

PALM

Pose Aware Live MIDI

User Manual

Version 1.0

Hand Gesture MIDI Controller

Transform your hand movements into expressive MIDI control

bioscotics.com

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1. Introduction

1.1 Welcome to PALM

Thank you for choosing PALM (Pose Aware Live MIDI). PALM transforms your standard webcam into a powerful MIDI controller, allowing you to manipulate sound parameters through natural hand gestures.

PALM uses advanced computer vision and machine learning to track your hand movements in real-time, converting finger positions and gestures into MIDI Control Change (CC) messages, musical notes, and expressive performance data.

1.2 Key Features

- **Four operating modes** — CC Mode, Keyboard Mode, Combo Mode, and XY Pad/Grid Mode
- **48 unique MIDI CC controls** — 4 Groups × 2 Hands × 5 Fingers + 8 MIDI Pads
- **Virtual keyboard** — 2-6 octave piano with key signature lock and velocity sensitivity
- **MPE support** — Per-note pitch bend via finger slide (industry-standard MPE Lower Zone)
- **Key Y-Axis control** — CC or aftertouch from vertical finger movement on held keys
- **XY Pad / Grid** — Configurable grid zones with custom labels and CC assignments
- **8 MIDI pads** — Toggle or momentary triggers (CC 60-67) available in all modes
- **10 visual effects** — Tracers, Glow, Particles, Lightning, and more
- **Custom CC assignment** — Remap any CC number with saveable profiles
- **Mouse input** — Click keyboard keys and pads with mouse for testing

1.3 System Requirements

Component	Requirement
Operating System	macOS 11.0 (Big Sur) or later
Processor	Apple Silicon (M1/M2/M3/M4) or Intel Core i5+
RAM	8 GB minimum (16 GB recommended)
Camera	Built-in FaceTime camera or USB webcam (720p+)
Storage	200 MB available space

2. System Setup

2.1 Camera Permissions

PALM requires camera access for hand tracking. When you first launch PALM, a dialog will appear asking for camera permission. Click Allow.

If you accidentally clicked "Don't Allow": Open System Settings → Privacy & Security → Camera, find PALM and toggle it ON, then restart PALM.

2.2 Disabling Camera Reactions

macOS Sonoma and later includes "Reactions" — automatic visual effects triggered by hand gestures. These can interfere with PALM and should be disabled.

- While PALM is running, click the green camera indicator in the menu bar
- Click Reactions to toggle it OFF (no checkmark)

3. IAC Driver Configuration

PALM generates MIDI in real time. To route MIDI into your DAW, you need the IAC Driver (Inter-Application Communication) on macOS.

3.1 Enable IAC Driver

- 1. Open Audio MIDI Setup (Spotlight search)
- 2. Window → Show MIDI Studio
- 3. Double-click the IAC Driver icon
- 4. Check "Device is online"
- 5. Under Ports, click + and create a port named PALM
- 6. Click Apply

3.2 DAW Configuration

DAW	Configuration Steps
Ableton Live	Preferences → Link/MIDI → Enable Track for IAC Driver (PALM)
Logic Pro	Settings → MIDI → Inputs → Enable IAC Driver PALM
FL Studio	Settings → MIDI → Input → Enable IAC Driver PALM
Cubase	Studio Setup → MIDI Port Setup → Enable IAC Driver PALM

MIDI signal path: PALM → IAC Driver → DAW → Instrument

4. Installation

1. Visit bioscopics.com/palm and click Download for macOS
2. Double-click PALM.dmg, drag PALM to Applications
3. First launch: if prompted "unidentified developer", go to System Settings → Privacy & Security → Open Anyway
4. Enter your license key when prompted: PALM-XXXX-XXXX-XXXX-XXXX-XXXX-XX

5. Quick Start Guide

Get up and running in five minutes:

- **1.** Launch PALM from Applications
- **2.** Position yourself 1-3 feet from camera with good lighting
- **3.** Hold up your hand — you should see the hand skeleton overlay
- **4.** Extend fingers — start with index finger (1 finger = CC 20)
- **5.** Move up and down — watch MIDI value change from 0 to 127
- **6.** Press K to cycle through modes: CC → Keyboard → Combo → XY Pad

6. CC Mode

CC Mode is the default operating mode. It converts hand position and finger count into MIDI CC messages, giving you access to 40 unique CC controls.

