



MANAGING VEHICLE NAVIGATION VIA MACHINE LEARNING AND VEHICLE-TO-VEHICLE (V2V) COMMUNICATION

IITM Technology Available for Licensing

Problem Statement

- ❖ The **invention** falls within the domain of intelligent transportation systems and **connected autonomous vehicles**, with a particular emphasis on **driver assistance in connected vehicle ecosystems**.
- ❖ In **Conventional ADAS**, the integration of these technologies, coupled with complex proprietary hardware and highly specialized processing units, further **escalates manufacturing expenses**.
- ❖ Traditional systems may **struggle with the nuanced interpretation of diverse traffic conditions**, such as highly congested urban settings with unpredictable pedestrian movements, or rapidly changing highway conditions.
- ❖ Therefore, **there is a need for a system** capable of **automatically identifying, processing, and disseminating** a comprehensive array of real-time roadway, traffic, and control conditions, thereby **enhancing vehicle safety**.

Intellectual Property

- IITM IDF Ref **3416**
- IN **202541075861** Patent Application

TRL (Technology Readiness Level)

TRL 6 – Technology demonstrated in relevant environment

Technology Category/ Market

Category – Automobile & Transportation Industry :

Transportation; System for Transportation Agencies

Applications :

The invention has strong commercialization potential in the domains of connected vehicles, smart mobility, and advanced driver assistance systems (ADAS)

Market :

The global Advanced Driver Assistance System market size was estimated at USD 34.65 billion in 2024 and is anticipated to reach USD 66.56 billion by 2030, growing at a CAGR of 12.2%.

Research Lab

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(a)

Figure: (a) Shows the instrumented vehicle.



Traffic Signal Detection



Traffic Sign Detection



Lane Marking Detection

(b)

Figure: (b) Shows the Visual data of Traffic Signal Detection, Traffic Sign Detection, and Lane marking Detection - Control Conditions.

CONTACT US

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(c)

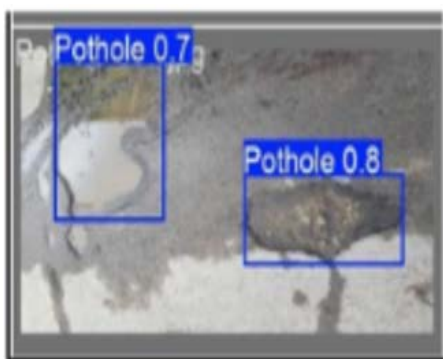


Figure: (c) shows the Visual data of Pothole and Speed bump Detection - Roadway Conditions.

Technology



The method involves acquiring real-time visual data of the external environment from a monocular camera.



A Machine Learning Model Ensemble (MLME) processes this data to generate distinct environmental outputs: identifying roadway elements, determining control conditions, and estimating traffic conditions.



The three outputs generated from the MLME processes are then integrated into a comprehensive unified output.



The unified output is indicative of the external environment and is provided to the vehicle's navigation dashboard for real-time driver assistance and broadcast to other externally connected vehicles via the V2V communication network.



Unified outputs from externally connected vehicles are received via the V2V network and subsequently provided to the vehicle's navigation dashboard.

Key Features / Value Proposition

- Designed specifically for complex traffic environments like the one in India, the system not only alerts the host driver but also transmits processed insights to nearby connected vehicles.
- The techniques improve both the efficiency and accuracy of environmental understanding in vehicular operations.
- Enhances overall road safety, all while benefiting from the practical advantages of a cost-effective monocular camera for easier implementation and maintenance.
- Allows continuous and effective utilization of real-time visual data, addressing the shortcomings of conventional systems that may underutilize or discard valuable current environmental information.
- Addresses the technical limitations of conventional driving assistance systems, which are often expensive due to their reliance on multiple, high-cost sensor modalities and complex processing architectures.



(d)

Figure: (d) Shows the Visual data of Vehicle Density Estimation – Traffic Conditions.

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