

# AFTER • IMAGE

A shooter where the enemy dodges you - with a quantum computer.



## HOW IT WORKS



### 01. Surround & Aim.

Shots from every direction become the constraints of an optimization problem.



### 02. The machine solves.

A real quantum annealer computes the joint angles that minimize hits.



### 03. The answer moves.

The solution appears as an unpredictable dodge. Optimization, made visible.

# 200,000,000,000,000,000

One pose, chosen from 200 quadrillion.

#### Real-machine driven.

These dodges aren't simulated or faked with a classical solver. Every pose is computed on a physical quantum annealer, and its raw output — untouched — is what the enemy does on screen.

#### QUBO at scale.

Each pose is written as a QUBO, the native language of an annealer. Yaw, tilt axis and limb angles become binary variables, opening a  $2 \times 10^{17}$  (about 200 quadrillion) space the machine searches in one shot.

#### Under 5 seconds.

A full solve first took around 15 seconds — too slow to feel alive. Parallel solving and Numba JIT compilation cut it to under 5, fast enough for the machine's answer to arrive as gameplay.

#### Randomness as design.

Annealing is probabilistic: the same conditions rarely return the same pose. Instead of smoothing that away, we kept it — the enemy stays unpredictable, and the machine's noise becomes the fun.

Created through MITOU Target — a program of Japan's IPA [Innovation Platform Agency, Japan], backing individual creators in frontier computing.

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<https://afterimage-web.pages.dev/>

