



Musical Mushroom® Firmware Release Notes

Firmware Revision	Release Date	Release Notes
0.0.2	Dec 26 th 2023	<ul style="list-style-type: none"> Initial release of the firmware for first units deployed.
0.0.4	Dec 26 th 2023	<ul style="list-style-type: none"> Different default settings for the Zones. New words recorded (menu EXIT and UNIT INFO).
0.0.5	Jan 19 th 2024	<ul style="list-style-type: none"> EXIT button now cancels the MIDI selection process early Fixed MENU mode "TIMEOUT" speak bug on menu IDLE or DISABLED. Now flashes every 5.5secs while the hand is in the beam to cue that automatic continuation is ready instead of only once. Beam valid resumed criteria to level 5 to ensure accurate range reading. Speaker now mutes on config file save to avoid the annoying glitches sounds due to the file system scheduler priority overriding the audio DAC buffer streaming. Redid the flash memory map to allocate 0x3D0000 = 3,997,696 bytes to each OTA partition and USB drive. Firmware update bug fixed. Anti-rollback call is made to prevent firmware rolling back to previous version after power cycle. Eliminated the Zone concept. The laser now considers the point of first entry into the laser as the volume level 0 and below increases following the new CFG_GESTURE_SENSING_RANGE_MM parameter in the config file.
0.0.6	Jan 25 th 2024	<ul style="list-style-type: none"> Unit info menu reads firmware version first and eliminated serial number readout to shorten speech. Serial number can be read via config file instead.

		<ul style="list-style-type: none"> • Fixed an issue when calibrating a bowl in noisy environment resulting in too many peaks found and tripping the watchdog causing system reset. • Re-ordered the menu options to have the LED color first since this is most likely the more popular option to adjust. • Changed the default config file hand gesture range to 300mm instead of 400mm. Feels a bit better with typical hand gesture. • Change the laser sensor beam configuration to 4x4 grid instead of 8x8. This makes the beam wider and more angled which makes it easier to detect hands. The other config was a bit flakey at standing ranges with a reflector. • Fixed bug to turn off any ongoing automatic sounds when MENU is pressed.
0.0.7	Jan 26 th 2024	<ul style="list-style-type: none"> • Fixed bug when entering the beam during autocontinuation of a note, issues a volume 0 command upon entering beam to stop the ongoing tone.
0.0.8	Feb 24 th 2024	<ul style="list-style-type: none"> • Upper hand detection threshold changed from 1.5m to 1.2m in order to avoid getting inadvertently triggered by a low ceiling when a bowl sits on a table. • At the end of a calibration sweep, mute the speaker to stop the annoying single click sound caused by the discontinuity between the sine wave and zero audio waveform. • Fixed the autocontinuation algorithm which was sometimes detecting a very fast shallow sinusoid when hand was removed very slowly from the beam. Now requires a minimum amplitude above noise to register as a peak. • Changed the operation of the autocomplete so that if you break the beam and exit within 1 second, it stops the bowl. If you break and exit beyond 1 sec but less than 5 sec, it immediately does a fixed amplitude tone. If you enter and exit after 5 seconds, it analyzes the buffer and either autocontinues a fixed tone or a sinusoidal pattern. This enables quickly turning on a fixed tone without waiting 5 seconds for performers who need to switch quickly between bowls during their performance. • Added an auto-pause feature to the bowl. This is to prevent inadvertently triggering the bowl during a performance by walking around the bowl and tripping the beam with legs/hands/clothing. • When no hand activity or autocontinuation activity is detected for 20 seconds, the bowl goes into a dormant state and no longer responds to hand gestures. To restore operation, a hand must be seen in the laser beam for ≥ 2 seconds which resumes operation.
0.0.9	Mar 18 th 2024	<ul style="list-style-type: none"> • Removed the auto-pause feature as it was confusing since the unit appeared to be unresponsive for 2 seconds when paused and would trigger at the bottom of a down gesture. Need to

