Abstract

This thesis deals with the study and analysis of various physical sensors and video image processing methods and design of a novel class of vehicle detection, vehicle classification, vehicle occlusion detection, traffic control, traffic simulation and traffic prediction techniques for traffic density estimation. Continuous growth of population all over the world creates a great challenge to the transport management systems. The conventional methods are no longer effective enough for solving complex and challenging transportation management problems. More economical, more efficient and thus more intelligent methods have to be developed to deal with these challenging problems. Very often complex transportation systems require integration of different methods from different branches of science. There is not a unique methodology to be applied in all cases, due to different road characteristics, different traffic flow patterns, different surveillance equipments, budget and information limitations, etc. Knowledge from different research areas is needed for developing these systems. The key factor is to obtain the maximum accuracy from the available data.

This thesis aimed at understanding the traffic issues and recommending improvements to facilitate smoother traffic flows for Indian roads. This thesis discussed about various sensors and video image processing methods/techniques used for traffic density estimation with its strengths, weaknesses and challenges in implementation for Indian traffic conditions. This thesis also proposed an efficient and robust algorithm for Indian traffic density estimation with real time experimental results.