IIT MADRAS
Indian Institute of Technology Madras

Technology Transfer Office
TTO – IPM Cell

Industrial Consultancy & Sponsored Research (IC&SR)

ROBUST AND UNIVERSAL VEHICLE CLASSIFICATION SYSTEM WITH INDUCTIVE LOOPS

IITM Technology Available for Licensing

Problem Statement

- Manual toll collection has **limitations such as human error, missed record of vehicle details, slow process, customer irritations, misbehaviour by the driver or the toll attendant, theft, other disturbances**
- **Tag based system on the other hand needs participation and associated issues**
- These can be resolved with a toll system that can **accurately classify the vehicles with an automated system that does not need participation by keeping a tag in the vehicle**

Technology Category/ Market

Category –Automotive
Applications – Transport systems, Automation, Automobiles
Industry –Automotive/ Transportation Systems
Market -The global intelligent transportation system market is projected to grow from $22.91 billion in 2021 to $42.80 billion in 2028, at a CAGR of 9.34%

Key Features / Value Proposition

Technical Perspective

- A robust mechanism in classifying vehicles under heterogeneous traffic conditions, which the regular loop designs and algorithmic methods cannot classify
- Signal De-noising using DWT (Discrete Wavelet Transform) technique helps to remove noise from the collected signal data
- Vehicle Classification using SVM (Support Vector Machine) classifier that classifies vehicles based on the extracted features.

User Perspective

- Enhanced, efficient and improved inductive loop for vehicle classification
- Accurate in obtaining the vehicle signatures from the de-noised data

Technology

A method and system for robust classification of vehicles under heterogeneous traffic condition, comprises of:

- **Hardware-executable components for execution**
- **Inductive classification loop sensors**
- **A smart inductive loop**
- **Graphical User Interface**
- **Microprocessor**
- **Display Module**

- Smart inductive loop is positioned between the classification loop array and the payment summit, it employs **time series techniques and machine learning algorithms to process the collected data**

Fig. 1 Automated real-time GUI for toll plaza applications

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Images

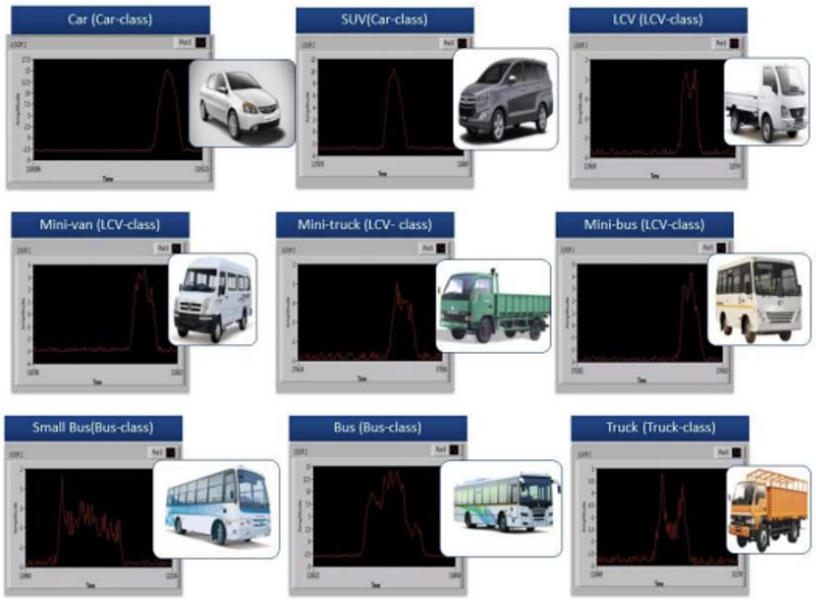

Fig 2 illustrates the heterogeneity in the traffic conditions and the variations in the signatures generated by different vehicle types

- The inductive classification system is designed to **classify heterogeneous traffic flow**, with one loop per lane of a modified shape with inner and outer loops having specific dimensions.
- The said microprocessor **enables signal de-noising using DWT technique**; signal segmentation with moving standard deviation technique; feature extraction with DWT and **vehicle classification using SVM classifier**
- Display Module displays information related to accounts associated with the operation and classification of vehicles

Intellectual Property

- **IITM IDF Ref. 1802**
- **IN201941013771**

Research Lab

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TRL (Technology Readiness Level)

TRL- 5,Technology validated in relevant environment

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