6.1 CC Assignments

Group	Right Hand	Left Hand
A (Sky Blue)	CC 20-24	CC 25-29
B (Ocean Blue)	CC 30-34	CC 35-39
C (Royal Blue)	CC 40-44	CC 45-49
D (Deep Navy)	CC 50-54	CC 55-59

Switch groups with the A/B/C/D buttons in the header, by touching them in camera view, or by pressing A/B/C/D on your keyboard.

7. Keyboard Mode

Keyboard Mode displays a virtual piano (2-6 octaves, default 4) that you play by touching keys with your fingers in the camera view. Supports polyphonic input with multiple fingers and both hands.

7.1 Octave Control

- < OCT / OCT > buttons in header, or press comma/period
- Keyboard → Number of Octaves to select 2-6

7.2 Key Signature Lock

Lock the keyboard to a musical scale via Keyboard → Key Signature → Lock to Scale. Select root note and scale type. Scales: Major, Minor, Melodic Minor, Harmonic Minor.

7.3 Velocity & Color Feedback

When enabled, finger speed determines velocity. Key colors indicate dynamics: Sky Blue (soft) → Ocean Blue → Royal Blue → Deep Navy (hard).

7.4 Mouse Input

Click keyboard keys with your mouse for testing. Mouse clicks use dynamic velocity based on vertical click position on the key.

8. Combo Mode

Combo Mode combines CC control and keyboard playing. The area above the keyboard responds to CC gestures while the keyboard area plays notes. Header layout: [<] [A] [B] [1-4] [LOGO] [5-8] [C] [D] [>]

9. XY Pad / Grid Mode

XY Pad Mode provides a configurable grid of touch zones. Each zone sends X and Y axis CC messages based on finger position within the zone.

9.1 Grid Sizes

Available via Grid → Grid Size: 1×1 (Single Pad), 2×2, 2×4, 4×4

9.2 Custom Zone Labels

Give each grid zone a meaningful name via Grid → Custom Zone Labels. Labels appear in the grid overlay during use, making it easy to remember what each zone controls.

9.3 CC Configuration

- Grid → Configure Cell CCs — set X/Y CC numbers per cell
- Grid → Base CC — set the starting CC number for the grid
- Grid → MIDI Learn Mode — touch cells to assign CCs interactively

9.4 Behavior & Display

- Release Returns to Center — finger release snaps values to center
- Show Grid Lines — visual grid overlay
- Show CC Labels — display CC numbers and values
- Active Axis — restrict to X only, Y only, or both

10. MIDI Pads

PALM includes 8 touch-activated MIDI pads visible in all modes. Pads 1-4 appear left of the PALM logo, pads 5-8 on the right. Each sends CC messages (CC 60-67).

10.1 Pad Modes

- **Toggle:** First touch = CC 127, second touch = CC 0. Alternates on/off.
- **Momentary:** CC 127 while held, CC 0 on release.

Default: Pads 1-4 = Toggle, Pads 5-8 = Momentary. Configure via MIDI → MIDI Pads.

11. MPE Mode (Per-Note Pitch Bend)

MPE (MIDI Polyphonic Expression) enables per-note pitch bend by sliding your finger horizontally on a held key. Each note gets its own MIDI channel for independent expression.

11.1 Enabling MPE

Enable via Keyboard → MPE (Per-Note Pitch Bend) → Enable MPE. PALM sends the industry-standard MCM (MPE Configuration Message) to configure compatible synths automatically.

11.2 MPE Configuration

PALM uses the MPE Lower Zone (industry standard):

- Channel 1 = Master Channel (global messages, pedals)
- Channels 2-16 = Member Channels (per-note: pitch bend, pressure, CC 74)
- Default pitch bend range: ± 48 semitones (MPE spec default)

11.3 DAW Requirements

Important: Your receiving synth/DAW must support MPE or be set to receive on All Channels. Most DAWs default to Channel 1 only — you may need to change this.

- Ableton Live: Set track MIDI input channel to "All Channels" or enable MPE mode
- Logic Pro: Enable MPE on the instrument track
- Bitwig: MPE support is automatic

11.4 Settings

- Pitch Bend Range: ± 2 , ± 12 , ± 24 , ± 48 (default), ± 96 semitones
- Slide Sensitivity: Very Low to Very High (adjusts how far you need to slide)

12. Key Y-Axis Control

When holding a key, moving your finger up or down sends continuous control data. This allows expressive modulation while notes are sounding.

