AI enabled Adaptive Traffic Control System & Smart Hawking Solutions

June, 2024

AI enabled Adaptive Traffic Control System (ATCS)

Adaptive Traffic Control System (ATCS) - Problem Statement

Increased Traffic Congestion
Rajkot is experiencing significant traffic congestion due to a combination of factors including the lack of traffic sense and the rise in both public and private transport.

Short Trip Lengths
With the average trip length in Rajkot being approximately 3.5 kilometers, there is insufficient shift towards the usage of mass mobility infrastructure, leading to a preference for private individual vehicles.

Migration and Economic Growth
Improved living standards and economic growth have attracted more people to Rajkot, leading to increased migration and consequently, a rise in the number of private vehicles.

Encroachment on Pedestrian and Cyclist Paths
There is no continuity of footpaths and cycle paths due to encroachment, forcing pedestrians and cyclists to use roads meant for vehicles, increasing the risk of accidents and further congesting the roads.

Vertical Growth of the City
The increase in Floor Space Index (FSI) from 1.2 to 2.4 has led to vertical city growth, resulting in a higher population density and an increase in the number of private vehicles.

Adaptive Traffic Control System (ATCS) – System Overview

To address the problem of traffic congestion in Rajkot city, Rajkot Smart City Development Limited (RSCDL) implemented the Artificial Intelligence (AI) enabled **Adaptive Traffic Control System (ATCS)** solution at **30 junctions** of the Rajkot city in two phases *(with 15 junctions in each phase)*

- AI enabled ATCS solution dynamically adapts to changing traffic conditions in real time. ATCS uses **machine learning algorithms** to analyze real-time traffic data from vehicle detectors to determine signal timings that are optimal for existing traffic conditions.
- The duration of traffic signal's red-green phases is **automatically changed every cycle** by examining the traffic conditions at intersections or along the corridors.
- The solution implemented is developed considering the **Indian traffic conditions** and its ecosystem. Basis the traffic conditions, the AI enabled ATCS solution can **be operated in 3 different modes** – *Vehicle Actuated - Spilt mode, Vehicle Actuated – Full mode & Full ATCS mode.* This is over and above the Fixed time mode for standard operations.
- ATCS solution is **operated remotely from ICCC** through **TRAMM application**. The current status of mode of signal and data allotted time and time consumed in clearing traffic in each lane of the junction is received through this application at ICCC.

Adaptive Traffic Control System (ATCS) – Operation modes

AI driven Operation modes

Vehicle-Actuated Split Mode

Maximum time is allotted to signal of each arm. Time is reduced automatically in an arm in case of less traffic.

Vehicle-Actuated Full Mode

It functions as VA-spilt mode but here, the time saved in any arm is allotted to remaining arms on priority basis.

Full ATCS Mode

The system learns the traffic patterns and sets timing for each arm with total timing of 240 seconds

