



MOTIOFORGE

STUDIO

Create. **Animate.** Control.

Professional software for **real-time motion control**, animation and device sequencing for **robotics** and **entertainment** systems.



MOTION CONTROL

Precise. Powerful. Reliable.



ANIMATION ENGINE

Sequences. Cinematics. Real-time.



HARDWARE INTEGRATION

Connect. Configure. Control.



PROFESSIONAL DEPLOYMENT

Stable. Scalable. Production-ready.



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MotioForge Studio - Overview

What is MotioForge Studio

MotioForge Studio is desktop software for creating and playing back animations on animatronic and electromechanical systems. It allows you to design complex movements for characters, masks, figures and props driven by servo motors, synchronize sound effects and manage digital outputs (lights, relays, actuators), all from a single visual interface.

The project name encapsulates its mission: Robotic and Environmental Automation for Spectacularity.

What It's For

MotioForge Studio transforms a collection of servo motors, control boards and speakers into a programmable animatronic system. Instead of writing code or using spreadsheets, the operator draws movements on a graphical timeline, exactly like you would with video editing or music production software - but instead of frames and notes, you work with angular positions and real hardware commands.

With MotioForge Studio you can:

- Program movement sequences for one or more servo motors, with precise control over position, speed and acceleration.
- Activate digital outputs (switches, relays, LEDs, pneumatics) in sync with movement.
- Play audio files coordinated with animation, or automatically generate movements synchronized with voice or music.
- Manage multiple devices in parallel on a single hardware domain, each on its own communication port.
- Loop the animation or activate it on command (manual or software trigger).

How It Works

The workflow in MotioForge Studio is divided into four steps:

1. Define the hardware (Domain)

Create a domain that describes the physical configuration: which communication ports are available, which elements are connected to each port (servo motors, switches, audio modules) and their parameters (minimum and maximum travel, rest position, hardware model).

Hardware Element Types

MotioForge Studio supports five types of hardware elements:

- Servo Bus — Serial servo motors (e.g., ST3215, compatible protocols) connected to a shared serial port. Allows precise angular position, speed, and acceleration control.
- Servo PWM — Standard PWM-based servo motors on individual digital pins or I2C expanders (e.g., PCA9685). Controlled via 50 Hz PWM signal.
- Switch — Digital output pin (relay, solenoid, LED, pneumatic valve). Can be turned on/off or toggled in sync with animation segments.
- Sound — Audio playback module. Play audio files, control volume, generate automatic movements synchronized with sound (amplitude or phoneme detection).
- Trigger Button — Physical push-button connected to DEIMOS hardware. When pressed, activates a configured animation or trigger. Typically mounted on the animatronic or control interface for manual activation.

2. Create an animation

Within the domain you add an animation: an empty project with its own timeline. The animation can be executed once, in continuous loop or on external activation.

3. Draw movements on the timeline

Each servo motor appears as a horizontal track. You draw a segment by dragging the mouse: the height of the segment represents the motor's angular position, the width represents time. You can add as many segments as you want, modify them, copy them and refine them until you get the desired behavior.

