



Lakbai

TOWARDS SUSTAINABLE
DATA-DRIVEN URBAN MOBILITY

ACSS-UPLB

1



2



PROBLEM DEFINITION

Metro Manila's **traffic congestion**, caused by rapid growth and urbanization, disrupts commuters and the economy.

Inefficient bus operations and **underutilized data tools** worsen mobility issues and policy effectiveness.

SIGNIFICANCE



Metro Manila ranks **9th** in traffic congestion among **387 cities** across the world.

*Taking **25 minutes** and **30 seconds** on average per **10KM** in 2023.*

DATASET

SafeTravelPH 2023 Edsa Busway

The screenshot shows a file sharing interface with a search bar at the top. Below the search bar are filters for 'Type', 'People', and 'Modified'. The main area displays a file named 'Data.csv' with a preview showing columns: longitude, latitude, altitude, gndSpeed, timestamp, _11, callEngineload, and vehSpeed. The data consists of numerous rows of coordinates and speeds. Overlaid on this interface is the SafeTravelPH logo, which includes the text 'SafeTravelPH sharing information. improving transportation' and icons for a bus, a van, a cyclist, and a pedestrian.

	longitude	latitude	altitude	gndSpeed	timestamp	_11	callEngineload	vehSpeed
0230711	120.989205	14.508133	-133	4	2023/07/07T19:46:5 NA	47	4	
0230711	120.9893299	14.507983	6	5	2023/07/07T19:46:5 NA	49	4	
0230711	120.9897449	14.5079416	35	3	2023/07/07T19:46:5 NA	49	4	
0230711	120.9897016	14.50792	54	4	2023/07/07T19:46:5 NA	49	5	
0230711	120.9896466	14.5079016	74	5	2023/07/07T19:47:0 NA	45	5	
0230711	120.98989	14.5078549	91	9	2023/07/07T19:47:0 NA	41	6	
0230711	120.9896065	14.5078833	95	8	2023/07/07T19:47:0 NA	38	6	
0230711	120.9895853	14.5078916	91	8	2023/07/07T19:47:0 NA	38	6	
0230711	120.9894553	14.507905	87	6	2023/07/07T19:47:0 NA	35	6	
0230711	120.98855	14.5079183	83	6	2023/07/07T19:47:0 NA	38	6	
0230711	120.988551	14.507933	77	6	2023/07/07T19:47:0 NA	60	6	
0230711	120.9885616	14.5079568	69	6	2023/07/07T19:47:0 NA	64	6	
0230711	120.989657	14.50798	62	7	2023/07/07T19:47:0 NA	51	7	
0230711	120.9898068	14.5080183	45	7	2023/07/07T19:47:0 NA	51	7	
0230711	120.989883	14.5080516	35	8	2023/07/07T19:47:1 NA	57	9	
0230711	120.9894553	14.5080653	23	8	2023/07/07T19:47:1 NA	50	10	
0230711	120.9896663	14.5091233	18	9	2023/07/07T19:47:1 NA	49	13	
0230711	120.9896665	14.509155	15	10	2023/07/07T19:47:1 NA	49	13	
0230711	120.9886066	14.5091866	14	10	2023/07/07T19:47:1 NA	60	18	
0230711	120.9897216	14.5092233	10	12	2023/07/07T19:47:1 NA	92	21	
0230711	120.989874	14.5092649	8	15	2023/07/07T19:47:1 NA	92	21	
0230711	120.9897616	14.5093133	6	17	2023/07/07T19:47:1 NA	94	26	
0230711	120.9898795	14.509375	2	20	2023/07/07T19:47:1 NA	84	28	
0230711	120.9898316	14.5094449	0	22	2023/07/07T19:47:1 NA	69	30	
0230711	120.9898616	14.5095183	1	25	2023/07/07T19:47:2 NA	56	32	
0230711	120.9898933	14.5095995	0	27	2023/07/07T19:47:2 NA	53	32	
0230711	120.9898916	14.5096666	0	28	2023/07/07T19:47:2 NA	53	33	
0230711	120.9897433	14.5097433	-1	29	2023/07/07T19:47:2 NA	81	33	
0230711	120.9895993	14.5098183	-1	30	2023/07/07T19:47:2 NA	87		

