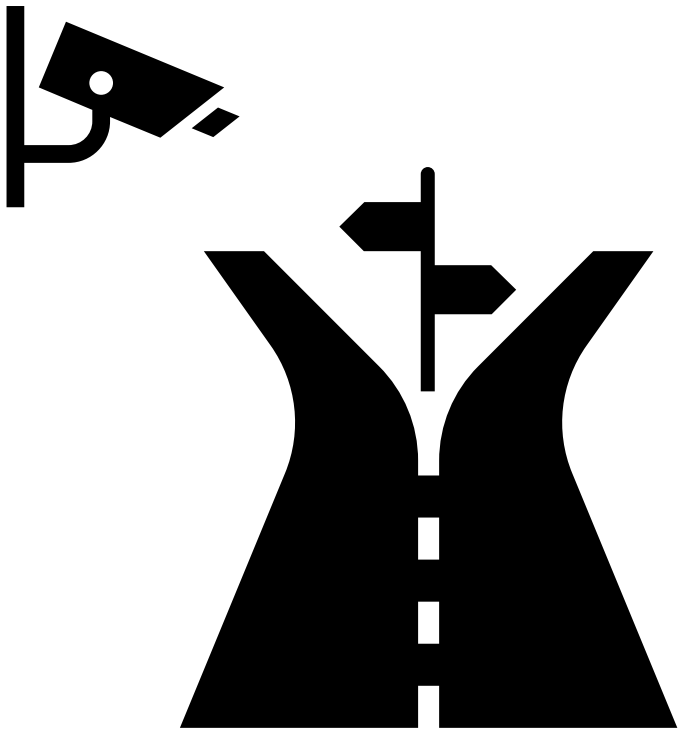
Case Study

AI Radar Based Traffic Safety Camera



+91 98109 10687 connect@arresto.in www.arresto.in

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1. Introduction

Arresto Case Study

Deployment of Vehicle Radar Speed Inspection Device with Camera for Industrial Traffic Safety Compliance

Client Profile:

- **Industry:** Heavy Manufacturing / Steel Production
- **Operational Environment:** Large integrated industrial plant
- **Vehicle Mix:** Two-wheelers, cars, heavy commercial vehicles, tippers, cranes, construction machinery
- **Operational Risk Level:** High (continuous vehicular and pedestrian movement)

2. Background & Challenge

In large industrial facilities, uncontrolled vehicle movement presents a **critical safety and operational risk**. The client faced persistent challenges related to:

- Over-speeding within plant premises despite low internal speed limits (20–40 km/h)
- Difficulty in enforcing speed discipline across multiple shifts
- Ineffective manual monitoring using handheld speed guns
- Absence of irrefutable evidence for enforcement and disciplinary action
- High dependency on manpower for traffic policing

The risk was amplified due to:

- High pedestrian density
- Blind spots near material handling and process areas
- Movement of heavy and oversized vehicles

3. Problem Statement

The client required a **reliable, automated, and tamper-proof system** to:

- Detect and record vehicle over-speeding in real time
- Capture vehicle and number plate evidence automatically
- Eliminate manual intervention and human bias

- Generate actionable violation data for Zero Tolerance enforcement
- Improve overall road and traffic safety culture inside the plant

4. Arresto Solution Overview

Arresto deployed a **Vehicle Radar Speed Inspection Device integrated with High-Resolution Camera and AI Analytics**, forming part of an intelligent traffic safety ecosystem.

Core Solution Components

1. **Radar-Based Speed Detection**
    - Accurate speed measurement irrespective of lighting or weather conditions
    - Suitable for industrial roads with mixed traffic
2. **Camera-Based Evidence Capture**
    - High-resolution image capture of:
        - Vehicle
        - Number plate
    - Time-stamped and location-tagged data
3. **Automatic Number Plate Recognition (ANPR)**
    - Instant identification of violating vehicles
    - Works with dusty and industrial environments
4. **Centralized Web-Based Dashboard**
    - Real-time violation display
    - Historical data analysis
    - Search, filter, and report generation

5. Scope of Implementation

- **Number of Locations:** 20+ high-risk and high-traffic zones
- **Coverage Areas:**
    - Main access roads
    - Material transport corridors
    - Pedestrian-heavy crossings
    - Workshop and loading zones
- **Speed Threshold Configuration:**
    - Zone-wise speed limits digitally mapped and configured
- **System Availability:**
    - 24x7 continuous monitoring across all shifts

6. Implementation Methodology

Phase 1: Site Assessment & Risk Mapping

- Identification of speed violation hotspots
- Finalization of camera and radar placement points

Phase 2: Hardware Installation

- Installation of radar speed inspection devices with cameras
- Alignment and calibration for vehicle type detection

Phase 3: System Configuration

- Speed limit hardcoding
- ANPR tuning for local vehicle formats
- Dashboard and user access setup

Phase 4: Testing & Validation

- Accuracy verification for speed detection
- Evidence validation for enforcement readiness

7. Operational Workflow

1. Vehicle exceeds the predefined speed limit
2. Radar detects speed violation instantly
3. Camera captures vehicle and number plate image
4. Violation details auto-populate on the dashboard
5. Evidence-backed record available for action and reporting

8. Key Outcomes & Results

Parameter	Impact Achieved
Speed Violation Detection Accuracy	High and consistent across all shifts
Manual Monitoring Dependency	Reduced significantly
Violation Evasion	Near-zero
ZTR / Challan Efficiency	Improved by ~80%
Safety Awareness	Visible behavioural change among drivers
Data Availability	Real-time + historical analytics

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9. Business & Safety Impact

- Significant reduction in over-speeding incidents
- Improved compliance among employees and contractors
- Strong deterrence due to evidence-based enforcement
- Enhanced safety culture across the plant
- Actionable data for:
    - Safety reviews
    - Contractor evaluation
    - Infrastructure improvements

10. Why Arresto

- Proven expertise in **industrial safety digitization**
- Ability to integrate **hardware, AI analytics, and dashboards**
- Solutions designed for **harsh industrial environments**
- Focus on **preventive safety**, not just enforcement
- Scalable architecture for future expansion

11. Conclusion

The deployment of the **Vehicle Radar Speed Inspection Device with Camera** enabled the client to transition from **manual, reactive traffic policing** to a **fully automated, data-driven safety enforcement system**.

By eliminating subjectivity and ensuring continuous monitoring, Arresto helped establish a **predictable, fair, and effective speed compliance framework**, directly contributing to safer operations, reduced incidents, and improved organizational safety maturity.

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