Management Information System (MIS)

A project report submitted in partial fulfilment of the requirement for degree of

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE & ENGINEERING

By

Chiruvella Hemanth (R170174)

Under the guidance of

Ms. E. Susmitha

Asst.Prof. In Department of Computer Science & Engineering

AP IIIT, RGUKT-RK Valley,

Vempalli, Kadapa (Dist), Andhra Pradesh-516330, India.

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RGUKT-RK Valley

Vempalli, Kadapa, Andhrapradesh-516330.

CERTIFICATE OF PROJECT COMPLETION

This is to certify that the report entitled "**Management Information System**" submitted by **Chiruvella Hemanth(R170174)** partial fulfilment of the requirements for the award of Bachelor of Technology in Computer Science and Engineering is a bonafide work carried out by them under my supervision and guidance.

The report has not been submitted previously in part or in full to this or any other University or Institution for the award of any degree or diploma.

Project Guide   **Head of the Department**

Ms. E. Susmitha,   Mr. N. Satyanandaram,

Asst.Prof. in Dept of CSE   Lecturer in Dept of CSE,

RGUKT-RK Valley.   RGUKT-RK Valley.

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DECLARATION

We are certifying that, I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Signature of the student

Ch Hemanth

R170174

<u>ACKNOWLEDGEMENT</u>

The satisfaction that accompanies the successful completion of any task would be incomplete without the mention of the people who made it possible and whose constant guidance and encouragement crown all the efforts success.

I am extremely grateful to our respected Director, **Prof. K. SANDHYA RANI** for fostering an excellent academic climate in our institution.

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I would like to convey thanks to our guide at college **Ms. E. SUSMITHA** for her guidance, encouragement, co-operation and kindness during the entire duration of the course and academics.

My sincere thanks to all the members who helped me directly and indirectly in the completion of project work. I express my profound gratitude to all our friends and family members for their encouragement.

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<u>ABSTRACT</u>

The "**Management Information System (MIS)"** is a comprehensive web-based platform that shows traffic and revenue reports for a financial year in which data is collected from TMS vendor. TMS Vendor is the client who provides access to toll data. Based on type of vehicle, length of stretch under one project which is normally 60 Km toll charge is collected.

       The MIS software can display daily, monthly, and yearly revenue reports and sending them to company shareholders. The system is also capable of generating detailed traffic reports, including the number of specific types of vehicles that have passed through a toll plaza. This information is used to generate lane-wise, road-wise, and plaza-wise reports that provide detailed information about the number of vehicles that have travelled through each lane, road, or plaza, and how much revenue was generated at each location.

       For generating these reports, Node.js is used as a backend, HTML, CSS, JavaScript and Angular is used as a frontend and MongoDB is used as database.

INTRODUCTION

Management Information System is an essential tool/Software for managing and monitoring various aspects of an organization. In the context of toll plaza management, the objective of this project is to develop a Management Information Software that can generate traffic and revenue reports for daily, monthly, and yearly vehicle-wise and lane-wise. The software will be designed to help toll plaza managers and operators to efficiently manage toll collection, monitor traffic, and generate revenue reports.

The software will provide a user-friendly interface that will allow toll plaza managers and operators to monitor real-time traffic information and track the progress of toll collection. The dashboard will display historical data, allowing users to compare and analyse traffic patterns and revenue trends.

The Management Information Software will also feature customizable reports that can be generated on demand or scheduled to be automatically generated at specific intervals. Reports will be available for daily, monthly, and yearly periods, and will be customizable based on vehicle type, lane, and other parameters.

PURPOSE

This Management Information Software will be an invaluable tool for toll plaza managers and operators to efficiently manage toll collection and monitor traffic. With real-time traffic and revenue data, toll operators can make informed decisions to optimize toll collection and improve traffic flow. The customizable reports will provide the ability to identify areas for improvement and to make data-driven decisions.

HARDWARE REQUIREMENTS

- Processor : Intel Core i5
- HardDisk : 500 GB
- RAM : 16 GB
- Monitor: 15'' LED

SOFTWARE REQUIREMENTS

- Operating System : Windows 10
- Tool : Visual Studio Code
- Deployment : Google Cloud Platform(GCP)
- Database : MongoDB
- Coding Language : Node.js, Express.js, Angular.js, HTML, CSS, JavaScript, Bootstrap

TECHNOLOGIES

Node.js

Node.js is an open-source, cross-platform, JavaScript runtime environment that allows developers to build scalable, high-performance applications. It is built on top of Google's V8 JavaScript engine and uses an event-driven, non-blocking I/O model, which makes it an excellent choice for building real-time, data-intensive applications.

Node.js provides several built-in modules, including HTTP, HTTPS, and TCP, which make it easy to build network applications. It also has a vast ecosystem of third-party modules, which can be easily installed and integrated into Node.js applications.

Express.js

Express is a popular open-source web application framework for Node.js. It provides a robust set of features for building web applications and APIs. Express is fast, flexible, and minimalist and has become the de facto standard for building web applications with Node.js.

