Solutions

Toll & Law Enforcement

Improving safety and following rules

SKYTOLL

Toll & Law Enforcement

Toll & law enforcement ensures compliance with laws, regulations, and the rules of the road. It involves the application of measures, actions, and penalties to make sure that drivers and vehicle owners adhere to the tolling and traffic laws and regulations. Toll & law enforcement aims to ensure that vehicle owners and drivers fulfil their toll obligations, that road safety is improved and accidents are prevented.

More information:
qrfy.com/p/2023_tle_p2

Solutions:

01 Toll Enforcement

Toll enforcement ensures that vehicles using tolled roads or bridges pay the penalties for non-compliance to maintain the financial viability of tolled infrastructure and fairness among road users.

02 Safety & Security Enforcement

Safety and security enforcement implements measures to protect people, assets and public spaces from harm and accidents. It ensures a safe environment and minimises risk to people and property.

01
Toll Enforcement

Toll enforcement is a critical component to maintaining the integrity of tolling systems, ensuring fair road use, and maximizing revenue generation. This brochure describes the technologies employed in toll enforcement and highlights their importance in achieving efficiency, accuracy, and fairness in toll collection processes.

Modern toll enforcement has seen a paradigm shift with the integration of cutting-edge technologies. **Automated Number Plate Recognition (ANPR)** systems that use cameras to capture license plate images and then cross-reference with databases to identify non-compliant vehicles have emerged as a cornerstone of efficient toll enforcement. They complement **Dedicated Short-Range Communication (DSRC)** technology that is used for reading on-board units to improve overall precision.

Further integration of **Laser** and **Lidar** technologies empowers toll enforcement with unparalleled precision. These cutting-edge tools ensure meticulous distance and vehicle classification measurements, improving the identification of non-compliant vehicles. **Weigh-In-Motion (WIM)** technology adds accuracy by detecting overloaded vehicles, ensuring proper toll assessment and safeguarding infrastructure. **Artificial intelligence (AI)** and **Machine Learning (ML)** algorithms can identify anomalies in transaction data, flagging instances of toll evasion or system misuse. These algorithms learn from historical data, adapt to new evasion techniques, and refine enforcement processes over time. By minimizing false positives and negatives, ML-driven enforcement enhances the effectiveness of toll violation identification. All of these technologies drastically reduce manual labour, they accelerate enforcement processes and enable real-time identification of toll offenders.

Advantages and benefits

- **Efficiency**
  ANPR and DSRC automation expedites enforcement, reduces congestion and enhances traffic flow.

- **Revenue Maximization**
  Precise toll enforcement minimizes revenue loss so the funds can be directed toward the vital infrastructure projects.

- **Fairness and Compliance**
  Transparent enforcement mechanisms and consequences promote fair road use, fostering public trust and compliance.

- **Resource Optimization**
  Laser, Lidar, and WIM refine enforcement, allowing authorities to allocate resources strategically.

- **Cost Savings**
  Automation reduces manual labour costs and boosts efficiency and operational savings.

- **Real-Time Tracking**
  Integrated data sharing enables immediate tracking of non-compliant vehicles, enhancing enforcement's real-time impact.

While the overall goal of toll enforcement is revenue generation, prevention and fairness are equally important. Overall public perception of toll systems strongly depends on the general belief that offenders are held accountable. Utilizing a combination of penalties, fines, and sanctions, authorities can prevent potential violators from avoiding tolls. Moreover, transparent communication of enforcement mechanisms and consequences contributes to a sense of fairness among compliant road users.

