

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Frontside Spin Mechanics Engine is a physics tool.

Get precise data on rotation, takeoff, and landing stability.

Frontside Spin Mechanics Engine provides high-fidelity physics modeling for freestyle athletes and coaches. Your AI client can calculate takeoff dynamics, determine flight characteristics, and predict landing success. It even accounts for wind conditions to ensure your rotation models remain accurate to real-world environments.

A+ Quality Score 100/100

snowboarding

skiing

physics

rotation

athletics



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Frontside Spin Mechanics Engine MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to turn raw physics data into actionable coaching insights. Instead of guessing if a rotation will hold, you can model the exact physical state at the moment of edge release. It handles the heavy lifting of calculating rotation profiles and predicting how an athlete will land based on their specific spin velocity and axis tilt. If you are working with environmental variables, the engine adjusts rotation profiles to account for wind conditions. This makes it a practical tool for analyzing the physics behind every frontside spin, from the initial pop to the final landing.

Core Capabilities

01 — Takeoff Modeling

Your agent uses this to find the physical state during edge release.

02 — Flight Analysis

Your AI client uses this to determine rotation profiles during flight.

03 — Landing Prediction

Your agent uses this to check if a landing will be stable.

04 — Environmental Simulation

Your AI client uses this to factor wind into rotation models.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/frontside-spin-mechanics-engine — connect your AI agent in three steps.

- 01 Connect your MCP-compatible client to Vinkius.
- 02 Provide your agent with specific athlete or environmental data.
- 03 The agent calls the necessary physics tools.
- 04 Receive precise numerical outputs for rotation, takeoff, or landing.

Connect your client to Vinkius and start running physics simulations immediately.

Built For

This MCP is built for professionals in freestyle winter sports who need to quantify movement.

Freestyle Coaches

They hand off athlete movement data to the AI to get stability scores.

Professional Athletes

They use the tool to model rotation profiles for new tricks.

Sports Analysts

They use the engine to simulate how wind affects spin physics.

What Changes When You Connect

- 01 Calculates edge pressure and angular momentum for takeoff.
- 02 Predicts landing risk using stability scores.
- 03 Adjusts flight models for real-world wind conditions.

04 Provides specific rotation axis tilt and spin velocity data.

Real-World Applications

Trick Validation

Model a specific rotation profile to see if the physics support the intended spin.

Landing Safety Checks

Use stability scores to evaluate the risk of a landing based on axis tilt.

Wind Impact Assessment

Simulate how different wind conditions will alter an athlete's rotation.

Takeoff Optimization

Analyze edge angles and approach speeds to find the ideal takeoff state.

4 Tools Available

#	TOOL	DESCRIPTION
01	analyze_takeoff_dynamics	This tool calculates the immediate physical state at the moment of edge release.
02	calculate_rotation_profile	This tool determines the specific flight characteristics of a spin.
03	evaluate_landing_stability	This tool predicts landing success based on the rotation performed.
04	simulate_wind_conditions	This tool adjusts the rotation profile to account for environmental factors.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

- U** Calculate the takeoff dynamics for an approach speed of 8 m/s, an edge angle of 35 degrees, and a wind-up intensity of 12.



The required edge pressure is 450N with an initial angular momentum of $96 \text{ kg}\cdot\text{m}^2/\text{s}$ and a release vector of [0.8, 0.6].

- U** What is the rotation profile for a 60 kg athlete with 100 initial momentum using a melon grab?



The rotation axis tilt is 12 degrees, the spin velocity is 4.5 rad/s, and the moment of inertia modifier is 1.15.

- U** Evaluate the landing stability for a spin velocity of 5.0 rad/s, an axis tilt of 5 degrees, and a landing slope of 30 degrees.



The stability score is 0.92, indicating a Low landing risk.

Frequently Asked Questions

01 What can this MCP calculate for snowboarding?

It calculates takeoff dynamics, rotation profiles, landing stability, and wind impacts on spins.

02 Which AI clients can use this MCP?

You can use this with any MCP-compatible client like Claude, Cursor, Windsurf, or VS Code.

03 How does the tool handle wind?

The `simulate_wind_conditions` tool adjusts the rotation profile based on environmental factors.

04 Can I predict if a landing will be successful?

Yes, the `evaluate_landing_stability` tool predicts success based on the rotation performed.

05 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you.

06 How does the engine calculate takeoff?

The engine uses ``analyze_takeoff_dynamics`` to process approach speed, edge angle, and wind-up intensity to determine the initial physical state.

07 Can I account for wind during a spin?

Yes, you can use ``simulate_wind_conditions`` to adjust the rotation profile based on wind speed and direction.

08 How is landing success predicted?

Landing success is predicted by ``evaluate_landing_stability``, which compares spin velocity and axis tilt against the landing slope angle.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+" Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"frontside-spin-mechanics-engine": { "url": "..."} </code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  Ask ChatGPT 
-  Ask Claude 
-  Ask Perplexity 
-  Ask Gemini 
-  Ask Grok 

READY TO CONNECT

Frontside Spin Mechanics Engine is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

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Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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