12.1 Modes

- **CC (default):** Sends assignable CC messages. Default: CC 1 (Mod Wheel)
- **Aftertouch:** Sends polyphonic aftertouch (per-note pressure)

Configure via Keyboard → Key Y-Axis Control. Select mode, CC number, or assign multiple CCs simultaneously.

13. Visual Effects

Effect	Key	Description
Tracers	1	Trailing balls following fingertips
Glow	2	Soft luminous glow around fingertips
Particles	3	Burst of particles when fingers extend
Motion Trails	4	Speed-based trails on fast movement
Pulse Rings	5	Expanding rings from wrist
Connections	6	Lines between matching fingers
Aura	7	Persistent color painting that fades
Symmetry	8	Mirror fingertips across axes
Lightning	9	Electric bolts between fingertips
Constellation	0	Star-map connecting all fingertips

E = Toggle ALL effects on/off. T = Toggle current selection (remembers your choices).

14. Menu Reference

File

- Quit (Cmd+Q)

View

- Groups (A/B/C/D), Show Boundaries, Fullscreen (F)

Effects

- Toggle individual effects (1-0), Toggle All (E), Toggle Current (T)

MIDI

- Output Device — select MIDI output port
- MIDI Channel — select output channel (1-16)
- Mute All MIDI (M) — silence all output
- CC Assignment Matrix — edit CC number mappings
- CC Profiles — save/load/delete CC configurations
- MIDI Pads — configure pad toggle/momentary modes

Keyboard

- Operating Mode — MIDI, Keyboard, Combo, XY Pad
- Octave controls, Number of Octaves, Position
- Display: Transparent Mode, Note Names, Mouse Input, Vertical Sliders
- Key Signature — Lock to Scale, Root Note, Scale Type, Highlight
- Expression: Velocity, Aftertouch, Key Y-Axis Control
- MPE — Enable, Pitch Bend Range, Slide Sensitivity

Grid

- Grid Size, Configure Cell CCs, Custom Zone Labels, Base CC
- MIDI Learn Mode, Active Axis, Release to Center
- Show Grid Lines, Show CC Labels

Settings

- Detection Settings, Boundaries, Stability, Hand Smoothing
- Screen Tint, Window Transparency, Presets

15. Keyboard Shortcuts

Shortcut	Action
Cmd+Q	Quit PALM
K	Cycle operating mode
A / B / D	Select Group (C reserved for Cycle)
, (comma)	Octave Down
. (period)	Octave Up
M	Mute / Unmute all MIDI
F	Toggle Fullscreen
S	Detection Settings
H	Help
1-0	Toggle visual effects
E	Toggle ALL effects
T	Toggle current effects

Shortcuts can be disabled via Settings → Disable Keyboard Shortcuts.

16. Troubleshooting

Camera Issues

Camera not detected: Ensure no other app is using the camera. Check System Settings → Privacy → Camera. Restart PALM.

Poor tracking: Improve lighting, use a plain background, sit 1-3 feet from camera, disable Reactions.

MIDI Issues

DAW doesn't see MIDI: Verify IAC Driver is enabled. Run PALM before opening your DAW. Check for "IAC Driver" in MIDI inputs.

MPE Not Working

If notes stop playing when MPE is enabled, your DAW/synth may only be listening on Channel 1. Set the instrument to receive on All Channels or enable MPE mode in your DAW.

If pitch bend has no effect, check that the synth responds to pitch bend messages and that the bend range is set appropriately.

Reset Settings

To reset all settings: Quit PALM, open Terminal, run: `rm -rf ~/Library/Application\ Support/PALM/`

17. Technical Specifications

Parameter	Value
Operating Modes	4 (CC, Keyboard, Combo, XY Pad/Grid)
Message Types	CC, Note On/Off, Pitch Bend, Aftertouch, MPE
MIDI Channel	1-16 (configurable)
MPE	Lower Zone, MCM, ± 48 st default PB range
CC Range	20-67 (40 hand controls + 8 pads)
Note Range	C0 to B7 (MIDI 12-107)
Key Y-Axis	CC 1 (Mod Wheel) default, or Aftertouch
Velocity	Speed-based (40-127)
Keyboard Octaves	2-6 (default 4)
Key Signatures	4 scales $\times$ 12 roots
Grid Sizes	1 $\times$ 1, 2 $\times$ 2, 2 $\times$ 4, 4 $\times$ 4
Visual Effects	10
MIDI Pads	8 (CC 60-67, Toggle/Momentary)
Hand Smoothing	5 levels

— End of Manual —

For support, visit bioscopics.com/support

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