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# DRONE TECHNOLOGY FOR ROAD TRAFFIC PLANNING

## Enhancing Data-Driven Road Safety Management in Zambia

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# Outline

- Background
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# Background

- Traffic management in Zambia faces persistent challenges due to rapid vehicle growth (Thomson, 1990).

- Traditional monitoring methods such as road tube counters and CCTV cameras provide point-specific data (Barmpounakis et al., 2016).

- but fail to capture spatial traffic dynamics comprehensively.

# Background

- Integrating drone technology offers a flexible, low-cost approach to capturing high-resolution aerial traffic data,

- enabling evidence-based planning and improved road safety outcomes.

# The Problem

- Current traffic planning relies on manual or fixed systems, which makes it difficult to capture real - time conditions accross rapidly changing road networks.

- while traditional mathods such as manual traffic count and fixed cameras are commonly used, they are limited in coverage, flexibility and real time responsiveness. There is limited integration of aerial, mobile data collection systems in traffic planning.

# Aim

To evaluate the feasibility and impact of integrating drone technology into urban traffic monitoring to enhance road safety and optimize traffic planning in Lusaka, Zambia.

# Study Area

- The study was conducted at the Great North Road and Makishi Road intersection in lusaka.

- Data collection was conducted during the peak period from 06:00 to 09:00 am.

***Intersection chosen for this study (QGIS) Image***

# Research Methodology

**Methodology**
**mixed methods approach**

- In-depth interviews with key road experts.
- Key road experts selected based on **purposive sample technique, *(which is a qualitative research method).***
- to assess the intersections which are very critical
- and the roads that are critical for this study.

# Research Methodology

**Qualitative Data Analysis**

**Open coding** (***expressing data and phenomena in the form of concepts***) was performed on interview transcripts in addressing the objective.

ALL Coding was done using **DESCRIPT FOR TRANSCRIPTION.**

# Research Methodology

**Quantitative**
**Data collection**

- Involved field based traffic monitoring using both conventional and Drone methods.
- The conventional method involved the use of an appollo traffic classifier to capture vehicle count,speed, and Vehicle classification.
- Drone traffic monitoring was also conducted during the same study period with the necessary **regulatory approvals.**

# Research Methodology

**Quantitative**
**Data Analysis**

- Collected data was processed using programming based analysis techniques and Centurion software.

- a Windows-based tool that manages traffic data from road tube counters.

# Results

**Themes** (interpretation of **qualitative data**, interview responses)

RDA-to **identify critical road sections** to include

- **Safety Protocols**

To ensure compliance with ZCARS part 18, the following safety measures will be observed:

-Drones will maintain a 50-meter distance from vehicles and roads.