		<p>figure out an alternative solution to the unintentional mistriggering of the bowls when people walk around them unsuspectingly during a show.</p> <ul style="list-style-type: none"> • Removed the led "wave" animation pattern from the menu options. This is done to reserve the wave pattern only to indicate hand presence in the beam. Otherwise, it is too confusing to the user. • Added the "SHARP" notes to the calibration results (A/A#, B, C/C#, D/D#, E, F/F#, G/G#). • Removed all the chakra information as there is no consistent standard and this may mislead clients. • Replaced the "chakra color" led animation with "assigned note color". • Reduced configuration save delay following calibration to eliminate gap in speech after calibration. • Removed debug printout of frequency during calibration. • Reimplemented from scratch the non-linear mapping function between hand position and volume output. Used piecewise linear approx. of decaying exponential function. This simpler approach eliminates hand too close artifacts. Also much more consistent regardless of the range.
0.1.0	Mar 20 th 2024	<ul style="list-style-type: none"> • When a fixed tone amplitude autocontinuation is triggered and the hand re-enters the beam, instead of starting at zero and kill the tone, the new approach biases the entry point so that the amplitude stays the same. This way re-entering the beam at any height starts from the currently playing volume, eliminating volume discontinuities.
0.1.1	Apr 28 th 2024	<ul style="list-style-type: none"> • (ESP-IDF version 5.1.2). • Added a factory test mode. • This allows testing the microphone at the factory.
0.1.2		<ul style="list-style-type: none"> • Migrated to the new ESP-IDF version 5.3.1. • Updated VL53L5CX driver component to latest one. • Added additional factory tests. • Also supports a factory-only compile mode with crippled operation for testing only.
0.1.3		<ul style="list-style-type: none"> • Added missing USB test by starting the mass storage device in test mode.
0.1.4	Nov 2 nd 2024	<ul style="list-style-type: none"> • Refactored the speech files and eliminated unused words. • Added PCB PN and PCB REV to config file.
0.1.5	Nov 4 th 2024	<ul style="list-style-type: none"> • Fixed midi over Bluetooth enable option bug in config file logic. • By default, disabled MIDI over BLE to reduce power consumption. • Added WIFI option in config logic file. • Added WIFI SETUP (pairing) menu option (only if WIFI is enabled) which broadcasts an WIFI message to the sender for pairing.

		<ul style="list-style-type: none"> • Added receive WIFI messages and substitute the hand position sensor reading for the remote one. • Added WIFI SETUP speech files. • Updated the tinyUSB filesystem library version. • Added WIFI channel number configuration parameter in sysconfig file.
0.1.6	Jan 24 th 2025	<ul style="list-style-type: none"> • Remove the "LOW BATTERY WARNING" voice announcement at the request of sound healers as it is too jarring during performances. • Added a different mechanism to quiet all bowls by using a "quiet bowl" special code in the hand position sensor reading instead of relying on the MIDI note off message. • Added a 4 white flashes sequence upon selection of the unit on the whisperer as a visual cue to easily identify which bowl is being addressed.
0.1.7	Mar 7 th 2025	<ul style="list-style-type: none"> • Changed pairing timeout to a few seconds instead of 30 seconds so the white flashing LED display doesn't stay ON beyond pairing. • Changed delay to declare loss of signal to a few seconds.
0.1.8	Mar 22 nd 2025	<ul style="list-style-type: none"> • Added the ability to control the display brightness (0-100%) in the config.txt file. This allows extending battery life if desired. By default (factory reset), the LED display brightness is now set at 50%.
0.1.9	July 6 th 2025	<ul style="list-style-type: none"> • Fixed a few bugs in the automatic hold algorithm. When a hand re-enters the beam during a note hold, there is no longer a blip in the sound volume or any slight increase in volume. As a result, the sound can now be faded gradually and smoothly. Also fixes a bug that occurred when the bowl was holding a note at 100% and the hand re-entered the beam. Now continues at 100% instead of turning off the bowl. Also fixed a bug when used with the Whisperer and an ALL OFF button is pressed. Will not jump in volume when re-entering the beam.
0.2.0	July 8 th 2025	<ul style="list-style-type: none"> • Fixed a bug when the hand entered the beam at a height above the sensor inside of the nominal sensing range. Now gives a smooth output without any blips. Also set the auto-hold sinusoidal pattern volume to re-enter at the min volume to also eliminate blips on re-entry.
0.2.1	Nov 26 th 2025	<ul style="list-style-type: none"> • Added delete all files and subfolders operation when doing factory reset. This was necessary to resolve a drive full when doing firmware updates using a Mac or PC (extra trash can invisible files were filling the drive, preventing updates).
0.2.2	Nov 27 th 2025	<ul style="list-style-type: none"> • Replaced all files delete from previous version to a full format operation on the FAT filesystem during a factory reset to ensure full restore of a corrupted filesystem.
0.2.3	Dec 6 th 2025	<ul style="list-style-type: none"> • Fixed a bug when someone played the mushroom for at least 5 seconds and then faded out and exited the beam quickly, the autoplay used to engage instead of stopping the bowl.

