

AI enabled Adaptive Traffic Control System & Smart Hawking Solutions

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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



TraMM Traffic Monitoring and Management

Junction Name: SHADHAVASWANI

Junction Parameters

SeqNo	Stage	Split	Status	Mode	CycleNo	ICT (sec)	ACT (sec)	Volume (veh/hr)
1	1	10	JUNCTION-ON	FullVA-Split	1	75	85	855

Stage Parameters

SeqNo	StageNo	Allocated	Available	Utilized
1	1	25	25	<div style="width: 100%;"></div>
2	2	30	30	<div style="width: 100%;"></div>
3	3	30	30	<div style="width: 100%;"></div>

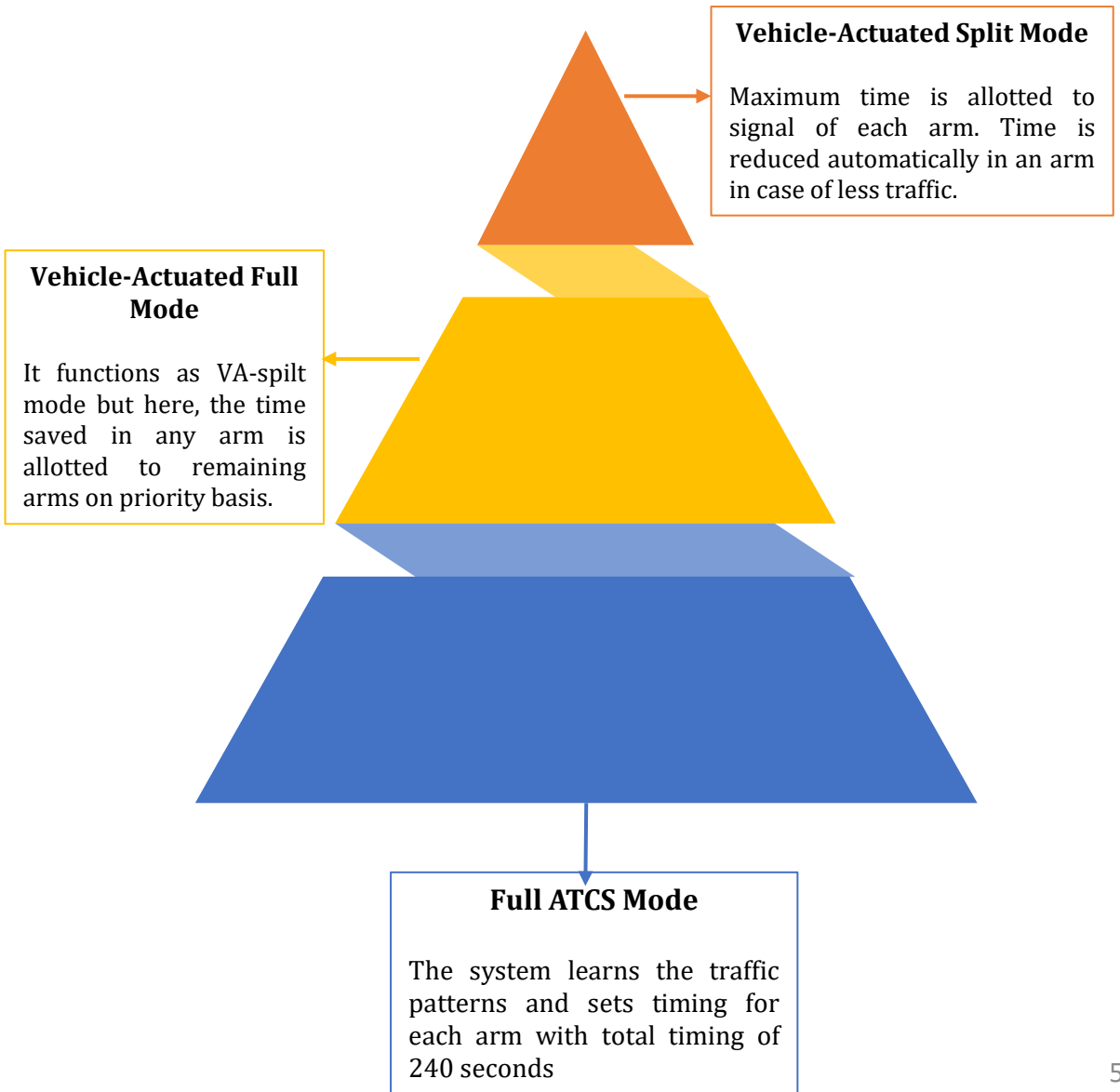
Saturation & Control Status

Saturation		Control Status	
Saturated	>=95 %	Junction State	ISOLATED
Normal	>70 < 95 %	CoSiCoSt Status	ACTIVE
UnderSaturated	<=70 %	Corridor-Mode	LEARNING-MODE

Remote Administration

Normal
 Flash
 Hurrycall
 Lamp OFF/ON

AI driven Operation modes



Adaptive Traffic Control System (ATCS) - Impacts



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



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.