Express provides a simple and intuitive API for handling HTTP requests and responses, making it easy to build RESTful APIs and web applications. It provides a middleware architecture, which allows developers to add additional functionality to the application, such as authentication, logging, and error handling.

Angular.js

AngularJS is a JavaScript-based open-source web application framework that was developed by Google. It is used to build dynamic web applications and provides a robust framework for building complex client-side applications.

AngularJS also provides several built-in features such as dependency injection, services, filters, and directives, which make it easy to build complex applications. It has a large and active community of developers, which provides a vast ecosystem of plugins and modules that can be used to extend its functionality.

MongoDB

MongoDB is a popular open-source NoSQL database that provides a flexible and scalable platform for storing and querying data. It is a document-oriented database, which means it stores data in JSON-like documents with dynamic schemas.

MongoDB also provides a powerful query language that supports complex queries and aggregations. It also has a flexible schema, which allows developers to modify the structure of data as their application evolves.

HTML

HTML (Hypertext Markup Language) is a standard markup language used for creating web pages and web applications. It provides a way for developers to structure and organize content on a web page, including text, images, videos, and other multimedia content.

CSS

CSS (Cascading Style Sheets) is a style sheet language used to describe the presentation and styling of HTML (Hypertext Markup Language) and XML (Extensible Markup Language) documents. CSS allows developers to control the layout, formatting, and appearance of web pages, including fonts, colors, margins, borders, and other design elements.

JavaScript

JavaScript is a high-level, interpreted programming language that is used to create interactive and dynamic websites. It is one of the three core technologies used in web development, along with HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets).

INPUT AND OUPUT

LOGIN

There are four types of users – ERP Read, Plaza Manager, superUser and Admin. Each set of user has its set of privileges and permissions. For example, ERP Read sets the rates for respective vehicle, while Plaza Manager updates the number of vehicles and revenue, if machine gives any wrong count and superUser can have access to all operations like viewing traffic and revenue reports,

Admin, on the other hand, have access to entire software. Admin can do CRUD Operations like creating, reading, updating and deleting reports, users and can made changes regarding to calculation's. He is simply a developer who is always be ready in case any bugs arise.

The login process ensures that only authorized users can access the system, and their roles and permissions are validated before getting access. Overall, the system aims to provide a seamless experience to all users, ensuring that they can perform their tasks efficiently and effective.
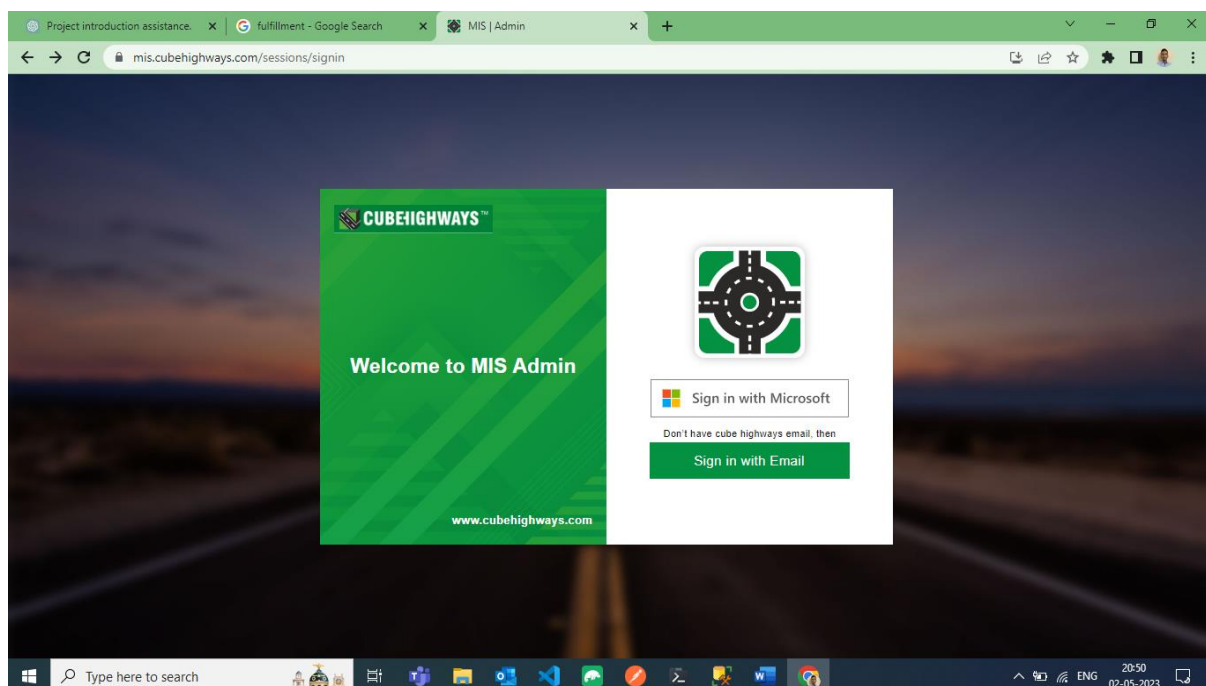
HOME PAGE