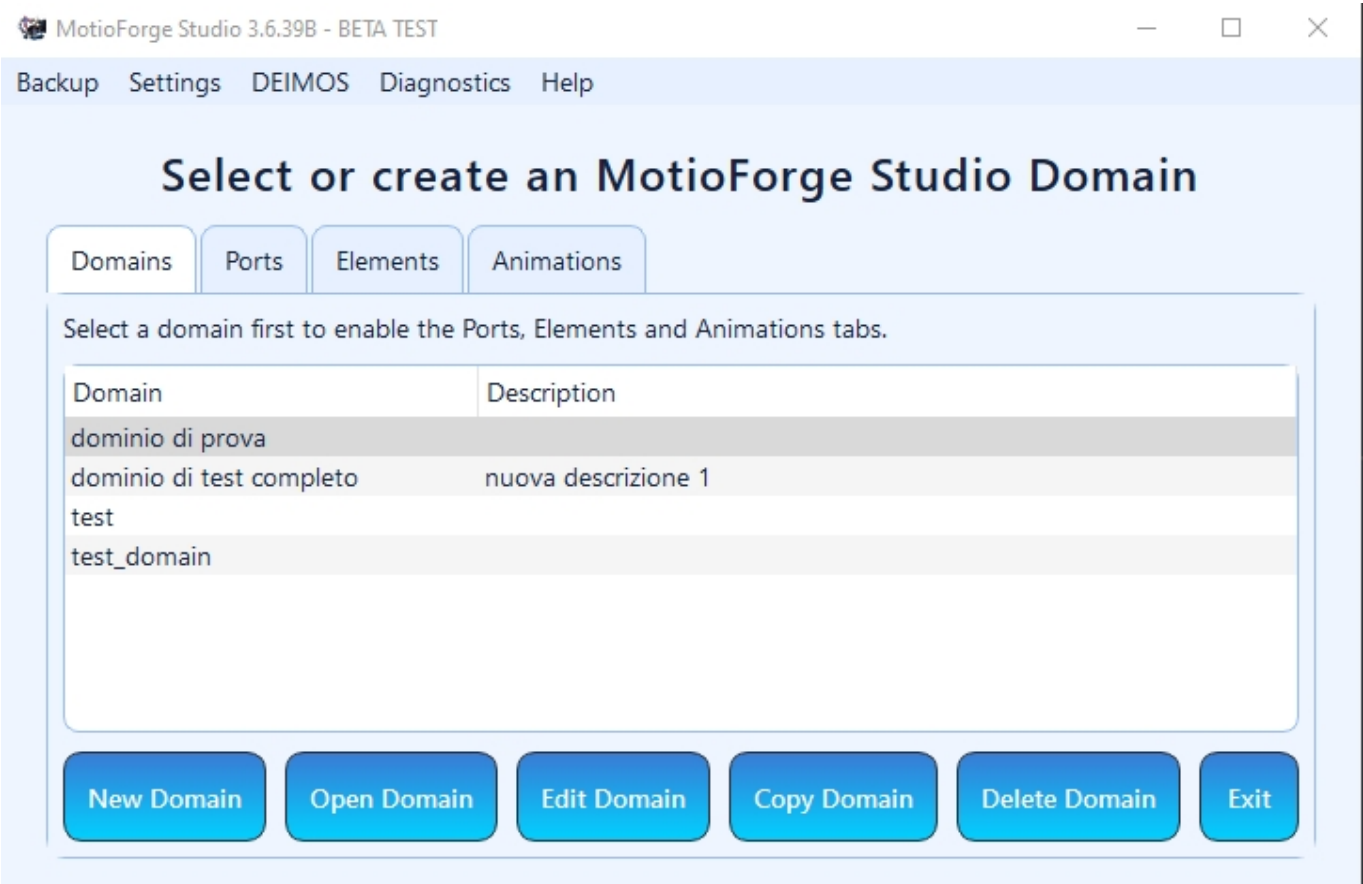
4. Execute and fine-tune

With one click you start playback: MotioForge Studio sends commands to the hardware in real time and the character or prop moves exactly as drawn. You can pause, move the playhead to any point and repeat the fine-tuning cycle until you get the final result.