Adaptive Traffic Control System (ATCS) - Impacts

1. Congestion and delays in transport systems due to **waiting time at junctions has reduced approximately by 33.8%.**

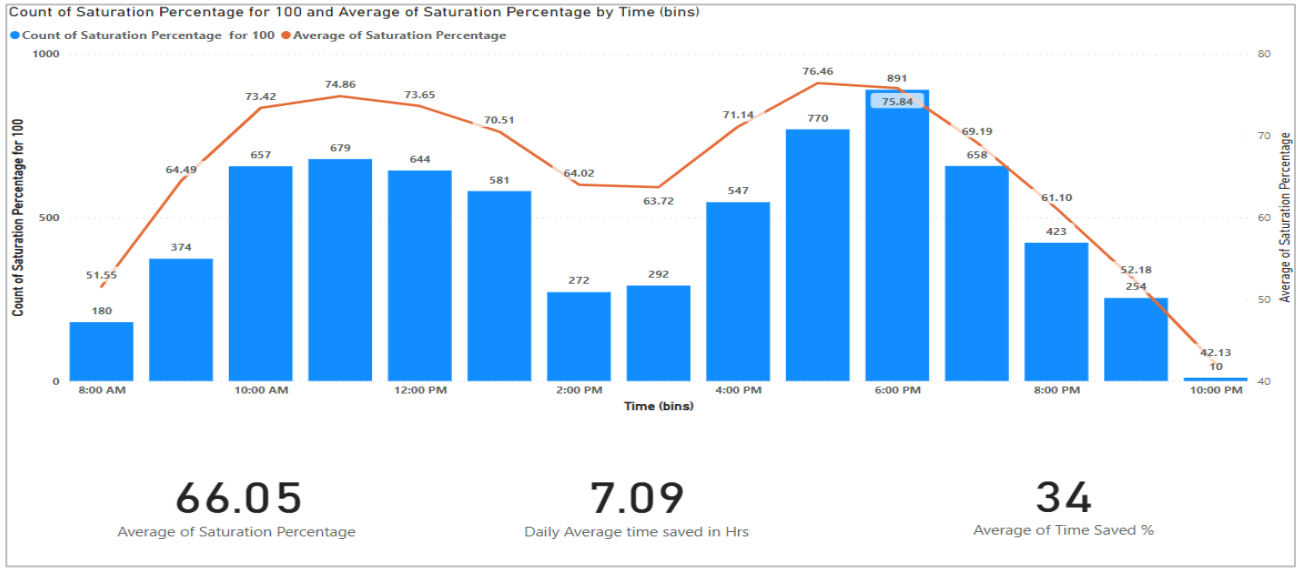
2. The traffic detector cameras at each arm of a junction, **counts and classifies the vehicles** which provide **insights in the traffic patterns** of the city.

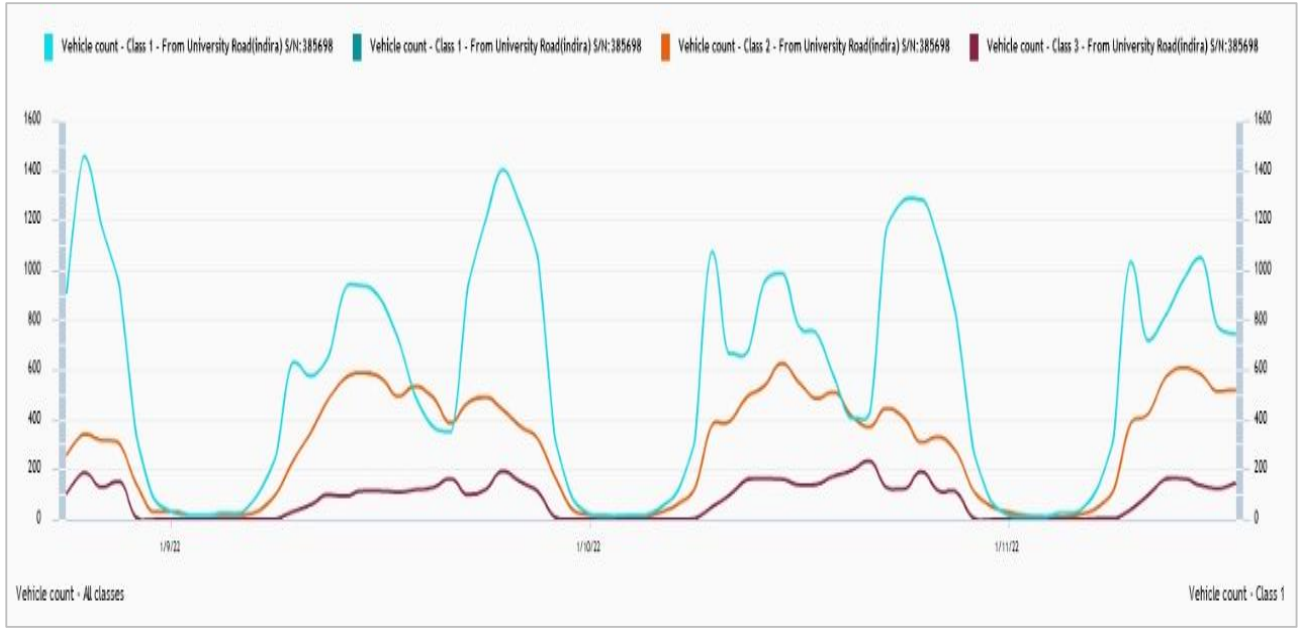
3. Solution is enabling the development of smart intersections, which are emerging as one of the most important **data-driven backbones** needed to solve core city challenges.

