

CERTIDOCS CT: An Intelligent Digital System for Vehicle Technical Inspection, Real-Time Governance, and AI-Assisted Automated Enforcement to Improve Road Safety in Cameroon

Keywords: Intelligent digital system, Safe vehicles, AI-assisted vehicle inspection, Real-time data, Automated enforcement, Cameroon.

Background

Road safety remains a major challenge in Africa, where low- and middle-income countries continue to experience high levels of road traffic mortality, despite the gradual adoption of the **Safe System** approach. One of the weakest links in this framework is the **safe vehicles** pillar, often undermined by unreliable and poorly supervised vehicle technical inspection practices.

In Cameroon, poor vehicle technical condition is involved in nearly **20% of road traffic crashes**. This situation is exacerbated by structural fraud, including complacent or fictitious inspections, circulation of counterfeit inspection stickers, and the lack of reliable and usable data. Traditional roadside controls, largely manual and sporadic, neither allow for systematic detection of non-compliant vehicles nor provide sustained deterrence.

In response to these limitations, securing vehicle technical inspection requires an **intelligent digital transformation** capable of ensuring the reliability of inspections, guaranteeing document authenticity, and supporting road safety governance based on **reliable, real-time data**.

Aim

The **CERTIDOCS CT** innovation aims to demonstrate that an **integrated intelligent digital system**, combining AI-secured vehicle inspection, automated enforcement, and real-time statistical governance, can:

- reduce mechanical defects and documentary fraud,
- increase vehicle compliance nationwide,

- enhance the effectiveness of roadside enforcement (technical inspection validity and speed control),
- and support proactive governance aligned with standards promoted by **Afrosafe Academy** and the **UN Decade of Action for Road Safety 2021–2030**.

Method

CERTIDOCS CT is a **national digital infrastructure** deployed across **77 accredited Vehicle Technical Inspection Centers (VTICs)** and connected to roadside enforcement systems. Its intelligence lies in **interconnection and automation**: every data point generated during inspection becomes immediately usable by public authorities and law enforcement agencies.

1. Secure AI-Assisted Vehicle Inspection Engine

A centralized web-based application governs the vehicle inspection process. Physical vehicle presence is secured through mandatory digital evidence, including geo-referenced and time-stamped photographs. Test equipment results are automatically captured to minimize manual data entry. An artificial intelligence module analyzes data consistency and helps detect anomalies related to non-calibrated equipment or fraudulent inspections.

2. Intelligent Roadside Control Layer: AI-Based Automated Enforcement + LIDAR

Smart cameras integrating **Automatic Number Plate Recognition (ANPR)** and **LIDAR** technology monitor traffic at high speed. Each vehicle is automatically detected and its license plate captured. In less than one second, the plate is queried against the CERTIDOCS CT database to verify the validity of the vehicle's technical inspection, while LIDAR simultaneously detects speeding offenses.

3. Real-Time Governance and Monitoring (Ministry of Transport)

CERTIDOCS CT enables data-driven governance by providing reliable indicators, including inspection volumes, re-inspection rates, recurrent mechanical defects by vehicle category, center-level performance, traceability, and compliance metrics. This

layer shifts public action from a reactive posture to **anticipatory, targeted, and evidence-based road safety policymaking**.

4. Intelligent Tools for Law Enforcement: Authentication and Digital Citations

Mobile applications and proximity ANPR devices enable police and gendarmerie officers to instantly authenticate vehicle inspection documents during roadside checks. These tools facilitate secure verification and digital issuance of citations, reducing manual handling and strengthening traceability.

Results

The intelligent digital approach delivers several structural benefits:

- enhanced transparency and supervision of vehicle technical inspection,
- continuous deterrence through large-scale automated control,
- significant reduction of fraud through AI validation and secure authentication,
- identification of high-risk mechanical trends to support targeted prevention campaigns,
- expected improvement in voluntary compliance due to certainty of detection,
- contribution to the detection of stolen vehicles and cloned license plates.

Conclusion: A High-Potential Replicable Innovation

CERTIDOCS CT is an **intelligent digital system** that closes the entire safety loop: **secure inspection → reliable data → automated roadside control → real-time governance → traceable law enforcement**. This integration operationalizes the **Safe System** approach in an African context and provides a **replicable model** for other countries, with a direct and measurable impact on reducing road traffic deaths and serious injuries.