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.



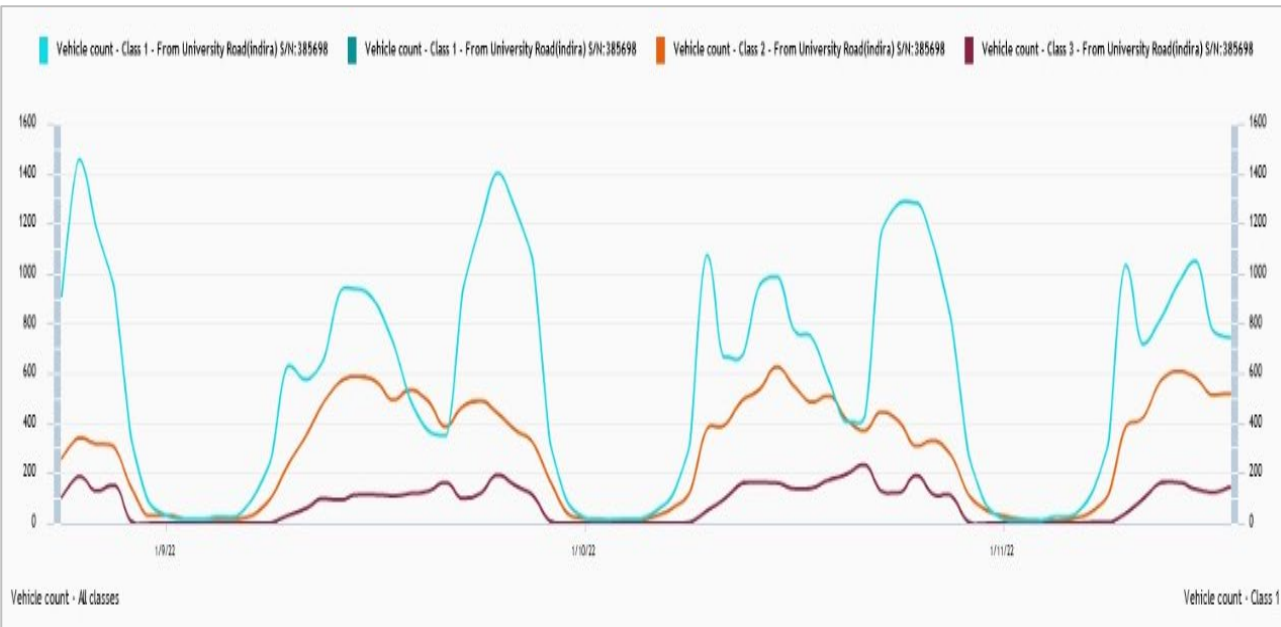
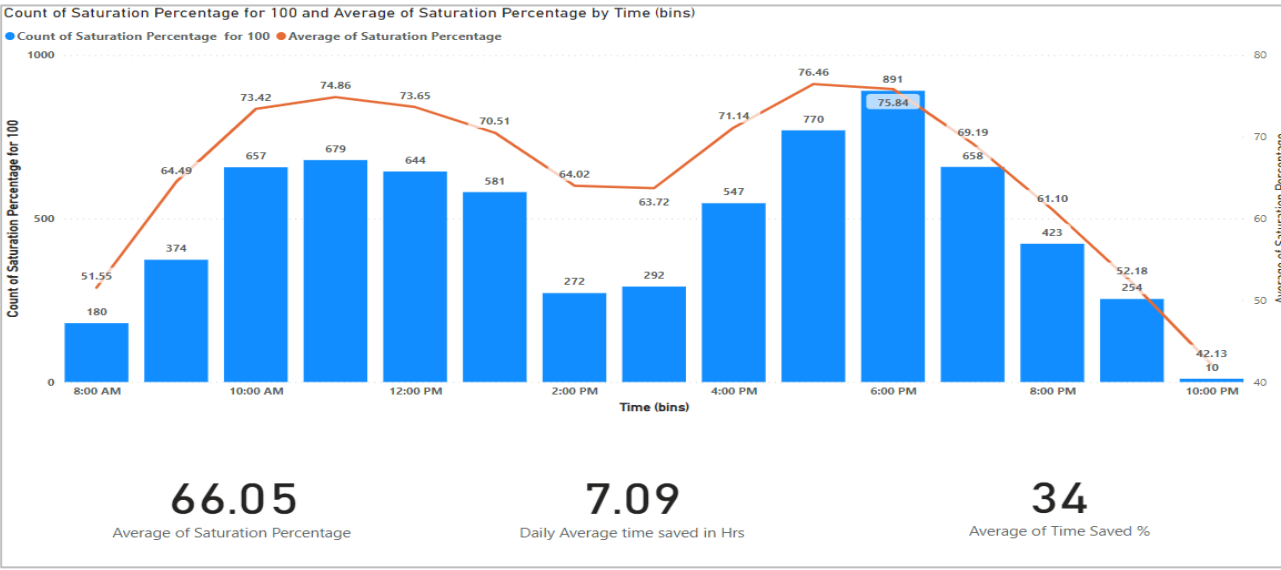
At present total **12 junctions** are operational on **Vehicle Actuated Split Mode** and at these locations, approximately **60 tons of CO2 emissions** are reduced on a yearly basis during the peak hour itself.