**Consent letter was obtained from Zambia Police service.**

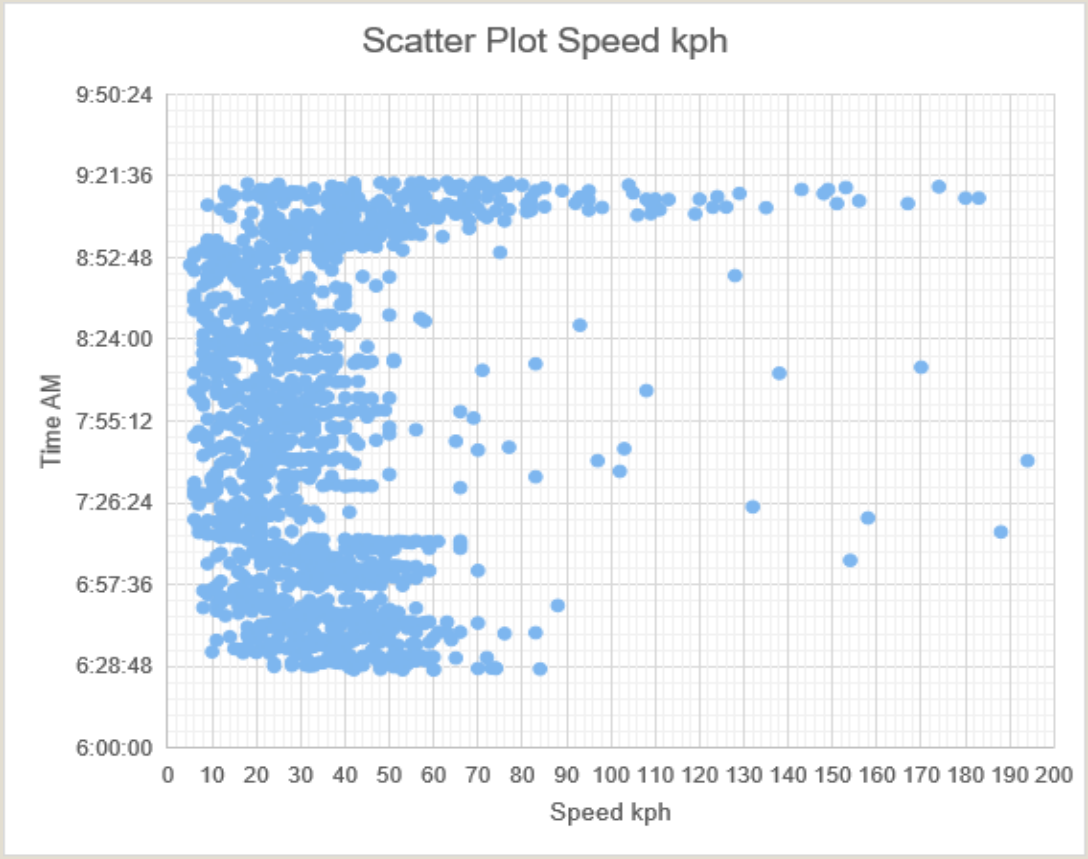
**Funding:** Ensure funds are available for equipment, licenses, and operations.

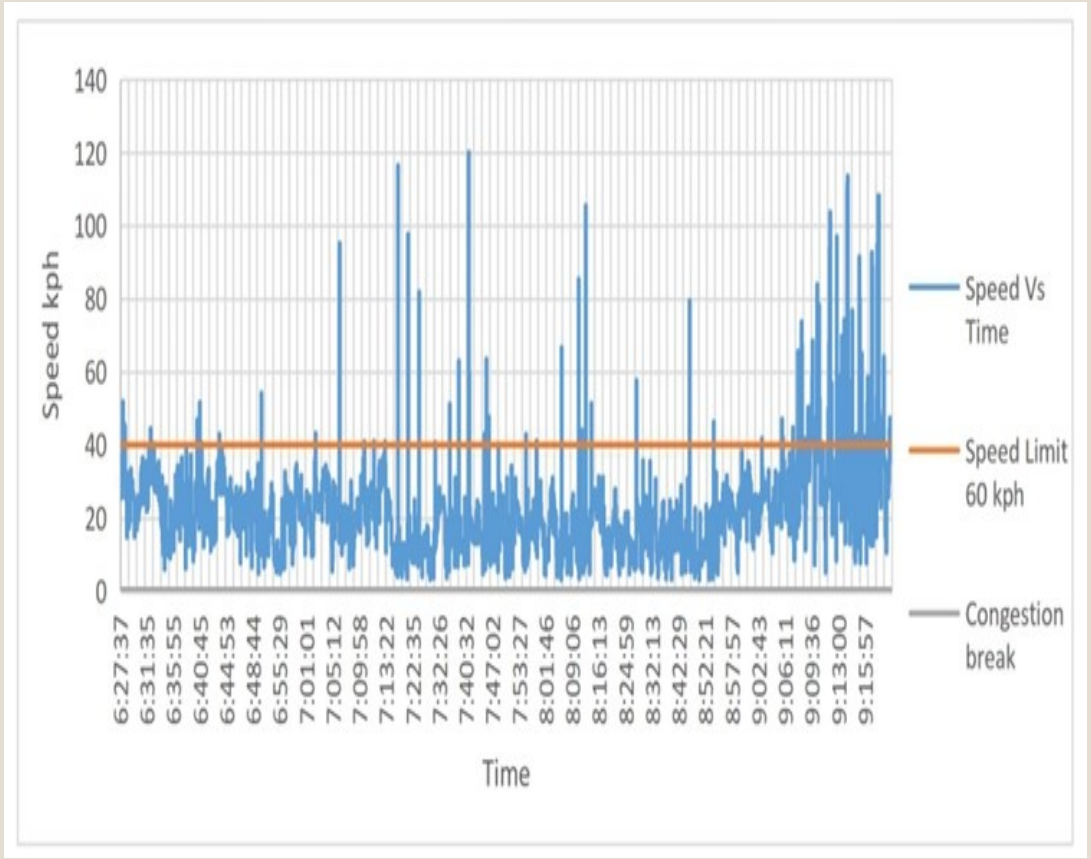
- **strategies for the application process**