4. At present total **12 junctions** are operational on **Vehicle Actuated Split Mode** and at these locations, approximately **60 tons of CO2 emissions are reduced on a yearly basis** during the peak hour itself.

5. **ATCS solution has empowered** the **Rajkot Municipal Corporation (RMC) and Rajkot Police** in managing the city traffic swiftly.

6. Maintenance of earlier installed traditional signal was manual efforts intensive. Whereas ATCS is managed automatically and efficiently from remote location, ensuring **efficient use of resources.**





SEVOTTAM Project – Smart Hawking

Smart Hawking - Problem Statement

Underutilization of Dedicated Hawkers' Zones
Despite the Rajkot Municipal Corporation (RMC) investing over 500 crore INR to create dedicated hawkers' zones across 40+ plots, many hawkers continue to operate outside these zones.

Traffic Congestion
Ilegal hawking outside designated zones exacerbates traffic congestion, especially in critical areas with high pedestrian traffic due to the concentration of activities.

Hygiene and Cleanliness Issues
The presence of illegal hawkers outside the dedicated zones leads to significant hygiene and cleanliness problems, affecting the overall environment of the city.

Increased road littering
Unauthorized hawking contributes to littering on roads, further deteriorating the city's cleanliness and sanitation.

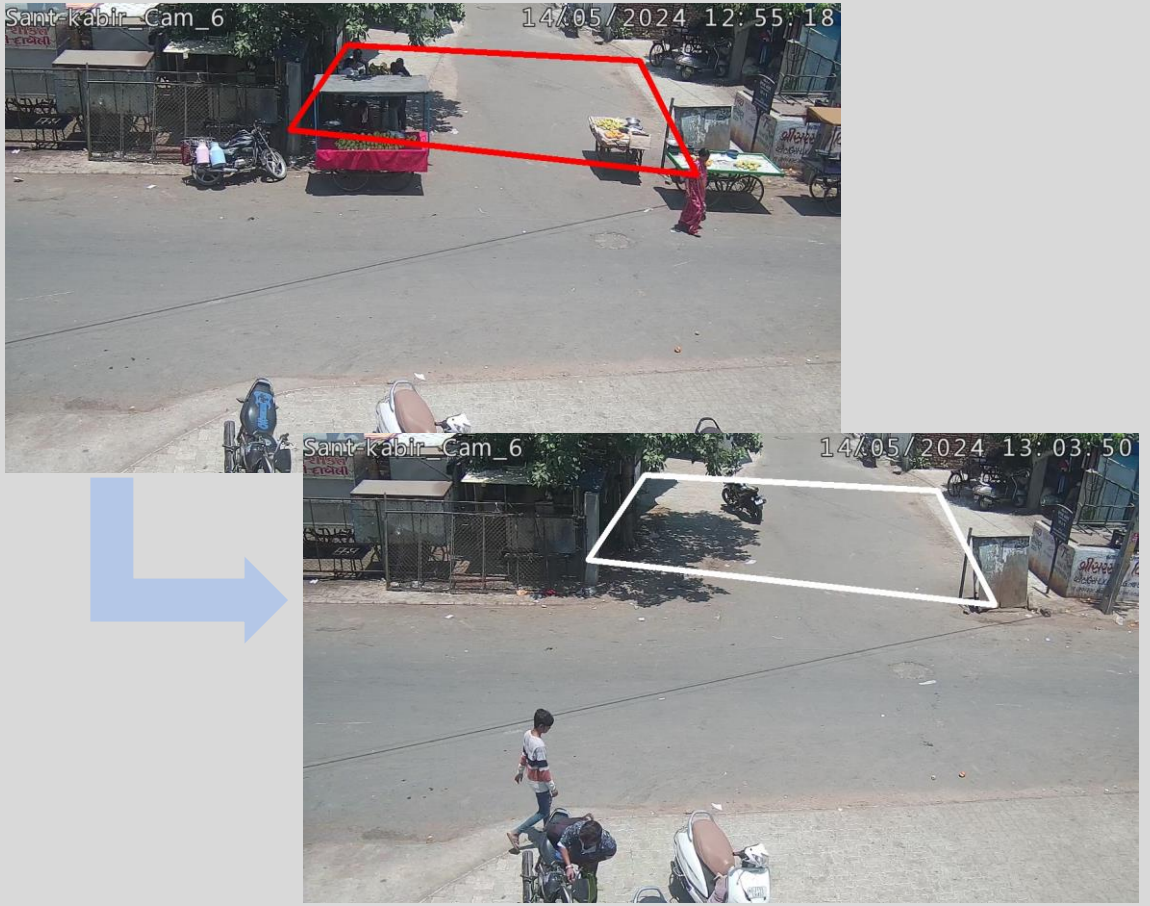
Obstruction of Emergency Vehicles:
Ilegal hawking often blocks paths crucial for emergency vehicles, hindering their ability to respond quickly and efficiently to emergencies.

