VAAHAN SAARTHI

Potholes Detected. Journey Perfected.

TEAM ID : T-075

THEME : OPEN INNOVATION

TEAM NAME : TURINATORS

TEAM LEAD – GURNEET SINGH

MEMBERS – GEETANSH GAUTAM, ARSHPREET SINGH, MANPREET SINGH

DAV INSTITUTE OF ENGINEERING & TECHNOLOGY, JALANDHAR (DAVIET)

PROBLEM STATEMENT

India faces a severe challenge due to pothole-ridden roads. According to reports, over 11,000 road accident deaths are linked to potholes. Despite technological advances in automobiles, there is no standard built-in solution in vehicles to detect and alert drivers about potholes.

Our project addresses this issue by leveraging Computer Vision (YOLO-based object detection) to automatically detect and mark potholes from real-time road footage. The system not only identifies potholes but also makes driving suggestions such as slowing down or steering assistance. Looking ahead, this solution can be integrated with ADAS (Advanced Driver Assistance Systems) in vehicles to give drivers a proactive advantage, especially in India where road infrastructure challenges are significant. This approach enables safer driving, accident prevention, and proactive road maintenance

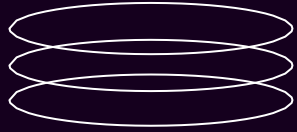# DRAWBACKS OF EXISTING SYSTEM

01

INEFFICIENT IN-CAR ADVANCED DRIVER-ASSISTANCE SYSTEMS (ADAS)

02

ATHER COMPANY'S INEFFICIENT SYSTEM

03
GOVERNMENT COMPLAINT PORTALS AND APPS

OUR SOLUTION : YOUR DIGITAL SARTHI

Capture	Capture : Takes a live video feed and breaks it into frames.
Detect	Detect: Model will analyse each frame in real time to find precise position of patholes.
Mark	Mark: Draws a digital polygon around each detected pothole directly on the live video display.
Alert	Alert : Issues an on- screen message to alter the speed

TECH STACK

Model Architecture:
Ultralytics YOLOv8: STATE-OF-ART OBJECT DETECTION MODEL

Core Libraries:
OpenCV (cv2) : processing frames and drawing the final detection polygons.
NumPy: efficient data manipulation and array processing.

Kaggle Notebooks: The entire model was trained and fine-tuned in a Kaggle environment, leveraging its powerful free GPU resources.

Dataset:
Our model's high accuracy comes from a specialized **Kaggle dataset** containing over **11,000 images** of real-world Indian road potholes.

Backend API
Flask: We built a lightweight, high-speed API server using Flask, a Python framework. This backend handles processing requests from the frontend and delivering the model's output.

Frontend (Web Application)
React with Vite: responsive web application built using modern frontend
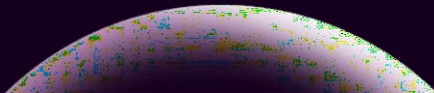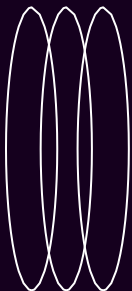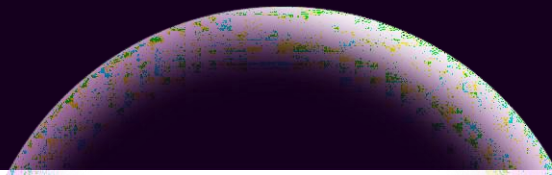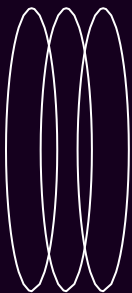
IMPLEMENTATION

Achieved an Accuracy of 84%

Unique Growth Vectors

OEM Dashboard Integration: License our system to car makers like Tata Motors and Mahindra to be a built-in "Pothole Alert" feature, reducing their warranty claims.

Proactive Suspension Control: Partner with luxury brands so a car's adaptive suspension can use our data to automatically adjust and brace for impact before hitting a pothole.
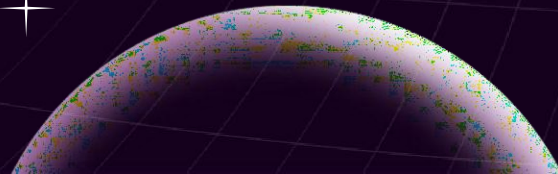
CONCLUSION

Our implementation of **YOLOv8** successfully provides accurate, real-time pothole detection, validating it as the perfect core for our project.

YOLOv8 delivers the essential combination of high-speed processing for on-device performance and the accuracy needed to be a reliable, life-saving tool.

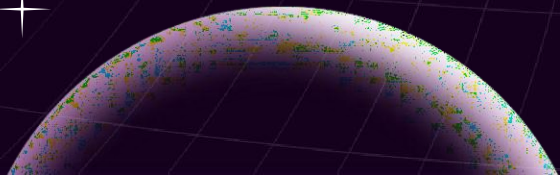# FUTURE SCOPE

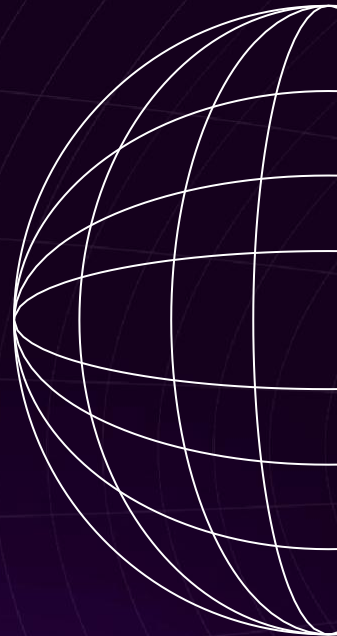**Automated, City-Scale Road Scanning**

Our system replaces the slow, manual process of citizens reporting potholes with a fully automated one. We transform every user's vehicle into a **mobile road scanner**.

Multi-modal fusion

Combine RGB with **depth (stereo, LiDAR, RGB-D)** or **IMU/GPS** data to get **true pothole depth and volume**,

Cloud dashboard

Build a **central pothole monitoring dashboard** for municipal authorities, showing live pothole maps and severity levels.

THANK YOU