FORECASTING DATASET

- **Objective:** Forecast traffic congestion and passenger demand (or flow) per trip.
- **Data Processing:** Cleaned data; aggregated congestion by minute and passenger flow by hour.
- **Model:** ARIMA with optimal parameters selected by the `auto_arima` function in Python.
- **Output:** Time series plots with confidence intervals and printed forecasted values for analysis.

WEB APPLICATION SETUP

MongoDB, Express, Next.js, Node.js

COLLATION OF EXISTING DATASET

JSON-transformed and statistically analyzed

DATA VISUALIZATION DASHBOARD

Leaflet, Chart and graph libraries

LAKBAI INSIGHTS AND POLICY RECOMMENDATIONS

OpenAI, Retrieval Augmented Generation (RAG)

LAKBAI CHATBOT FOR CUSTOM QUERIES

Related to dataset and AI-generated results

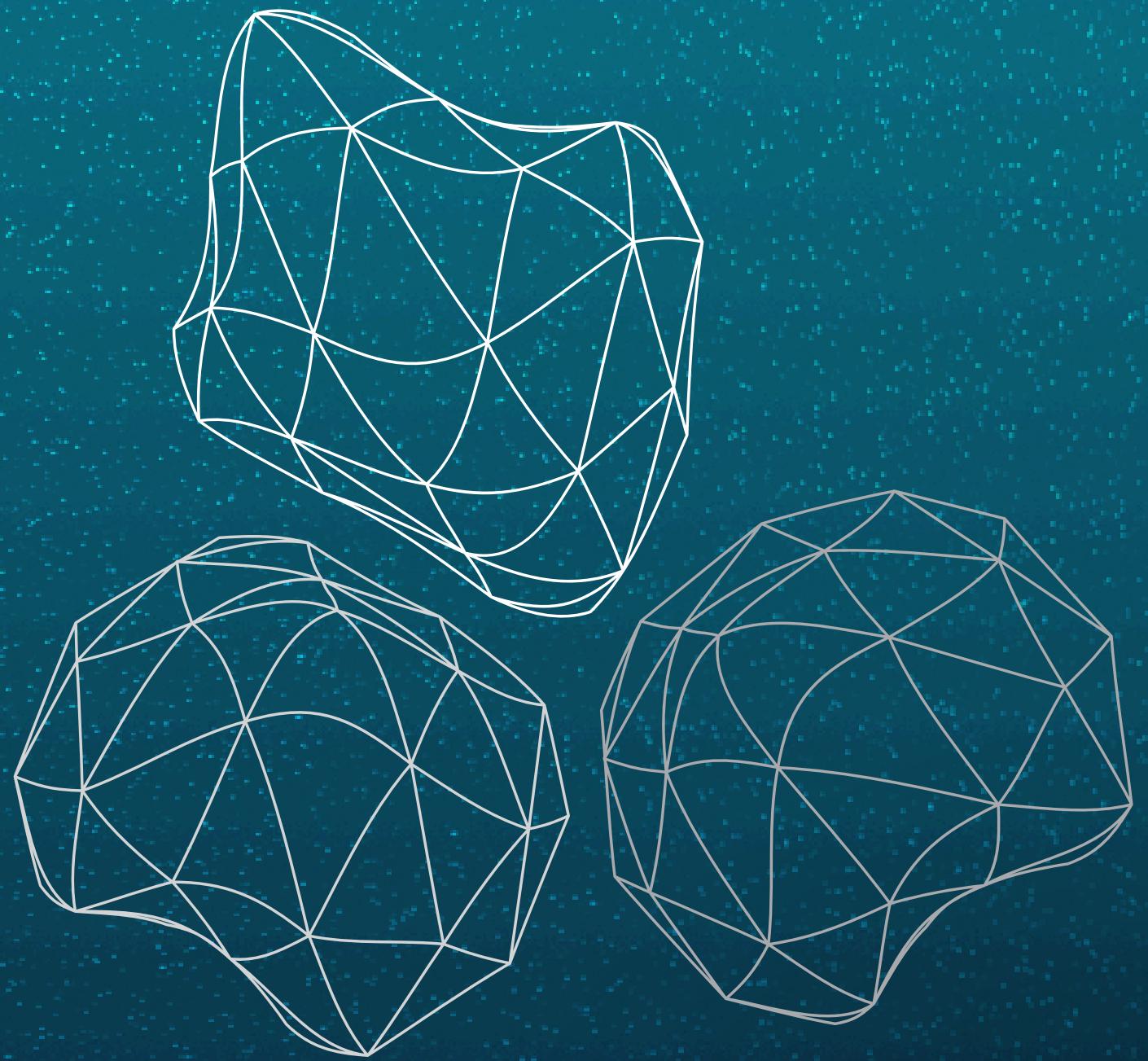
METHODOLOGY



SOLUTION OVERVIEW

LakbAI is an **AI-powered** web application to promote **sustainable urban mobility** in Metro Manila by providing **data-driven insights** for stakeholders to improve policy decisions in Philippine bus transportation.

Keywords: artificial intelligence, data-driven policy-making, Philippine bus transportation system





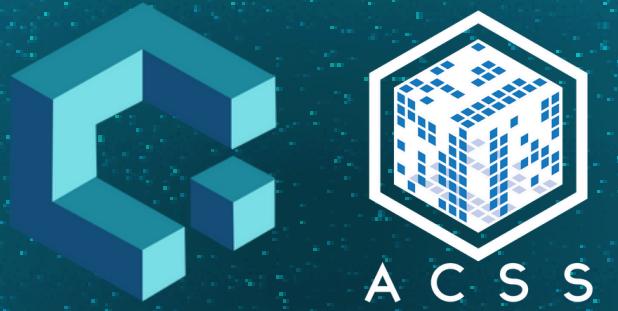
LIVE DEMONSTRATION

RESULTS & MEASURABLE IMPACT

- **Reduced Traffic Congestion:** Target 15% decrease in traffic delays on EDSA during peak hours in the first six months.
- **Improved Prediction Accuracy:** Enhanced traffic flow and demand forecasting using metrics like Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE).