Impact on Pedestrian safety
The congestion caused by illegal hawkers in high-traffic areas poses safety risks for pedestrians, forcing them to navigate through crowded and obstructed pathways.

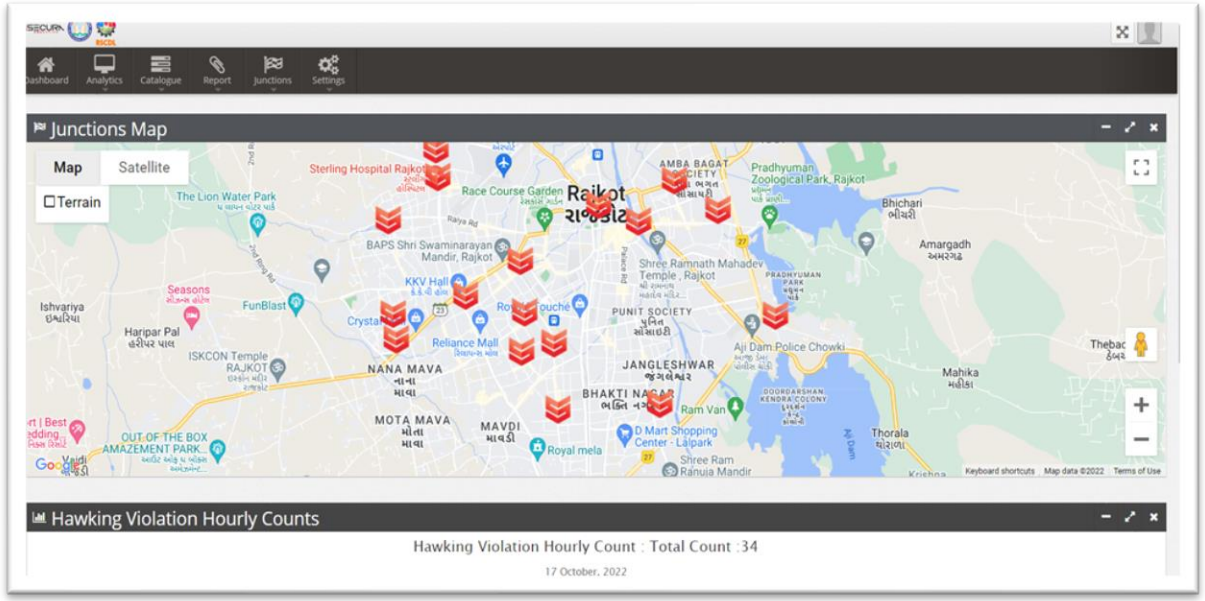
Smart Hawking – System Overview

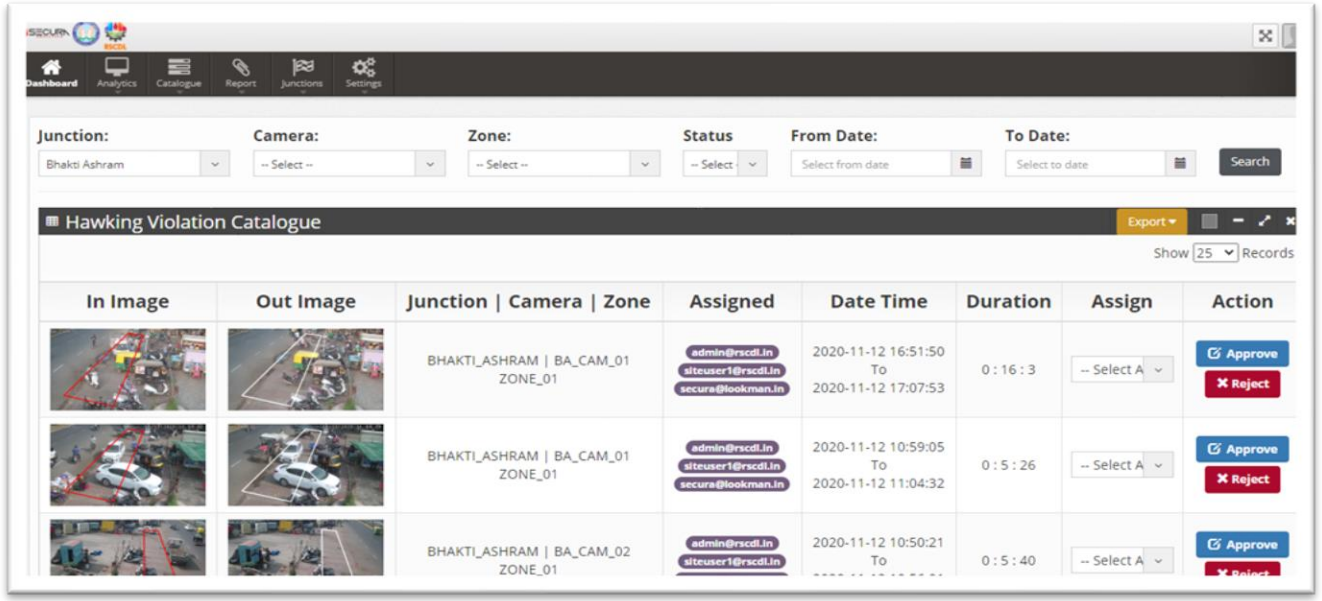
To address the problem of hawkers hawking outside the authorized hawkers' zone, Rajkot Smart City has implemented the Artificial Intelligence (AI) enabled **Smart Hawking** Solution at **25 locations** in the city.

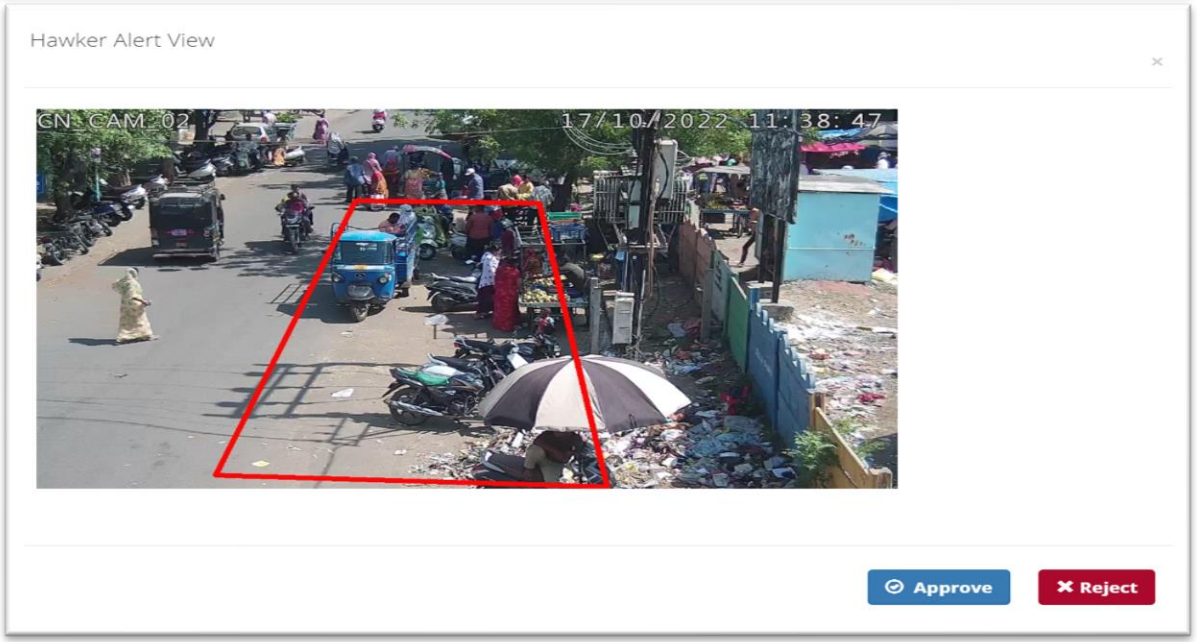
- AI enabled Smart Hawking system is a **machine learning based smart video analytics solution** that identifies illegal hawking being conducted in designated public spaces in the Rajkot city.
- **Smart Video Analytics based Cameras** have been deployed at **25 major Hawkers-prone locations** across the city and integrated with Integrated Command and Control Centre (ICCC).
- A timer-based, sensor-enabled solution generates **alerts for illegal hawking**, displaying **video feeds** on the web portal, mobile app, and at the ICCC.
- Smart Hawking solution has a **web dashboard** showing real-time counts of hawking violations by location and hour with reports, with AI video analytics capturing high-resolution images of offenders.