This page contains all the information like Total Traffic, Total Revenue, Daily Traffic, Daily Revenue, Monthly Traffic and Monthly Revenue for respective roads.
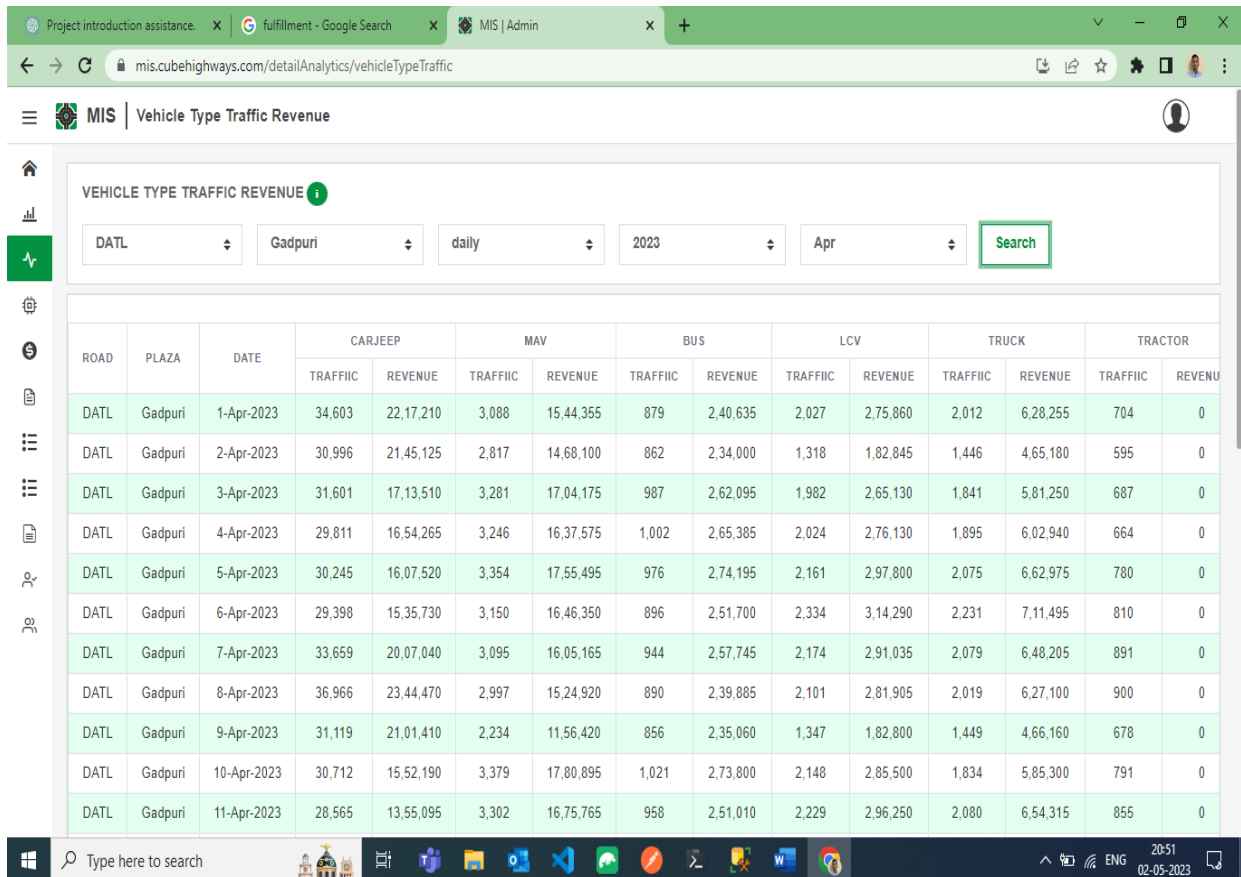