- **High Usability:** Dashboard usability score target of over 68 on the System Usability Scale (SUS).
- **Increased Policy Engagement:** 50+ interactions per policymaker with the AI chatbot monthly to generate actionable insights.

NEXT STEPS & FUTURE POTENTIAL

- **Data Expansion:** Integrate additional datasets (e.g., crowd-sourced data, IoT sensors) to cover more regions and variables.
- **Enhanced AI Capabilities:** Continuously improve AI models for more precise predictions and insights.
- **Collaborations:** Partner with more government agencies and private transit operators to extend usage.
- **Scalability:** Expand to other cities and transportation types facing similar urban mobility challenges across the Philippines.
- **User Feedback and Iteration:** Regularly collect feedback to refine user experience and improve functionalities for stakeholders.



THANK
YOU

REFERENCES

SafeTravelPH. (2024, September). *SafeTravelPH Open Data Drive*.

<https://drive.google.com/drive/folders/1eqlw8pEeBJ9wc1GugvVIX7zN5-sY1gC4>

Inquirer, P. D. (2024, January 18). Manila currently holds the 'world's worst traffic in metro area' title. Asia News Network.

<https://asianews.network/manila-currently-holds-the-worlds-worst-traffic-in-metro-area-title/#:~:text=Philippine%20Daily%20Inquirer&text=MANILA%20%E2%80%93%20Admit%20it%20or%20not,30%20seconds%20per%2010%20kilometers>