Visual Interface

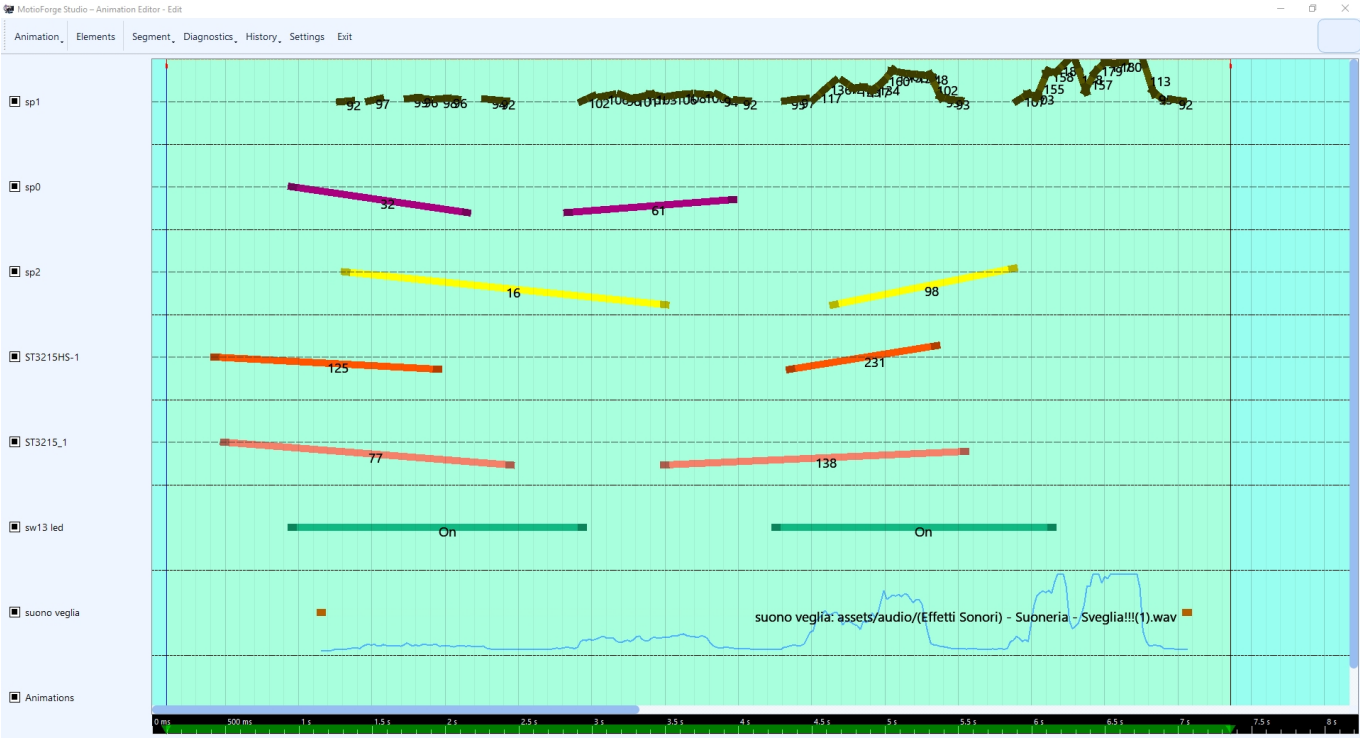
Launch window

The initial window allows you to create a new domain (hardware project) or open an existing one. From here you can access settings and manage loading the DEIMOS firmware onto your Arduino board.



Timeline editor

The timeline editor is the heart of MotioForge Studio. Each hardware element appears as a horizontal track, where you can draw segments that represent movements. The playhead (vertical line) moves during playback, showing real-time progress. You can zoom in/out, navigate the timeline, and edit segments by double-clicking to access detailed properties.



Audio element properties

When you add an audio segment (to play sound files), you can configure its properties: which audio file to play, volume, startup delay, and optionally enable automatic movement generation synchronized with the sound (amplitude analysis or phoneme detection for lip-sync movements).

 Sound segment ×

Audio file Browse...

Link a servo to volume

Volume servo

Minimum position delta (tenths °) Check volume every N steps

Minimum volume (%) Maximum volume (%)

Bass/mid cutoff (Hz) Mid/high cutoff (Hz)

☒ Exclusive (one band at a time)

Frequency bindings

Bass

(none)

Min %

30

Max %

80

Mid

(none)

Min %

30

Max %

80

High

(none)

Min %

30

Max %

80

Generate/Regenerate Servo Segments Fit segment to sound duration Cancel

Application Examples

Theater and live entertainment

Animatronic masks for non-human characters, mechanical mouths synchronized with actor or voice-over, moving tails and ears for costumes, motorized eyes with coordinated movements.

Theme parks and attractions

Large-format figures with multiple movements (head, arms, torso), activated automatically when visitors pass or controlled remotely by an operator. Synchronized environmental effects: fog, strobe lights, background sounds that start with movement.

Escape rooms and immersive installations

Props that react to player input, doors that open with a mechanical key turn, rotating mirrors, talking pictures. MotioForge Studio manages the activation logic and timing of each element.