Here, Users can select road name to get data only for itself. And also Angular echart libaray used to represent all data in a graphical format.
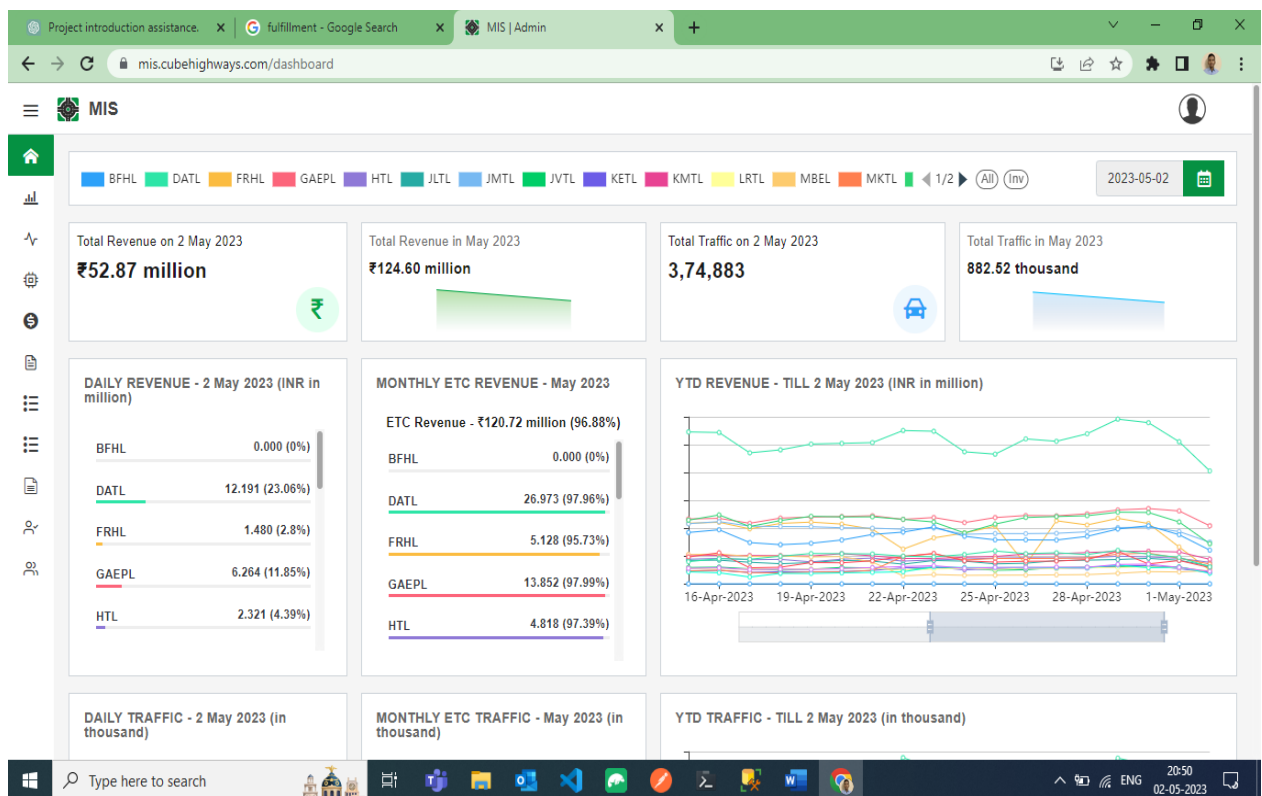
DAILY TRAFFIC AND REVENUE

