

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

Cork Spin Physics Engine for freestyle sports.

Model complex 3D rotational dynamics for precise flight analysis.

Cork Spin Physics Engine provides high-fidelity calculations for freestyle athletes performing off-axis cork spins. It models how body positioning and flight parameters change rotation, allowing your AI client to predict axis tilt, angular velocity, and landing stability based on specific body configurations.

A+ Quality Score 100/100

physics

freestyle

rotation

dynamics

sports



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.

Cork Spin Physics Engine MCP

4 tools available

Cloud-hosted on Vinkius

If you are analyzing freestyle maneuvers, you need more than just a general physics model. This MCP handles the specific 3D rotational dynamics required for off-axis cork spins. You can use it to see how changing a tuck or an arm extension alters your inertia mid-air. It helps you figure out if a specific rotation speed will actually result in a stable touchdown. Instead of guessing how a grab might affect your axis, you can run simulations to see the exact tilt and velocity changes. It turns your AI client into a specialized physics consultant for aerial maneuvers.

Core Capabilities

01 — Axis Tilt Analysis

Your agent uses this to determine the orientation of a spin.

02 — Velocity Modeling

Your AI client calculates spin speed based on air time.

03 — Landing Prediction

The agent checks if an athlete's orientation will be stable upon impact.

04 — Body Position Simulation

Your agent modifies inertia by simulating different body shapes.

One Click on Vinkius — From Prompt to Execution

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

- 01 Connect your AI client to the MCP via Vinkius.
- 02 Provide flight data like air time, rotation degrees, and grab type.
- 03 The AI invokes the necessary physics tools to run the math.
- 04 Your agent receives the calculated velocity, tilt, or stability results.

Connecting to this MCP gives your AI client immediate access to specialized physics tools.

Built For

This MCP is built for professionals analyzing aerial rotation and freestyle movement.

Freestyle Coaches

They hand off flight data to the AI to check if a student's technique will lead to a stable landing.

Sports Physicists

They use the tool to model the 3D rotational dynamics of complex off-axis spins.

Athlete Performance Analysts

They feed body configuration data into the AI to see how different grabs affect rotation.

What Changes When You Connect

01	Calculates 3D rotational dynamics for off-axis maneuvers.
02	Predicts landing stability based on flight parameters.
03	Models how body position changes inertia during flight.
04	Provides specific axis tilt and velocity data.

Real-World Applications

Landing Safety Checks

Run a simulation to see if a specific rotation and air time will result in a stable touchdown.

Technique Optimization

Compare how a tight grab versus a loose grab changes the rotation velocity.

Axis Control Modeling

Determine the exact tilt of a cork spin based on the intended angle.

Inertia Studies

Simulate how arm extensions or tucks modify the speed of a spin.

Patterns to Avoid

Using general physics models

❌ AVOID

Asking your AI client to estimate a spin speed using basic gravity formulas for a freestyle jump.

✓ INSTEAD

Use ``calculate_rotation_velocity`` to get accurate speed based on actual flight time and total rotation.

Ignoring body position changes

❌ AVOID

Assuming a rotation stays constant regardless of whether an athlete is tucked or extended.

✓ INSTEAD

Run ``simulate_body_configuration`` to see how changing body shape actually modifies inertia.

Guessing landing stability

❌ AVOID

Assuming a rotation is safe just because the athlete completed the flip.

✓ INSTEAD

Use ``predict_landing_alignment`` to check if the orientation at touchdown is actually stable.

The Right Fit

Connect this MCP if you are a coach or physicist modeling complex aerial rotations. Do not connect it if you are looking for general motion graphics or simple projectile math. The decision depends on whether you need specific 3D axis tilt and inertia data for off-axis maneuvers.



Cork Spin Physics Engine: 4 Specialized Dynamics Tools

These tools handle the 3D rotational math needed to model off-axis maneuvers and landing stability.

#	TOOL	DESCRIPTION
01	calculate_axis_dynamics	This tool calculates the specific tilt and orientation of your rotation axis.
02	calculate_rotation_velocity	Use this to find out how fast an athlete is spinning by looking at flight time and total rotation.
03	predict_landing_alignment	This tool determines the athlete's orientation at the exact moment of touchdown.
04	simulate_body_configuration	This tool adjusts rotation characteristics based on how the athlete positions their body.

See It in Action

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

U What is the rotation speed for a 720 degree spin with 2 seconds of air time using a tight_grab?



The rotation speed is 360.0 degrees per second.

U Calculate the axis tilt for a 45 degree cork angle with 360 degrees of rotation and a mid_grab.



The resulting axis tilt is 48.5 degrees.

U Will a 540 degree spin with a 30 degree cork angle and 1.5 seconds of air time result in a stable landing using a loose_grab?



No, the landing is not stable.

Frequently Asked Questions

01 What kind of physics does this MCP handle?

It focuses on 3D rotational dynamics specifically for off-axis cork spins in freestyle sports.

02 Can I use this with Claude or Cursor?

Yes, you can connect this MCP to any MCP-compatible client like Claude, Cursor, or Windsurf.

03 How does body position affect the results?

The simulate_body_configuration tool adjusts rotation characteristics based on the athlete's specific body position.

04 Does it predict if a landing will be stable?

Yes, the `predict_landing_alignment` tool determines the athlete's orientation at the moment of touchdown to check stability.

05 How is rotation velocity calculated?

The `calculate_rotation_velocity` tool determines speed based on the total rotation and the time spent in the air.

06 How do I calculate the rotation speed of a spin?

You can use the `calculate_rotation_velocity` tool by providing the total degrees rotated, the air time in seconds, and the grab type used.

07 Can I predict if a landing will be stable?

Yes, the `predict_landing_alignment` tool calculates the landing angle and returns a stability boolean based on the athlete's orientation.

08 How does a body tuck affect the spin?

The `simulate_body_configuration` tool shows that a tighter tuck decreases the moment of inertia, which increases the rotation speed multiplier.

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>"cork-spin-physics-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

Cork Spin Physics 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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Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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