Collaborating with Licensed Operators: Work with certified drone operators

# Results

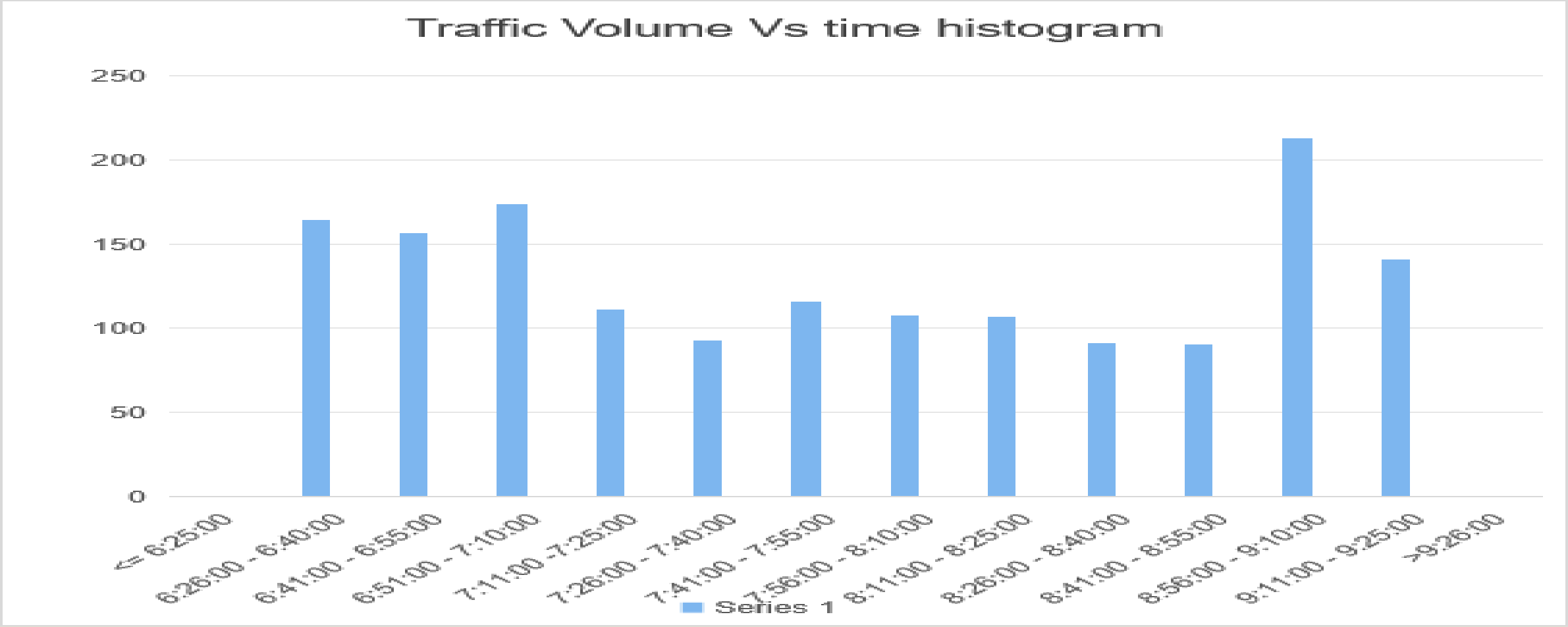
Data collected from the intersection using road tube counters, was analyzed in Excel, yielding the following results.



