BLACK JACK

MōVI Firmware Release 2.0

360 ROLL GUIDE

360° Roll Intro

This feature guide describes how 360° Roll works in MōVI Pro v2.0 Software. For the best experience, take the time to understand both the theory and practical aspects of 360° Roll modes before you go out on a shoot.

How to use?

Enabling it is as simple as turning on 360° Roll mode from the App, MōVI Screen, or MōVI Controller menu. However, keep in mind that these new behaviors also introduce an additional level of complexity. All features described in this guide apply with 360° Roll on.

There are many ways to use 360 °Roll and its features, depending on your crew size and roll control method. Options like Tilt and Roll Snap can be applied to the different 360° Roll methods to modify their behavior as well—continue reading for more information.

#protip

- If you don't actually need to roll past ±90º for your shot, consider leaving 360° Roll off and using regular control. 360° Roll is specialty tool, but also adds a level complexity that may unnecessary if you just need to do a simple, leveled-off shot.

- MōVI Pro ecosystem currently allows roll commands from:
    - MōVI Controller
    - MIMIC
    - Wheels
    - Gamepad
    - Pilot
    - API
    - App (coming soon)

Method: Barrel Roll

< P L A Y >

Perfect for the single operator that wants to execute 180° moves without moving the ring*, or 360°+ moves by rotating the ring to follow the camera lens axis.

How to use?

Settings

- 360 Roll -> On
- Roll mode -> Free/Majestic
- Tilt mode -> Free/Majestic, or Snap!
- Pan mode -> Free/Majestic (make sure to not command pan rate from a controller)
- Majestic Window -> Medium to reject unintentional movement

Operation

There are two ways input roll command for Barrel Roll:

- #1 Majestic Roll
    - Simply rotate handles for majestic roll
- #2 Roll Command
    - Command roll rate from a controller (here are the options).
    - Follow the roll motion of MōVI with the handles/ring to ensure MōVI doesn't get into singularity or hit its hard stops.

#protip

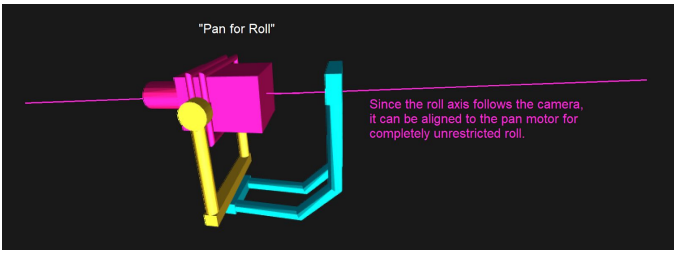
- Set Tilt Mode to Snap for shots where you want to ensure tilt doesn't move up or down, ie, a shot where you are moving straight down a hallway while Barrel Rolling.
- *We plan on releasing a Barrel Roll feature in the app that lets you start/stop roll commands. This will allow solo operators to executed command #2.

Method: 360° Roll Via Pan

< P L A Y >

The perfect method for when you want continuous 360° rolls and without moving the ring or handles. By rotating the pan axis 90° offset, it now acts as the roll axis and allows 360° moves.

How to use?



- In dual op, there's no specific setup required to use this mode. For solo operator, this is currently not possible.
- Pan for Roll has potential for confusion, since there are two ways to set it up. The picture above is one possibility, the other is with the roll beam above the camera. The setup you use might depend on how far you need to look up or down.

#protip

- **Warning**: In this orientation, more stress is placed on the pan motor and quick release. Make sure the quick release is fully engaged and tightened, and always use safety rigging.
- Wiring and mechanical constraints still limit the available travel of the "roll" motor.
- Pan balance is especially important in this orientation. Become familiar with pan balancing by watching the MōVI Pro balancing tutorial.
- Use the Hula Hoop method we showed here

Method: Vector Roll

< P L A Y >

360° Roll mode allows users to set a ‘virtual’ target and command an axial roll along that line.

How to use?

- In 360° Roll mode, roll axis is defined **with respect to the camera and lens**, not the horizon. So, no matter which way the camera is pointed, a roll command will always cause the image to rotate along the optical axis of the lens.
- Start by adjusting the axis of MōVI in dual operator mode (for instance with MōVI Controller)
- Command roll rate from a controller (here are the options).

#protip

- This works best if you tilt down or up at least 30 degrees in gimbal up or gimbal down configuration.
- If you have a setup with long lenses, make sure you have clearance with roll beam.

Method: Roll With Snap < P L A Y >

MōVI gently snaps the camera to the nearest 90° plane so you can execute roll moves but ‘land’ on a horizontal or vertical frame.

How to use?

- Settings
    - 360 Roll -> On
    - Roll mode -> Snap
    - Majestic response -> Set to your liking. It will change the speed of snapping.
- Setup Roll input source. Here are the options.
- Operation
    - Start commanding roll rate to start your shot
    - When you stop commanding roll rate, MōVI will snap to the nearest 90° plane.