The daily traffic report typically includes data on the total number of vehicles passing through the toll plaza, broken down by vehicle type (such as cars, trucks, and buses), as well as the number of vehicles passing through each individual lane. This information is useful for identifying peak traffic times and trends, as well as determining the overall efficiency of the toll plaza.

The daily revenue report provides information on the amount of revenue collected at the toll plaza each day. This data is typically broken down by vehicle type and lane, as well as other factors such as toll rates, discounts, and exemptions. By analyzing this data, toll plaza operators can identify areas where revenue may be lost or potential opportunities for revenue growth.
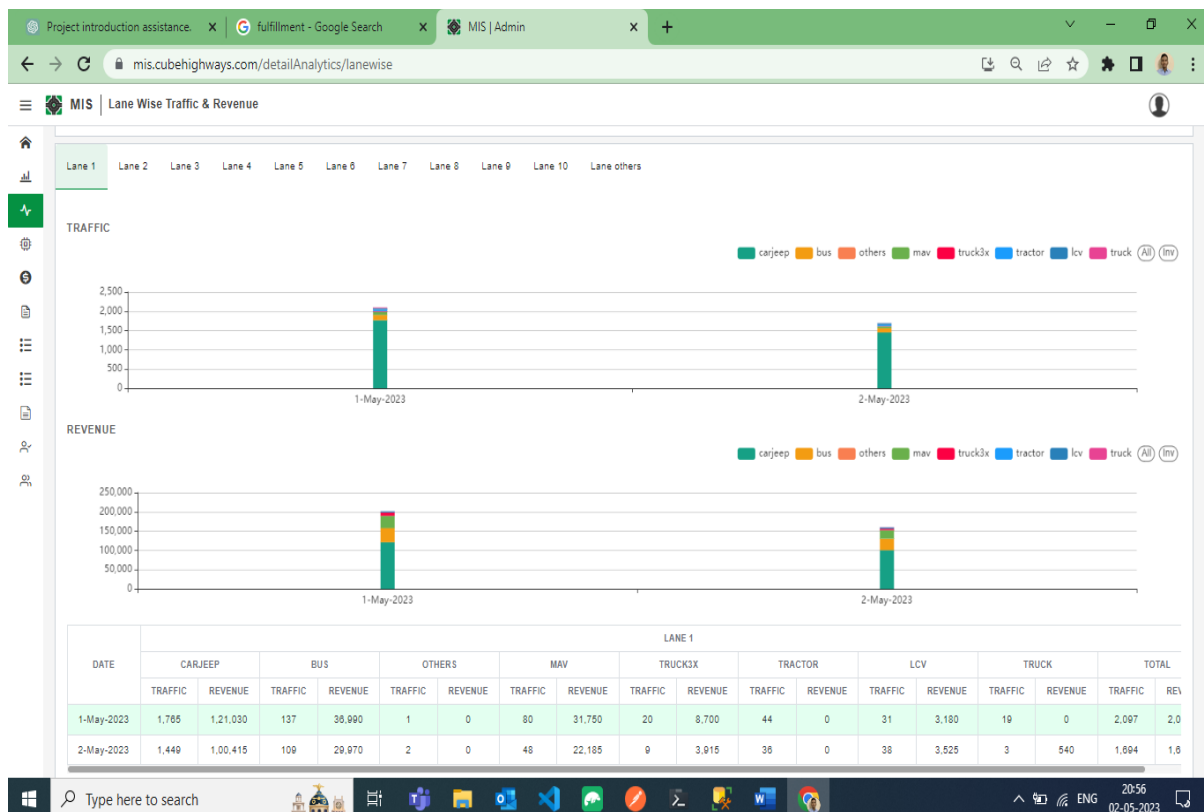
ROAD	PLAZA	DATE	CARJEEP		MAV		BUS		LCV		TRUCK		TRACTOR	
			TRAFFIIC	REVENUE	TRAFFIIC	REVENUE	TRAFFIIC	REVENUE	TRAFFIIC	REVENUE	TRAFFIIC	REVENUE	TRAFFIIC	REVENU
DATL	Gadpuri	1-Apr-2023	34,603	22,17,210	3,088	15,44,355	879	2,40,635	2,027	2,75,860	2,012	6,28,255	704	0
DATL	Gadpuri	2-Apr-2023	30,996	21,45,125	2,817	14,68,100	862	2,34,000	1,318	1,82,845	1,446	4,65,180	595	0
DATL	Gadpuri	3-Apr-2023	31,601	17,13,510	3,281	17,04,175	987	2,62,095	1,982	2,65,130	1,841	5,81,250	687	0
DATL	Gadpuri	4-Apr-2023	29,811	16,54,265	3,246	16,37,575	1,002	2,65,385	2,024	2,76,130	1,895	6,02,940	664	0
DATL	Gadpuri	5-Apr-2023	30,245	16,07,520	3,354	17,55,495	976	2,74,195	2,161	2,97,800	2,075	6,62,975	780	0
DATL	Gadpuri	6-Apr-2023	29,398	15,35,730	3,150	16,46,350	896	2,51,700	2,334	3,14,290	2,231	7,11,495	810	0
DATL	Gadpuri	7-Apr-2023	33,659	20,07,040	3,095	16,05,165	944	2,57,745	2,174	2,91,035	2,079	6,48,205	891	0
DATL	Gadpuri	8-Apr-2023	36,966	23,44,470	2,997	15,24,920	890	2,39,885	2,101	2,81,905	2,019	6,27,100	900	0
DATL	Gadpuri	9-Apr-2023	31,119	21,01,410	2,234	11,56,420	856	2,35,060	1,347	1,82,800	1,449	4,66,160	678	0
DATL	Gadpuri	10-Apr-2023	30,712	15,52,190	3,379	17,80,895	1,021	2,73,800	2,148	2,85,500	1,834	5,85,300	791	0
DATL	Gadpuri	11-Apr-2023	28,565	13,55,095	3,302	16,75,765	958	2,51,010	2,229	2,96,250	2,080	6,54,315	855	0

Lane wise Traffic and Revenue Reports

The lane-wise traffic report provides information on the number of vehicles passing through each lane, broken down by vehicle type. This data can help toll plaza operators identify traffic bottlenecks and make decisions about lane allocation and staffing.

The lane-wise revenue report provides information on the amount of revenue collected at each lane, broken down by vehicle type and other factors such as toll rates, discounts, and exemptions. This data can help operators identify revenue leakage or opportunities for revenue growth.

By analyzing lane-wise traffic and revenue data, toll plaza operators can make informed decisions about lane allocation, toll rates, staffing levels, and other factors that impact the overall efficiency and revenue generation of the toll plaza.

