

**A NOVEL EXPRESSWAY TICKETING SYSTEM FOR SRI LANKA USING  
ARTIFICIAL INTELLIGENCE**

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All E-Grade expressways (commonly called highways) in Sri Lanka are levying a user charge depending on the type of vehicle and currently the fee-levying operation is totally manually handled. When a vehicle enters an expressway, an electronic ticket is issued at the entrance interchange mentioning the type of vehicle and the name of the interchange entered. When the vehicle reaches the exit point, the ticket received at the point of entry is handed over to the exit toll gate and the user charge based on the vehicle type is informed. The user has to make the payment only in cash to the toll gate and a receipt is issued for the payment. After finishing the payment, the barrier gate is opened and the vehicle can pass through the lane. The current system of operation has led to wastages of time both at the entry and exit points of the expressways. The intent of this research is to propose an automated expressway fee-levy system using Computer Vision and Artificial Intelligence concepts. According to the proposed fee-levy system, the vehicle registration number is detected and recognized using a digital camera and Automatic License Plate Recognition (ALPR) software at the entrance, and the date, time and point of entry are saved securely in a database. The payment can be made using a credit/debit card and mobile cash while in transit. At the exit point, the registration number of the vehicle is again recognized and the relevant entry details are traced. Exit toll gate barriers open automatically for those vehicles that made the relevant payments while in transit. This mode of operation will reduce waiting time at the entry and exit points particularly during weekends, long holidays and festive seasons. For other non-regular vehicles, once the user fee is paid at the exit, the toll gate barriers open automatically. The system was implemented using MATLAB, OpenCV library and NewSQL. Experimental results have shown that the system is capable of recognizing vehicle registration number plates, in all standard formats provided by Department of Motor Traffic Sri Lanka, even in noisy images. The system works satisfactorily even under wide variations of illumination in real-time situations.

**Keywords:** Automated expressway ticketing system, Artificial Intelligence, Automatic license plate recognition, Computer Vision