Museums and interactive exhibitions

Reconstructions of prehistoric animals or historical figures with realistic movements, explanatory panels with moving elements that capture visitor attention, hands-on exhibits with physical feedback.

Shops and display windows

Animated mannequins, rotating displays, seasonal decorative elements with programmed cyclic movements, all without needing technical personnel on site after setup.

Cosplay and wearables

Motorized wings that open on command, automatic moving visors, robotic tails, LED accessories and synchronized servo motors - all programmed with dedicated animations for each performance.

Prototyping and research

Experimental robotic platforms, mechanical arms for laboratory testing, automated test systems for electromechanical components.

Key Advantages

- No code required - Animation is created graphically; no need to know programming.
- Real-time preview - Movements are sent to hardware during playback, with no intermediate compilation stages.
- Multi-channel - Dozens of servo motors coordinated on a single timeline.
- Multi-platform hardware - Compatible with serial servo bus (ST3215 and compatible) and PWM servos on pins or I2C expander.
- Integrated audio - Audio file playback and automatic generation of lip-sync movements synchronized with voice.
- Portable project - Each domain and its animations are saved in standard files that can be transported to any computer with MotioForge Studio installed.
- Integrated AI assistant - A conversational assistant that answers questions about configuration, animations, troubleshooting - available both online (Claude API) and offline (local Ollama).

Integrated AI Assistant

MotioForge Studio includes an intelligent conversational assistant (accessible with the F2 key) that provides real-time contextual help. The assistant knows the entire software documentation and can read the execution log to help troubleshoot problems.

Two modes of use

Claude API (cloud)

- Powerful and precise, suitable for complex questions about documentation and error resolution.
- Access via Anthropic account (minimal cost: a few cents per session).
- Requires Internet connection.

Ollama (local)

- AI models run directly on your PC, no recurring costs.
- Completely private: no data leaves your computer.
- Ideal for those who prefer offline-first or don't want cloud.

Select your preferred backend in Preferences → AI Assistant.

Reliability and Quality

MotioForge Studio is subjected to rigorous testing to ensure that animations execute correctly and that communication with hardware remains stable and reliable in every situation. This means you can rely on precise movements, perfect audio synchronization, and robust error handling.

Installation

What you need

- A PC with Windows 10 or Windows 11 64-bit
- A board on which DEIMOS software can run, for example an Arduino Mega, connected via USB
- The MotioForgeStudio.zip archive (provided by the development team)

No need to install Python, Qt drivers or other dependencies: everything is already included in the archive, including DEIMOS software.

Step 1 - Extract the archive

Double-click on MotioForgeStudio.zip and choose Extract All. You can extract it wherever you prefer, for example:

C:\Program Files\MotioForge Studio\

or in your Documents folder. Avoid system folders like C:\Windows\ or C:\Program Files\ if you are not an administrator on the PC.

Step 2 - Verify the USB driver for Arduino Mega 2560

Before launching the program, make sure Windows recognizes the Arduino Mega 2560.

1. Connect the board to your PC with the USB cable.
2. Open Device Manager (search for "Device Manager" in the Start menu).
3. Look for an entry like Arduino Mega 2560 (COM3) or similar in the Ports (COM and LPT) section.

If the board appears with a yellow triangle, you need to install the driver. Compatible boards often use the CH340 chip: download the driver from wch.cn(<https://www.wch.cn/downloads/CH341SEREXE.html>), install it and restart your PC.

If the COM entry is present and has no errors, you're ready for the next step.

Step 3 - Launch MotioForge Studio

Open the extracted folder and double-click on MotioForgeStudio.exe.

> If Windows shows the "App not recognized" warning, click More info and then Run anyway. This message appears because the program doesn't have a digital signature, but it doesn't indicate any security problem.

Step 4 - Install DEIMOS on the connected board (Arduino Mega)

From the menu of the startup screen, select DEIMOS and then choose the version compatible with your hardware and proceed with the upload.

Step 5 - First setup: projects folder

On first run the program automatically creates a default folder to save your projects (domains and animations), typically: Documents\MotioForge Domains\

You can change it at any time from the Settings → Preferences menu by selecting a different folder for your projects.