Smart Hawking







Smart Hawking - Impacts

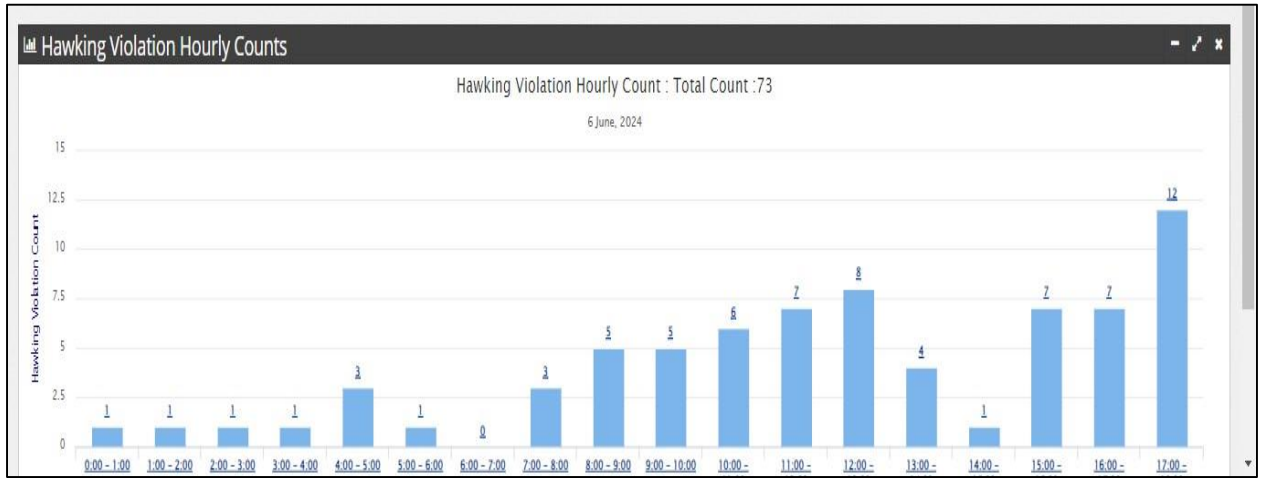
1. The solution effectively **reduces congestion at critical locations** where **high pedestrian traffic intersects** with regular traffic, often causing conflicts and congestion.

2. Solution enables the monitoring and removal of illegal hawkers, thereby **resolving traffic issues and enhancing overall traffic conditions** in the city.

3. Solution provides **real-time alerts based on camera feeds** at key locations, assigning case tickets to **designated officials for prompt action**.

4. Smart Hawking solution leads to **less road congestion** and **helps maintain a clean, safe, and secure environment** for citizens by preventing illegal hawking.

5. Real-time alerts enable **authorities to plan visits and actions efficiently**. This reduces the need for frequent visits and monitoring.



Thank You