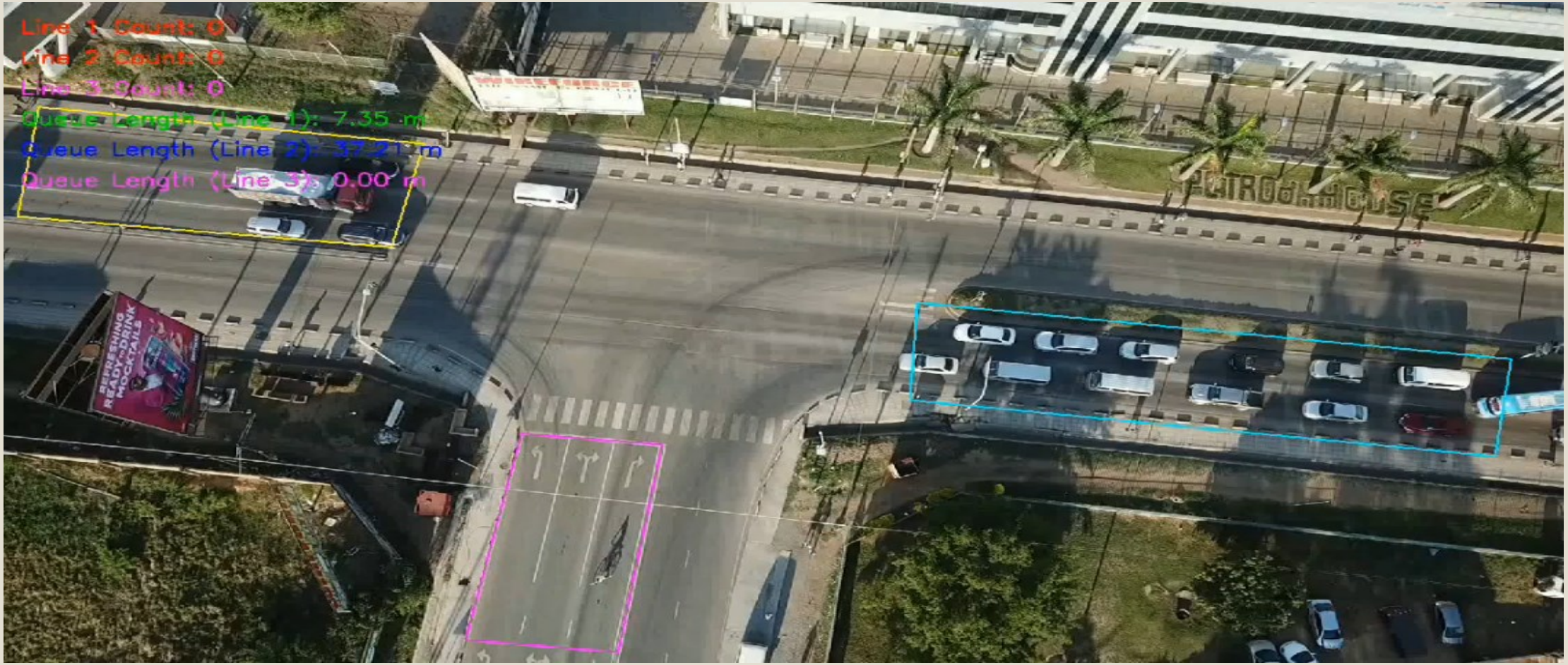
# Results

The traffic flow data reveals distinct patterns of vehicle movement throughout the morning hours, starting with zero vehicles until 6:25 AM, followed by a noticeable increase at 6:40 AM.



