



Technical Overview: Rotational Labs Weapons Detection Master Dataset (RL-WDMD)

Proprietary Dataset Summary Total Volume: 2M+ Images | 20+ Hours of Video

Contact: Rotational Labs | info@rotational.io | <https://rotational.io>

1. Overview

The Rotational Labs Weapons Detection Master Dataset (RL-WDMD) is a high-fidelity, proprietary computer vision dataset engineered for the development, training, and validation of automated threat detection systems. RL-WDMD is characterized by its high-variance environmental contexts and synchronized multi-angle capture, designed to replicate the complexities of real-world security and surveillance deployments.

2. Dataset Composition

The dataset was captured across multiple high-stakes environments, ensuring model resilience and the ability to generalize across varying architectural styles and lighting conditions.

Attribute	Specification
Total Frames	2,000,000+ individual images
Video Duration	20+ hours of raw footage
Capture Perspectives	3 scenes (office, industrial, warehouse), with 4 to 7 unique, synchronized camera positions per scene
Primary Locations	Corporate Offices (Including External Parking Lot), Industrial Mechanic's Bay, Warehouse
Target Classes	Firearms (can be decomposed into rifles, shotguns and handguns); People; Improvised Weapons (golf clubs, baseball bats, tools, etc.)
Environmental Context	Variable lighting (Natural/Artificial), scripted and improvised human movement

3. Data Capture & Methodology

Scene Diversity & Realism

To prevent models from overfitting on rigid, predictable poses, capture sessions involved a team of human actors engaged in a mix of scripted scenarios and improvised movements.

- **Location Profiles:**
 - **Industrial:** High-clearance ceilings, heavy shelving occlusion, and high-intensity overhead lighting.
 - **Commercial:** Low-contrast office interiors, glass reflections, and narrow corridors.
 - **External:** Uncontrolled ambient lighting with complex background motion (vehicle traffic, pedestrians).
- **Asset Variety:**
 - **Long Guns:** 5 unique variants across different profiles (rifles, shotguns).
 - **Handguns:** 8 unique variants including semi-automatics and revolvers.
 - **Negatives/Distractors:** A curated set of non-weapon props—such as power tools, smartphones, and dark-colored wallets—integrated to minimize false-positive rates in production environments.

Multi-Angle Capture

Each scene in the dataset was recorded simultaneously from 4-7 viewpoints. This multi-perspective approach is critical for:

- **3D Spatial Reasoning:** Development of multi-camera handoff and tracking algorithms.
- **Occlusion Resilience:** Training models to identify weapon signatures even when partially obscured by a subject's anatomy or environmental obstacles.

4. Annotation & Quality Control

The RL-WDMD includes a subset of pre-annotated images, providing a robust baseline of human-verified ground truth data. Annotation protocols were strictly enforced to ensure high inter-rater reliability, focusing on:

- **Tight Bounding Boxes:** Precise localization of weapons in diverse orientations and contexts.
- **Strategic Frame Sampling:** Annotations are focused on high-variance keyframes to ensure the training subset captures the most distinct and challenging visual features of each threat scenario.

5. Security & Availability

This dataset is proprietary to Rotational Labs. It serves as the gold-standard training set for our internal detection models and is available for audit, validation, or licensing to authorized partners and research institutions.

For inquiries regarding licensing or access, please contact Rotational Labs.