		This has now been fixed. If you exit the beam at zero volume, the mushroom stops playing in any mode.
0.2.4	March 12 th 2026	<ul style="list-style-type: none"> • By default, the wireless radio is now completely powered OFF from a factory reset state. This increases battery life by 30%. The wireless radio is now only enabled if a pairing to the whisperer is initiated. It then remembers the state. To reset it to the OFF state again, a factory reset can be done or the config.txt file can be edited manually. • The maximum gesture sensing height has been reduced from 1.2m to 1.0m to avoid triggering the beam inadvertently with low ceilings or low objects above the Musical Mushroom. • Improvements to the calibration routine to ensure better identification of the bowl resonant frequency. Now ignoring resonant peaks found below 150Hz since they likely are due to cable or mechanical vibrations of the setup rather than the bowl resonance.
0.2.5	March 28 th 2026	<ul style="list-style-type: none"> • Fixed issue with parameter save errors when a USB cable was connected. This was a problem especially for MIDI setup with USB cable connected as it wasn't able to save the selected notes correctly. • Fixed config.txt user comment text error for LED color mode. 1 is rotating color and 2 is custom color instead of the other way around. • Upgraded the internal operating system to newer version for stability
0.3.1	April 6 th 2025	<ul style="list-style-type: none"> • Eliminated MIDI over Bluetooth functionality completely since it wasn't reliable. • Solved the USB over MIDI enumeration issue with Windows 2026 patch release. • MIDI device now has a unique device ID (based on the MAC ID) to support multiple Mushrooms plugged to the same computer. • Changed system tick rate. USB over MIDI is now more responsive.
0.3.2	April 8 th 2026	<ul style="list-style-type: none"> • Eliminated internal diagnostic messages to improve MIDI performance and reduce dropouts. • Elevated task priorities of WIFI tasks to eliminate MIDI dropouts when using Whisperer.
0.3.3	April 10 th 2026	<ul style="list-style-type: none"> • Added the ability to turn OFF the MIDI NOTE and MIDI CC messages by setting them to 128 in the config file.
0.3.4	May 28 th 2026	<ul style="list-style-type: none"> • Lowered the max audio output power to accommodate the new smaller 3W exciter and also to reduce the incidence of buzzing caused by too loud a volume. • Added the white LED "orbiting pattern" to signal that a hand is seen in the beam. This is a simple visual indication allowing you to troubleshoot cases when the beam is being inadvertently triggered by the rim of a too tall bowl or by object in the near vicinity. This replaces the old wave pattern. Unlike the old

		wave pattern, it also no longer will continue when auto-holding a note. If you see a white orbiting LED pattern, it means that the sensor is seeing something right now. No white orbiting LED pattern means it doesn't see anything.
0.3.5	May 31 st 2026	<ul style="list-style-type: none">• Fixed a bug with the LED orbit logic to disable it when the calibration occurs or when the gesture sensor is disabled.