# Results

This short clip illustrates the traffic flow captured during the study period.



# Discussion

- The study's findings highlight the role of technology and innovation in advancing transport planning, with a focus on the use of automated traffic counters and drone technology.

- Automated traffic counters provided foundational data on vehicle speeds, counts, and flow patterns, while drone technology offered a unique aerial perspective, allowing for real-time analysis of queue lengths, traffic density, and vehicle headway.

- Together, these tools provided a comprehensive view of traffic behavior, with drones filling crucial data gaps that automated counters alone could not capture.

# CONCLUSION

- In conclusion, the integration of drone technology for real-time traffic monitoring fills critical gaps in traditional traffic counters, offering a comprehensive approach that supports more efficient and safer road traffic planning.

- This study highlights the importance of adopting technology, such as drones, to address the evolving needs in traffic monitoring, thereby contributing to optimized urban mobility and enhanced roadway safety.

**Thank You**
**Questions?????**

# Thank you.

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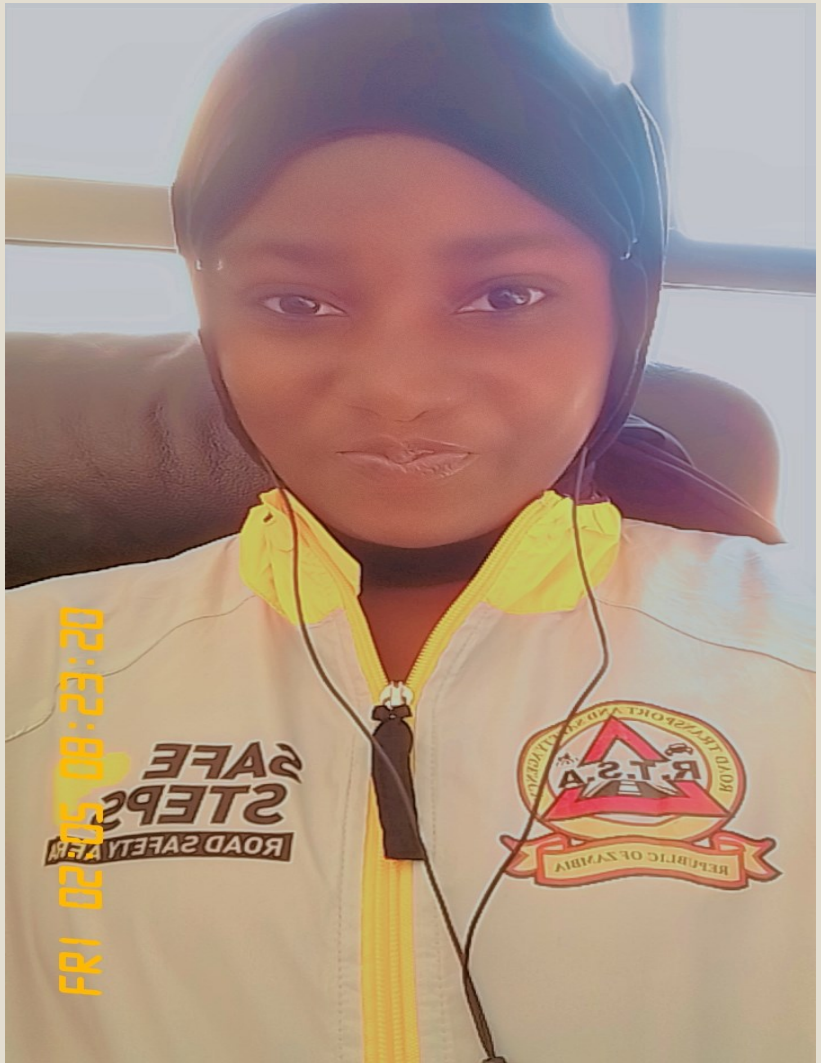


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