# Project Name

Avyra: Pothole-Filling Robot

# Tag Line

See the Crack. Fill the Gap.

# Team

Team RoadSavior

# Name of Team Member and Roles

-Shem Koech – Mechanical Design

- Elisha Jilo – Electricakl System Developer

- Disckson Mbogo – SoftwareDeveloper

# Reason for Allocating the Roles

Roles assigned based on core competencies in robotics, mechanical design, and control logic to maximize productivity and avoid role overlap.

# Technologies

- Languages: Python, C++

- Libraries: OpenCV, NumPy, TensorFlow Lite

- Hardware: Raspberry Pi, Camera Module, Arduino Mega, Linear Actuators, Filler Hopper, Mobile Chassis

- Platform: ROS Noetic, Ubuntu 22.04

- Tools: SolidWorks, GitHub, PyCharm, Gazebo

- Resources: Research papers on road maintenance, SDG 9 documentation

# Challenge

Manual pothole detection and filling is slow, unsafe, and inefficient. Avyra automates this by detecting potholes via computer vision and filling them autonomously.

Limitations: Not designed for deep structural damage or highway-scale repairs.

Users: Urban road maintenance teams, smart city projects, municipal bodies.

Locale: Initially designed for urban Kenya, expandable globally.

# Risk

Technical:

- Incorrect detection – Mitigated by bounding box validation and machine learning thresholds.

- Mechanical overfill or underfill – Managed via calibration and real-time feedback from actuators.

Non-Technical:

- Road interference by sapiens or vehicles – Mitigated via obstacle detection and rerouting.

- Risk of vandalism – Minimized with GPS tracking and remote alerts.

# Infrastructure

- Git Strategy: GitFlow with protected `main`, issue-based branches.

- Deployment: Raspberry Pi local execution; OTA updates via SSH in later stages.

- Testing: CV model simulation, mechanical fill trials, on-road field tests with varied pothole dimensions.

# Existing Solutions

- Python Patcher: Trailer-based semi-autonomous filler—lacks full automation.

- RoadBotics: Vision-only detection without physical repair.

Avyra uniquely combines real-time detection and physical repair—compact, mobile, and intelligent.