The evolution of toll enforcement is pivotal for toll system sustainability. Tolling stakeholders are taking advantage of ANPR, DSRC, Laser, Lidar, and WIM technologies to enhance the enforcement ecosystem and secure revenue. To leverage the advantages of this evolution we have created a flexible, state-of-the-art, modular Toll Enforcement solution that includes the **Enforcement infrastructure** and the **Enforcement Back-office system.** The solution is under continuous improvement to ensure a fully optimised system.
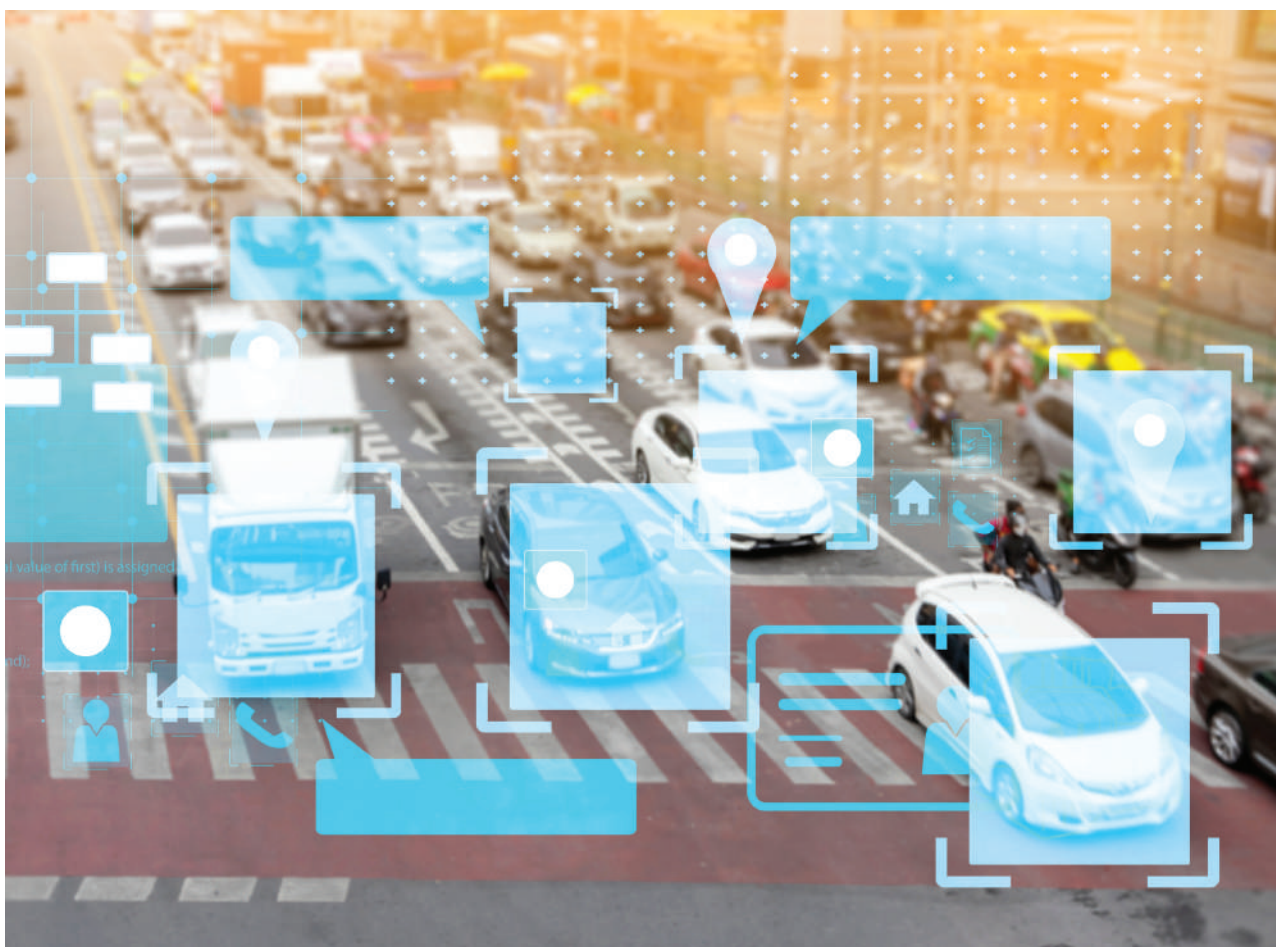
Platforms

- **Enforcement infrastructure**
  Localized and operated on the road infrastructure e.g. tolled road network, it consists of enforcement infrastructure elements that includes a combination of ANPR, DSCR, Laser, Lidar and WIM technologies

- **Enforcement back office**
  A central enforcement system that performs most of the data processing and additional supporting functions for enforcement infrastructure

The enforcement infrastructure is the crucial part of a Toll Enforcement system and may have specific requirements for different infrastructure elements for which we have created individual products.

Products

- **Stationary enforcement gantry (RSE)**

- **Portable enforcement set**

- **Mobile enforcement vehicle (MEV)**

- **Handheld enforcement equipment**

Enforcement back office (EFBO) represents the system that **automatically collects, processes and evaluates data** from enforcement infrastructure. One of its main purposes is to identify offenders who do not pay tolls and generate evidence that could be automatically transferred to the relevant authorities.

