

Poster presentation: 105

Image-based user fee charging system for expressway in Sri Lanka

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Road network development plays a vital role in national development of a county. Even though there is a broad road network in Sri Lanka, most of them were built about 50 years ago and they are not having the ability to cope with the increasing traffic volumes. Therefore, recently Sri Lanka Road Development Authority has proposed expressway system (Commonly called as highway) to amend the road network to meet the growing transport requirements of the country. All E-Grade highways in Sri Lanka are proceeded of paying user charges. But currently the process of charging user fee is handled in a manual way completely. When a vehicle enters the highway, an electronic ticket will be issued at the toll gate of the interchange which mentions the type of the vehicle and the name of the interchange entered. You have to handover the ticket received at the entering toll gate, when you are entering to the exit toll gate, and you will be informed the traveling charge based on the vehicle type. A receipt will be issued after the payment of travelling charge. Payments can be made only through cash. After finishing the payment, the toll gate barrier will be opened and can pass through the lane. Current charging system has led to the wastage of time, the delay on expressway and increase in labor cost. Motivated by this manual system, this research is proposed an automated user fee charge system using image processing concepts and distributed database management. In this system, at the entrance point, number plate of the vehicle is captured by the surveillance camera in highway which is used to mention the starting point of the journey to the database. Moreover, the driver and the front passenger are checked to use safety belts before enter the highway. At the exit point, number plate of the vehicle is again captured. Finally, vehicle number is used to get the type of the vehicle from the database and the charge for using the highway is calculated accordingly based on the entrance and exit points mentioned on the database. Seat belt detection of both driver and the front passenger was done by extending H. Guo *et al.*'s image-based seat belt detection study. Number plate recognition was done by applying color-based approach. A distributed database was created by interconnecting databases at each interchange in the highway. This system was implemented using C++, open computer vision library and New SQL database. The proposed system was evaluated using 100 real-time images. Accuracies of 86% and 95% were obtained for correct identification of seat belts of both driver and front passenger and number plate detection, respectively. Thus, the proposed system has a higher accuracy for the real time situation.

Keywords: Automated travelling charge system, distributed database, number plate recognition, seat belt detection