	LANE 1															
DATE	CARJEEP		BUS		OTHERS		MAV		TRUCK3X		TRACTOR		LCV		TRUCK		TOTAL
	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REVENUE	TRAFFIC	REV
1-May-2023	1,765	1,21,030	137	36,990	1	0	80	31,750	20	8,700	44	0	31	3,180	19	0	2,097	2,0
2-May-2023	1,449	1,00,415	109	29,970	2	0	48	22,185	9	3,915	36	0	38	3,525	3	540	1,694	1,6
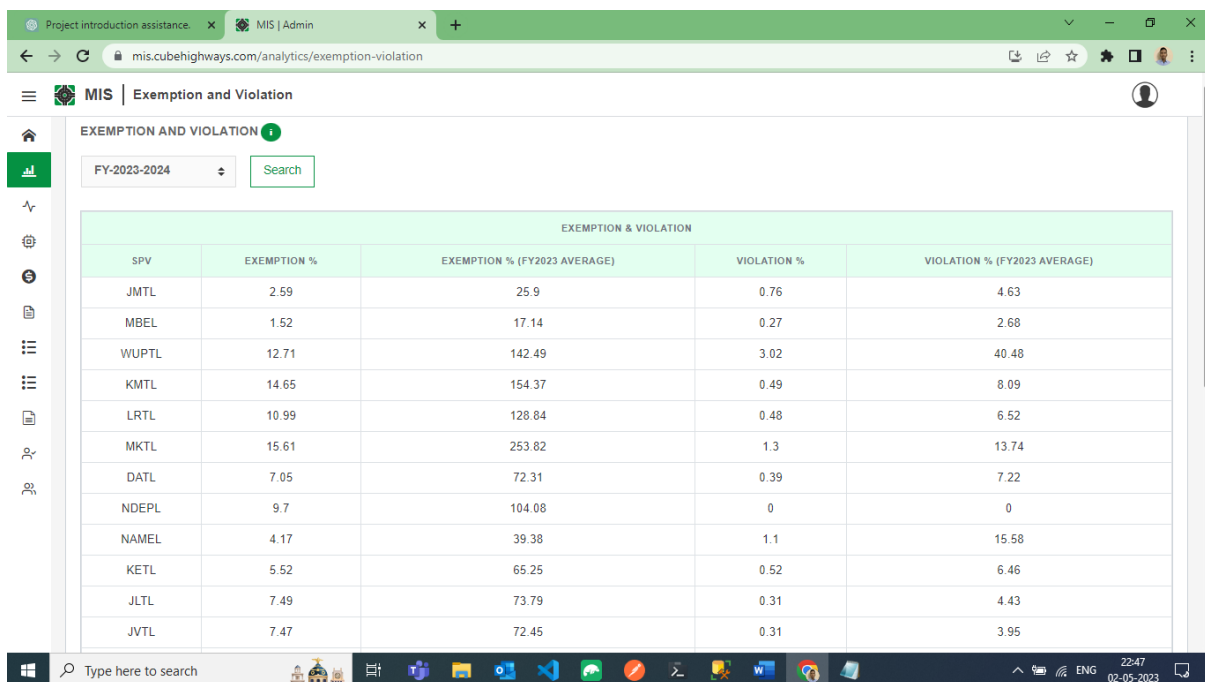
EXEMPTION & VIOLATION

Exempted vehicles are those that are exempt from paying toll fees, such as emergency vehicles, government-owned vehicles, and vehicles belonging to disabled persons. The MIS can generate a report on the number of exempted vehicles passing through the toll plaza each day, as well as the revenue that is lost due to these exemptions.

Violated vehicles, on the other hand, are those that attempt to avoid paying toll fees or violate toll plaza rules, such as by entering the plaza through an unauthorized lane or evading toll payments. The MIS can generate a report on the number of violated vehicles detected at the toll plaza each day, as well as any revenue lost due to toll evasion.

By analysing exempted and violated vehicle data, toll plaza operators can identify areas where revenue is being lost or opportunities for improved enforcement and compliance. This information can be used to improve toll plaza operations and increase revenue generation.

SPV	EXEMPTION %	EXEMPTION % (FY2023 AVERAGE)	VIOLATION %	VIOLATION % (FY2023 AVERAGE)
JMTL	2.59	25.9	0.76	4.63
MBEL	1.52	17.14	0.27	2.68
WUPTL	12.71	142.49	3.02	40.48
KMTL	14.65	154.37	0.49	8.09
LRTL	10.99	128.84	0.48	6.52
MKTL	15.61	253.82	1.3	13.74
DATL	7.05	72.31	0.39	7.22
NDEPL	9.7	104.08	0	0
NAMEL	4.17	39.38	1.1	15.58
KETL	5.52	65.25	0.52	6.46
JLTL	7.49	73.79	0.31	4.43
JVTL	7.47	72.45	0.31	3.95

ERP Rates

ERP rates for vehicles are a key component of toll management and can be configured and managed through the MIS, providing detailed data and insights on toll rates and revenue generation.

ERP (Electronic Road Pricing) rates are the toll fees that are charged to vehicles passing through a toll plaza. These rates are typically set by the toll authority or government agency responsible for managing the toll road network and are based on factors such as the type of vehicle, distance travelled, and time of day.

In the context of the Management Information System (MIS) for toll management, ERP rates for vehicles can be configured and managed through the software. This allows toll plaza operators to set and adjust toll rates as needed, based on traffic and revenue data collected by the system.

BLANK REPORTS

Blank reports refer to instances where toll machines at the toll plaza fail to detect vehicles passing through, resulting in incomplete or missing traffic and revenue data. The Management Information System (MIS) for toll management can generate reports on blank reports, which provide information on the number of vehicles that were not detected by the toll machines and the potential revenue loss due to these instances.

By analyzing blank report data, toll plaza operators can identify areas where toll machines may need to be repaired or replaced to ensure accurate and complete data collection. Additionally, they can identify potential revenue losses and take action to address these issues.

In summary, blank reports can have a significant impact on toll plaza operations and revenue generation. The MIS can generate reports on blank reports, providing valuable data and insights that can be used.

AVC ACCURACY REPORT

AVC (Automatic Vehicle Classification) and ACC (Automatic Vehicle Counting) are technologies used in toll plazas to automatically detect and classify vehicles passing through, and count the number of vehicles that pass through the toll plaza.

