AMAL JYOTHI COLLEGE OF ENGINEERING, KANJIRAPPALLY

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**FINAL PROJECT**

**REAL-TIME POTHOLE DETECTION, MAPPING AND OPTIMAL ROUTING SYSTEM**

Guide : Prof. Mekha Jose

Abhishek R. Paleri

Ali Jasim

Athul Mohan

Avin Joshy

**Abstract**

Potholes on road surfaces are a persistent issue that poses significant risks to drivers, often leading to vehicle damage and accidents. To mitigate these dangers, our project presents an innovative real-time pothole detection and mapping system that utilizes advanced computer vision and deep learning techniques, specifically leveraging the YOLO (You Only Look Once) object detection algorithm. The primary objective of this system is to detect potholes as vehicles travel on the road, providing real-time alerts and facilitating safer driving conditions.

The YOLO algorithm, known for its speed and accuracy, processes video footage of the road surface, identifying potholes and estimating their distance from the vehicle in real time. This rapid detection capability is crucial for preventing accidents by allowing drivers to take immediate corrective action. In addition to real-time detection, our system incorporates mapping and optimal routing functionalities, which play a vital role in enhancing overall road safety.

The mapping component of the system generates a dynamic map of detected potholes, which is continuously updated as new data is collected. This map not only provides a visual representation of road conditions but also feeds into the optimal routing module. The routing system utilizes this real-time data to suggest safer and more efficient routes for drivers, helping them avoid roads with high concentrations of potholes. This dual approach—combining detection with mapping and routing ensures that drivers are well-informed about road hazards and can make informed decisions to avoid potential dangers.

Our system is designed to be highly adaptable, capable of integration into various vehicle platforms. The focus on real-time performance ensures that the system remains responsive and effective even in dynamic driving environments. While the current implementation is optimized for immediate deployment, future enhancements will aim to improve detection accuracy under varying lighting and environmental conditions, further refining the system's reliability and effectiveness.

In summary, this project represents a significant advancement in road safety technology, offering a comprehensive solution to the problem of pothole detection and avoidance. By integrating real-time detection, mapping, and optimal routing, our system not only helps prevent accidents but also contributes to smoother, more efficient driving experiences.