Safety & Security Enforcement

The concept of road safety and security enforcement through advanced traffic monitoring technologies, such as cameras and intelligent processing, offers a transformative approach to enhancing traffic management, violations reduction and overall road safety. Using real-time data, automation, and intelligent analysis, creates the potential to significantly reduce accidents, improve traffic flow, and create safer road environments for all users.

In recent years, advances in technology have significantly transformed how road safety and security are enforced. The integration of cameras and additional technology for traffic monitoring has emerged as a crucial strategy to enhancing road safety, enforcing traffic regulations, and mitigating security risks.

Key components and benefits

- **Observation Infrastructure**

  Modern traffic monitoring systems leverage a network of cameras strategically positioned across roads, intersections, and critical points. These cameras capture real-time footage of traffic conditions, vehicle movements, and incidents to create a comprehensive visual database for further analysis and enforcement.

- **Automated Violation Detection**

  The system's intelligence enables the automatic detection of traffic violations. When a violation occurs, such as running a red light or exceeding the speed limit, the system creates an incident. This incident could be further processed or sent directly to law enforcement authorities in real-time, thus enabling swift response and targeted enforcement.

- **Intelligent Image Processing**

  Cutting-edge image processing and computer vision technologies play an essential role in analysing captured video data. These systems can detect and recognise various elements, such as vehicles, pedestrians, lane markings, traffic signs, signals etc. Additionally, they can identify anomalies like reckless driving, speeding, wrong-way driving, and other potential violations.

- **Data Integration and Analysis**

  The data collected from traffic monitoring cameras is crucial to analysing traffic patterns, identifying high-risk areas, and creating evidence-based strategies for road safety and improvement. By integrating this type of data with geographical information systems (GIS) and historical traffic data, the responsible authorities can make decisions to either enhance the infrastructure or optimize the overall traffic flow.

- **Real-time Alerts and Notifications**
  The system can generate automated alerts and notifications to inform law enforcement, emergency services, and relevant stakeholders about incidents, accidents, and potential security threats. This real-time information ensures quicker response times and better coordination among agencies.

- **Remote Monitoring and Control**
  Advanced traffic monitoring systems offer remote access and control capabilities. The (law) enforcement authority personnel can monitor live camera data and make operative decisions remotely. This capability could be particularly useful for managing traffic during large events, accidents, or security incidents.

- **Data Privacy and Security**
  To address concerns about privacy, robust data encryption and access controls are implemented to ensure that only authorised personnel have access to video and recorded data, ensuring that sensitive information remains appropriately protected.

- **Scalability and Future Prospects**
  These systems are highly scalable, allowing for the integration of emerging technologies such as machine learning, artificial intelligence, and predictive analytics. As these technologies continue to evolve, traffic monitoring systems will become even more effective in preventing accidents and security breaches.
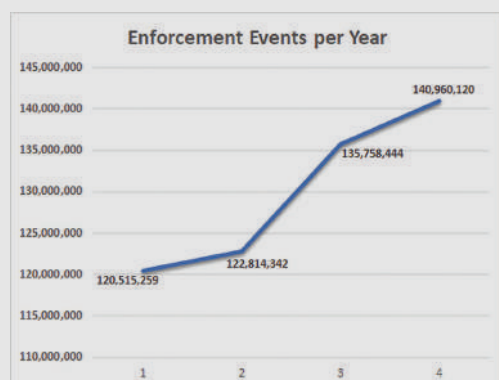
- **Public Awareness and Prevention**
  Visible use of cameras and awareness of automated enforcement act as a prevention for potential violators. Public awareness campaigns educate road or infrastructure users about the presence of these technologies and their role in promoting road safety and security.

Enforcement Events per Year

145,000,000
140,000,000
135,000,000
130,000,000
125,000,000
120,000,000
115,000,000
110,000,000

120,515,259   122,814,342   135,758,444   140,960,120

1   2   3   4

The number of enforcement events logged into our system over the last four years of its functionality.

Our solution combines the essential components outlined above, enabling the detection and evaluation of various safety and traffic related incidents.

Incident detection

- Speed measurement

- Sectional speed measurement

- Detection of travelling at an unsafe distance

- Unauthorised driving in dedic ated (e.g. BUS) lane (specific vehicle category in particular lane)

- Unauthorised driving in the fast lane (e.g. if the vehicle is occupied by only one person (prerequisite is to count the number of people in the vehicle)

- Detection of unfastened seat belts

- Detection of the mobile phone use by the driver

- Red light violation

- No Stopping sign check

- U Turn and Forbidden turn crossing

- Overweight

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