180°
oled_screensaver=100	Specifies the time in seconds after which the screen saver should be displayed

Note: The OLED display support is currently in beta testing and will not be available in the initial release of the GHv4. It is planned to be included in a future firmware update.

Hilt Calibration

The Golden Harvest v4 introduces the "Hilt Calibration" feature, a vital tool for optimizing the performance of the motion sensor relative to the saber. This calibration ensures that the motion sensing capabilities of the soundboard align perfectly with how the board is mounted within the saber, providing a more accurate and responsive user experience. To perform a calibration, users simply access the Hilt Calibration submenu in the Saber Editor. From there, they can follow intuitive prompts to adjust the sensor's settings. This process involves maneuvering the saber through various positions and orientations. The calibration values are stored in the override-general.txt file.

Parameter	Value
hilt_calibration_edit_mode=1	0: Disables access to Hilt calibration in the Saber Editor
	1: Enables access to Hilt calibration in the Saber Editor

Blade Style Canvas

The Golden Harvest v4 introduces "Blade Style Canvas", that revolutionizes how the GHv3 treated blade style customization. Traditional blade styles are typically defined by a set of parameter files that detail background effects, on top effects, and color profiles. While this method offers substantial freedom in design, it naturally has limitations in terms of visual complexity and detail.

Blade Style Canvas elevates the potential for customization by allowing blade styles to be defined through .bmp files that contain every single frame of the blade's animation. This means that virtually any visual concept or design can now be realized on your lightsaber blade, from intricately detailed patterns to dynamic, animated sequences.

How Blade Style Canvas Works

File Structure

Each state of the saber - such as ignition, basic operation, clash, stab, and others - has a dedicated .bmp file that contains the animation for that specific state. The height of each .bmp file matches the number of pixels in the blade, and the width corresponds to the number of frames in the animation. In addition to that, there is a canvas.txt file containing a parameter defining the delay between two subsequent frames of the animation, which determines the animation speed.

State-Specific Animations

For every saber state, there is a primary .bmp file named [state].bmp, which displays the main animation for that state. For instance, during a clash, the clash.bmp file would be displayed.

Transition Animations

In addition to the main state files, there are also transition files named [state]_fade_out.bmp for each state except the basic state. These files are used to smoothly transition from the state effect back to the basic blade state. The clash_fade_out.bmp, for example, would be used to control how the clash effects transition back to the normal blade appearance. The transition files serve as fade out masks and are grayscale .bmp files. The grayscale value of each pixel in these masks determines the blend between the current state's effects and the basic blade effects. A grayscale value of 0 indicates that the state effect is completely blocked, displaying only the basic effects, while a value of 255 allows the state effect to fully appear, covering the basic effects.

Special Treatment of Ignition and Retraction

Just like standard blade styles, the animation speed for ignition and retraction can be synchronized with the duration of their respective sound effects or set to a custom speed. This flexibility is controlled by the poweron and poweroff parameters in the settings.txt file of each sound font. For all other saber states, the animation speed is consistently maintained at a fixed value. This speed is determined by the frame_delay parameter found in the canvas.txt file associated with each blade style.

Parameter	Value
frame_delay=12	Specifies the delay between two subsequent frames, defining the animation speed

Note: The Blade Style Canvas feature is currently in beta testing and will not be available in the initial release of the GHv4. It is planned to be included in a future firmware update.

Sound Font Identification Sounds

The GHv3 supports a single "font.wav" sound file that is played when the respective sound font is chosen. The Golden Harvest v4 extends this feature by allowing an arbitrary number of different sound files of the format "font[number].wav", whereby it is chosen randomly which of them will be played.

Enhanced Charging Indicator

The Golden Harvest v4 introduces a refined approach to monitoring and indicating charging status, significantly enhancing the precision over its predecessor, the GHv3. Previously, the GHv3 utilized a simple method based on detecting any rise in voltage to trigger a charging sound, which could sometimes result in false triggers due to non-charging related voltage fluctuations. The GHv4 adopts a more error-safe solution for detecting the charging status of the battery using the Det. pad on the GHv4. Sounds indicating that the charging started, was interrupted or completed are played under the following conditions:

- **Charger Connection:** When the Det. pad is grounded, the GHv4 recognizes that the charger is connected and the battery is charging.
- **Charger Removal:** If the Det. pad is no longer grounded after having been grounded, the GHv4 detects the removal of the charger. At this point, the soundboard will respond differently based on the battery's charge status:
  - **Interrupted Charging:** If the battery is not yet fully charged, a sound indicating that the charging was interrupted will play.
  - **Completed Charging:** If the battery is fully charged, a sound indicating that the charging was completed will play.

This enhanced feature is specifically designed for use with the Seedling v2, with its VBUS pad having to be connected to the Det. pad on the GHv4, providing the precise and necessary information to accurately manage and indicate charging states. This system not only improves the reliability of charging status notifications but also enhances user interaction by providing clear auditory signals that reflect the actual charging activities. The charging indicator feature is controlled by the parameters described in the table belo, which are stored in the general.txt file.

Parameter	Value
charging_indicator=0	0: Disabled 1: Enabled, using the legacy charging indicator of the GHv3 2: Enabled, using the enhanced charging indicator
charging_completed=4100	Determines the actions of the board upon charger removal based on the battery voltage, measured in millivolts. If the battery voltage exceeds the value set for this parameter, the board will play a sound indicating that charging has been completed. Conversely, if the battery voltage is below this value, the board will play a sound signaling that the charging was interrupted.

Customizable Battery Low Voltage

The Golden Harvest v4 introduces a significant enhancement in battery management compared to its predecessor, the GHv3. In the previous version, the voltage threshold that triggered the board to enter deep sleep mode due to low battery was fixed. This limitation has been addressed in the GHv4, offering

users the ability to customize this voltage threshold, which is controlled by the parameter in the following table.

Parameter	Value
battery_low=2650	Specifies the voltage in millivolts at which the board enters deep sleep mode due to low battery

A reasonable range for this voltage threshold is between 2500 and 3000 millivolts, which balances battery preservation with operational availability. To prevent the board from entering deep sleep at too high voltages, the maximum limit for this setting is capped at 3000 millivolts.

Important Information on Parameter Adjustments

When manually changing parameter values on the GHv4, it is crucial to make these changes in both the general.txt and override-general.txt files, if the latter is present. This practice is recommended because any parameters defined in override-general.txt will take precedence over those in the general.txt file. The override-general.txt file on the GHv4 is structured to contain all the parameters that are available in general.txt. This ensures that any modifications made in the override file will effectively override the default settings specified in the general file. By updating parameters in the override-general.txt, users can ensure their custom settings are correctly applied and maintained, preventing any default settings from inadvertently taking precedence.