#protip

- Play with different majestic smoothing/response settings to vary how the snapping speed.
- Try and stop your move slightly before 90 degrees so MoVI can finish the move and land perfectly at 90 degree plane

Method: Portrait Shooting < P L A Y >

Great for when a mobile or social company is paying the bills and insists on flipping that Red Epic on its side. Quickly transition from landscape to portrait mode with no change to the camera rigging.

How to use?

- Settings
    - 360 Roll -> On
    - Roll mode -> Snap
- This is useful if you want to shoot in social media square or vertical aspect ratios by rotating the camera 90º. You will still have Pan and Tilt Majestic control in this orientation.

#protip

- Set a wide window on Roll Majestic so you don’t accidentally put in a roll move

Method: Full 3D Majestic

Perfect for the single operator that wants to have full 3D Majestic control with no limits. This is useful for simulating a zero-gravity perspective or a first-person-view flight through open space.

How to use?

- 360 Roll -> On
- Tilt and Roll -> Free/Majestic
- Majestic Window -> small
- Majestic Response -> optional

Method: Full 3D MIMIC

This is similar to Full 3D Majestic, but with a remote 3D input from MIMIC. The camera will follow the MIMIC orientation in 3D with no limits.

How to use?

- MIMIC Mode: Direct (not Level Roll or Majestic).
- Tilt Free and Roll Free.

Method: Free Gamepad Roll

How to use?

Suggested Settings:

- Map Roll to the Gamepad left and right triggers from the MIMIC.
- Use medium Joystick windows to prevent joystick/trigger-induced drift.
- Tilt and Roll Free

Operation

- Set a roll rate using the analog left and right triggers on the DS4 gamepad while also controlling pan and tilt with the joystick. This can create many complex 3D rolling shots. With snapping off, the roll will remain fixed when you release the triggers.

#protip: Snapping for Tilt and Roll

While 360 Roll is on, the usual Tilt and Roll modes (Level, Smooth Lock, Majestic) take on new options that are more applicable to full 3D operation.

- Free: When not being driven, the axis stays where you leave it.
- Snap: When not being driven, the axis smoothly moves to the nearest 90º increment.
    - For roll, this means landscape or portrait.
    - For tilt, this means lens horizontal or lens vertical.

#protip: New Behaviors

New high-level “360 Roll” toggle changes the behavior of Roll and Tilt modes.

360 Roll:	Off (0)	On (1)
Roll Mode 0	Level	Snap (New)
Roll Mode 1	Majestic	Free (New)
Tilt Mode 0	(Smooth) Lock	Snap (New)
Tilt Mode 1	Majestic	Free (New)

Here are more details about these new modes, whether you are using them in Majestic, MIMIC, or in Rate

Majestic

- The angle of the ring or base determines the snapping orientations.
- Window, smoothing, and span are applied to camera-frame axes. For example, roll settings always apply on the lens optical axis.
- Tilt and Roll snapping are applied in parallel with Majestic commands. Must be within the Majestic Window on all relevant axes to fully snap.

MIMIC

- Inputs are processed directly, regardless of MIMIC Mode settings.
- Only the highest priority MIMIC input is used.
- Tilt and Roll snapping should be off.

Rate (Joystick, Rocker, Gamepad Triggers, Wheels)

- A higher-priority rate command
    - on a *single* axis will be applied to that camera-frame axis, *on top* of the MIMIC/Majestic command.
    - on *two or three* axes will *override* the MIMIC/Majestic command.
- The current attitude determines the snapping orientations.

#protip: Singularity

Why does Pan wobble/swing during 360 happen?

- This is due to the “singularity.” When the roll arm lines up with the pan arm, you mechanically constrain the system and end up losing tilt control. Software does its best to compensate for this, but it can’t defy physics.
- Here is an example of why pan moves to achieve an axial 360° roll shot.
- This video also goes over the concept

What do I do to prevent this?

There are few options:

- #1 For unrestricted, continuous 360° roll shot, you can mount pan for roll (example video). Learn more in pan-for-roll section
- #2 When working as dual operator with handheld, MōVI operator can follow the roll motion with the handles/ring to ensure MōVI doesn’t hit singularity (example, example)
- #3 Don’t over constrain the system. Just command roll and have pan and tilt in majestic with zero windows. Currently only available with MIMIC + Wheels or MIMIC + Pilot but we will have many more options in the future.
- #4 Have the MōVI perfectly level (example video: level vs non-level)

#protip: How To Command Roll Rate

Here are some options:

- MōVI Controller: Map Roll to Zoom (360) on the TX Config screen
- MIMIC + Gamepad: Map Roll in Gamepad screen
- Wheels + MIMIC: Map Roll in Input Setup screen
- Wheels + MōVI Controller: Map Roll to Wheels on the TX Config screen
- MIMIC + Pilot: Map Roll in Input Setup screen
- API

You can command roll from MIMIC itself in MIMIC mode as well, however this is *absolute* mode and not *rate* mode.