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



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

Illegal 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.

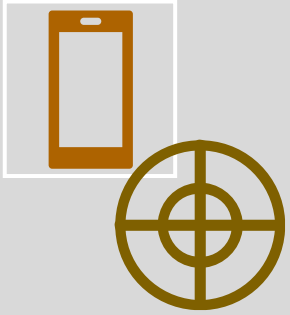
❑ Obstruction of Emergency Vehicles:

Illegal 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

SECURIX

Dashboard Analytics Catalogue Report Junctions Settings

Junctions Map

Map Satellite Terrain

Hawking Violation Hourly Counts

Hawking Violation Hourly Count : Total Count :34

17 October, 2022

SECURIX

Dashboard Analytics Catalogue Report Junctions Settings

Junction: Bhakti Ashram Camera: -- Select -- Zone: -- Select -- Status: -- Select -- From Date: Select from date To Date: Select to date Search

Hawking Violation Catalogue

Export Show 25 Records

In Image	Out Image	Junction Camera Zone	Assigned	Date Time	Duration	Assign	Action
		BHAKTI_ASHRAM BA_CAM_01 ZONE_01	admin@rscdl.in siteuser1@rscdl.in secura@lookman.in	2020-11-12 16:51:50 To 2020-11-12 17:07:53	0 : 16 : 3	-- Select A	Approve Reject
		BHAKTI_ASHRAM BA_CAM_01 ZONE_01	admin@rscdl.in siteuser1@rscdl.in secura@lookman.in	2020-11-12 10:59:05 To 2020-11-12 11:04:32	0 : 5 : 26	-- Select A	Approve Reject
		BHAKTI_ASHRAM BA_CAM_02 ZONE_01	admin@rscdl.in siteuser1@rscdl.in	2020-11-12 10:50:21 To -----	0 : 5 : 40	-- Select A	Approve Reject

Hawker Alert View

GN_CAM_02 17/10/2022 11:38:47

Approve Reject

Hawker Alert View

JB_CAM_01 24/05/2023 19:11:33

Approve Reject

Smart Hawking - Impacts



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



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



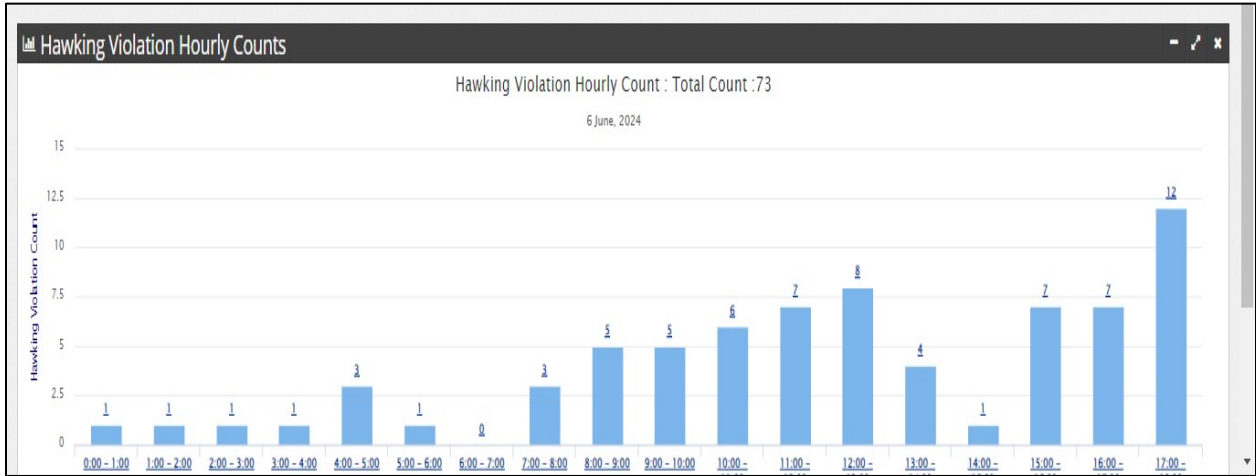
Solution provides **real-time alerts based on camera feeds** at key locations, assigning case tickets to **designated officials for prompt action**.



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



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



Thank You
