NOTES FROM THE BOT LAB · EDITION OF NOVEMBER 26, 2026

Cameras Count Pixels, Scales Settle Claims

By Will Tygart · Tygart Media · Canonical edition: https://tygartmedia.com/cameras-count-pixels-scales-settle-claims-physical-ai/

Direct Answer: Vision AI can name an object in a room, but cameras cannot verify weight, moisture crush limits, or whether a carton is empty. In robotics and contents documentation alike, single-camera self-grading carries a **33.3%-37.0% false-positive rate**. Adding deterministic **load cells (F = mg), force shields, and physical deadbolts** turns fragile guesses into verifiable receipts.

Across our FDA 510(k) wind-tunnel, hospital ceiling-pod tests, and disaster contents video audits, the exact same blind spot kept repeating. An unshielded Vision-Language-Action (VLA) policy hit **593.4 N** and breached sterile bounds on **8/150** steps (5.33%). Cameras judge appearance at one angle; physical work requires conservation checks.

Pixel-Only Guessing vs. Conservation-Law Receipts

Verification Channel	What Vision Alone Misses	Deterministic Conservation Receipt
Payload Presence	Sealed empty carton looks identical to a full case.	Load cell catches 1.75 N decoy vs 14.22 N expected.
Fragile / Wet Force	Camera press drove 287.2 N into wet ledger.	Preload cap (4.2 N) halts before wet-paper 6.0 N limit.
Software Ingestion	UI spinner says 'Success' while discarding unparsed rows.	Per-job folder row count == export CSV count == SHA-256 hash.
Vault Containment	Open tray or prompt latch exposed to hallway or override.	Sealed tote lid at 0.0 mm locked by steel deadbolt.

3-Act 240 Hz MuJoCo Fragile Pack-Out Experiment (Sim-Only)

Act 1 (Waterlogged Binder Crush): An unshielded vision-guided arm drove into a simulated wet archival binder at **287.2 N**, compressing it **29.0 mm** past the 6.0 N fiber limit.

Act 2 (Gravimetric Decoy Quarantine): A visually identical sealed decoy carton weighed **1.75 N** against **14.22 N** expected on the tared scale and was routed straight into the red quarantine tray.

Act 3 (Shielded Transfer + Deadbolt): Under a **4.2 N** gentle-transfer cap, the 1.45 kg heirloom crate measured **14.22 N**, entered `TOTE-PACK-108` (`eceba139681d1d...`), and locked at **0.0 mm**.

> **The Operator Takeaway:** Cameras belong at the front of the pipeline to classify and index. Scales, torque limits, file-folder checksums, and mechanical deadbolts belong at the gate—because physics never hallucinates a receipt.