The AVC accuracy report is a report generated by the Management Information System (MIS) for toll management, which provides data on the accuracy of the AVC system in detecting and classifying vehicles passing through the toll plaza. This report can be used to identify areas where the AVC system may need to be adjusted or optimized to improve accuracy and reduce errors in vehicle classification.

The ACC accuracy report is a similar report that provides data on the accuracy of the ACC system in counting the number of vehicles passing through the toll plaza. This report can be used to identify areas where the ACC system may need to be adjusted or optimized to improve accuracy and reduce errors in vehicle counting.
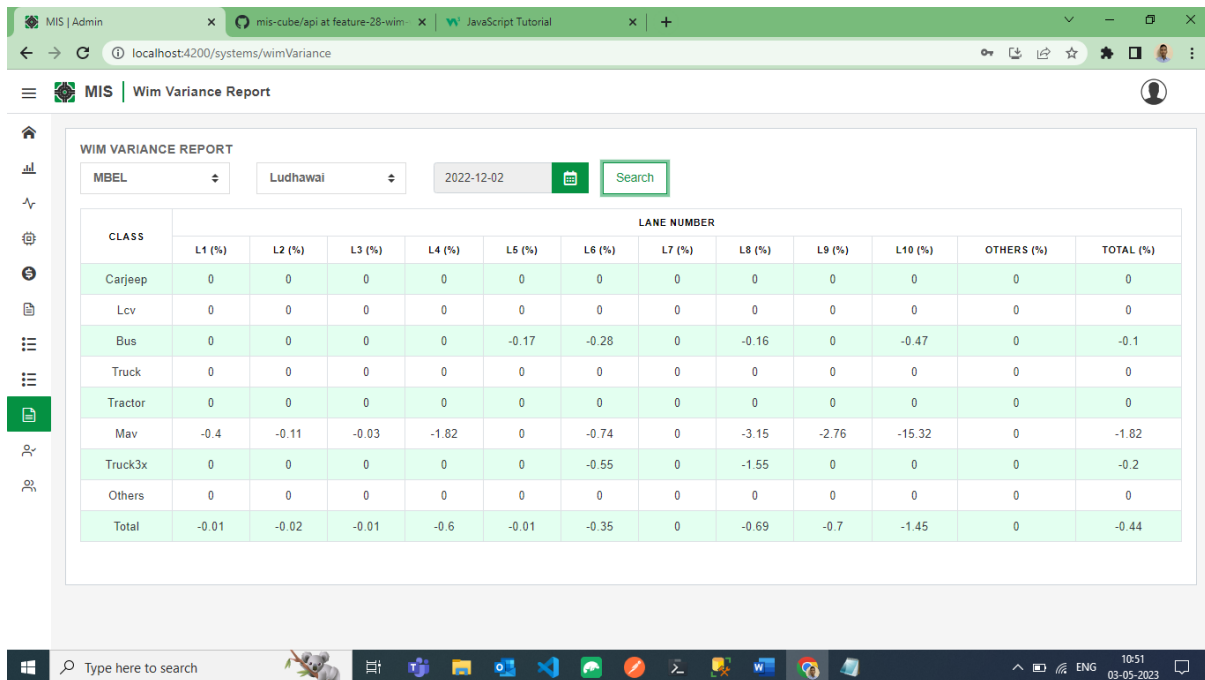

LANE NUMBER	TOLLABLE VEHICLES	MATCHED VEHICLES	UNMATCHED VEHICLES	NA	MATCHED VEHICLES (%)	UNMATCHED VEHICLES (%)	NA (%)
1	31	0	9	22	0	29.03	70.97
2	43	0	41	2	0	95.35	4.65
3	73	0	72	1	0	98.63	1.37
4	61	0	57	4	0	93.44	6.56
5	309	1	271	37	0.32	87.7	11.97
6	67	1	64	2	1.49	95.52	2.99
7	52	1	48	3	1.92	92.31	5.77
8	131	0	110	21	0	83.97	16.03
9	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0
total	767	3	672	92	0.39	87.61	11.99

WIM VARIANCE

WIM (Weigh-in-Motion) systems are technologies used at toll plazas to measure the weight of vehicles passing through, in order to determine the appropriate toll charges based on vehicle weight.

The WIM variance report is a report generated by the Management Information System (MIS) for toll management, which provides data on the variance or difference between the actual weight of a vehicle passing through the WIM system and the expected weight of the same vehicle based on its class or category.

This report is important for toll plaza operators because it helps them to identify and address issues with the accuracy of their WIM systems. If the WIM system is consistently overestimating or underestimating the weight of vehicles passing through, it can result in incorrect toll charges, revenue loss, and dissatisfaction among customers.
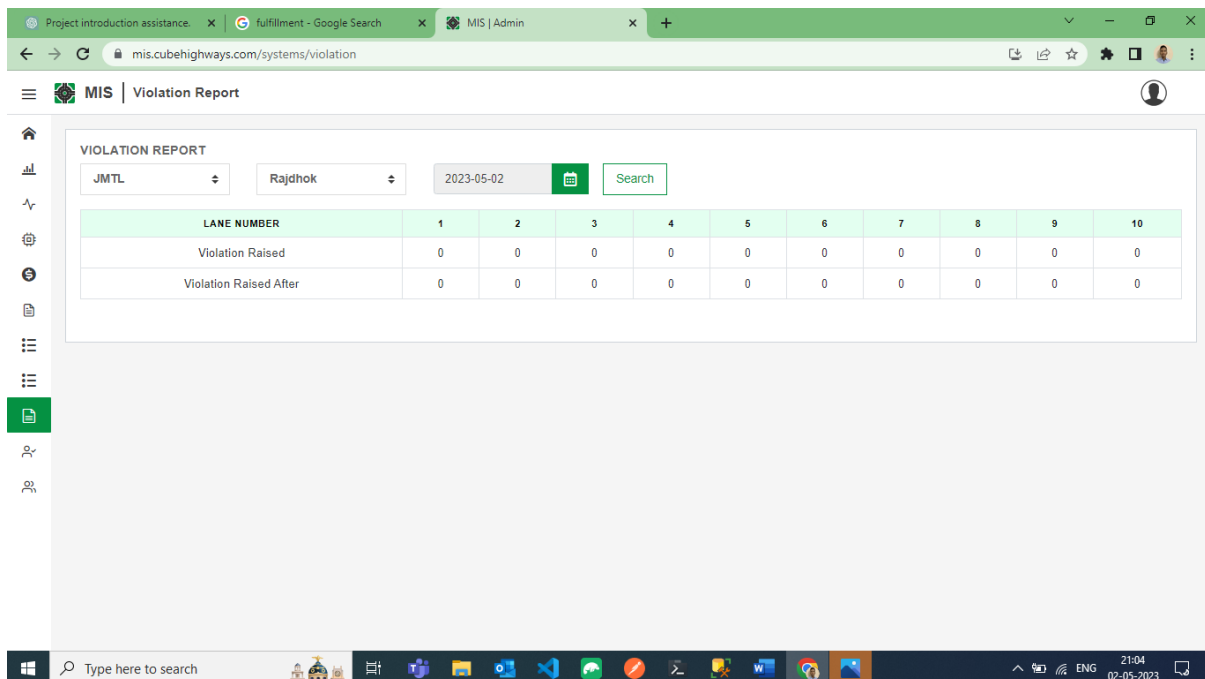

CLASS	L1 (%)	L2 (%)	L3 (%)	L4 (%)	L5 (%)	L6 (%)	L7 (%)	L8 (%)	L9 (%)	L10 (%)	OTHERS (%)	TOTAL (%)
Carjeep	0	0	0	0	0	0	0	0	0	0	0	0
Lcv	0	0	0	0	0	0	0	0	0	0	0	0
Bus	0	0	0	0	-0.17	-0.28	0	-0.16	0	-0.47	0	-0.1
Truck	0	0	0	0	0	0	0	0	0	0	0	0
Tractor	0	0	0	0	0	0	0	0	0	0	0	0
Mav	-0.4	-0.11	-0.03	-1.82	0	-0.74	0	-3.15	-2.76	-15.32	0	-1.82
Truck3x	0	0	0	0	0	-0.55	0	-1.55	0	0	0	-0.2
Others	0	0	0	0	0	0	0	0	0	0	0	0
Total	-0.01	-0.02	-0.01	-0.6	-0.01	-0.35	0	-0.69	-0.7	-1.45	0	-0.44

VIOLATION REPORT

Violation reports are generated by the Management Information System (MIS) for toll management, which provides data on vehicles that have violated the toll payment rules or regulations. These reports are used to track vehicles that have not paid tolls, have used counterfeit tickets or passes, or have tampered with their vehicle identification tags to avoid paying tolls.

Violation reports typically contain information such as the vehicle registration number, time and date of the violation, location of the violation, and the type of violation. They can also include photographic or video evidence of the violation.

Violation reports are important for toll plaza operators to ensure that all vehicles passing through the toll plaza pay the appropriate toll charges. By identifying and tracking vehicles that violate toll payment rules, toll plaza operators can take action to recover the unpaid toll charges, prevent future violations, and improve revenue generation.

CONCLUSION

In conclusion, the Management Information System (MIS) for toll management is a comprehensive web-based platform that provides a range of reports and data analysis tools for toll plaza operators. The system generates traffic and revenue reports for daily, monthly, and yearly vehicle-wise and lane-wise, as well as exemption and violation reports. The MIS also provides system reports for detecting blank reports and generating AVC accuracy and WIM variance reports.

The MIS is built using a range of technologies including Node.js as a backend, HTML, CSS, JavaScript, and Angular as a frontend, and MongoDB as a database. As an Intern, I contributed my work related to all system reports such as Blank reports, AVC Accuracy, Violation and Wim Variance reports. And also I did Some changes in existing API's inorder to optimize feature performance.

Overall, the MIS is an essential tool/Software for toll plaza operators, enabling them to monitor and analyze toll collection data, detect anomalies, and improve the accuracy and efficiency of their toll collection systems. It helps toll plaza operators to ensure compliance with toll payment rules and regulations, prevent revenue loss, and maintain the integrity of their toll collection systems.

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