# MICRO SIMULATION OF CITY TRAFFIC FLOWS IN SUPPORT OF PREDICTIVE OPERATIONAL CONTROL

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Abstract

During the last two decades significant research effort has been invested into development of various computer assisted traffic control schemes. The evolution of these control schemes reflected the changes in optimisation criteria that evolved gradually in line with the accumulated operational experience. Early traffic control systems essentially performed static optimisation of the maximum bandwidth of the 'green waves' on specific routes in the city. This worked well on lightly or moderately loaded signalised arterials with few vehicles turning in from side roads. However, the optimisation of a more complex city traffic required taking into account other performance indices such as the length of queues on traffic lights or the number of vehicle stops during a journey. More recent control systems use the on-line traffic flow data to modify the split/cycle/offset timing of the road junction lights in response to random fluctuations of traffic intensities. The projected developments of the traffic management systems of the 90's incorporate the inclusion of priority levels for various groups of users, road pricing, in-car route guidance systems, etc.

As the control strategies grow in complexity, requiring expensive real time measurements to maximise the road capacity, there is a need for the assessment of their effectiveness. While the test scenarios for the field trials of the early control systems, which were concerned with the averaged levels of performance, were relatively easy to design, the evaluation of the new control schemes is a much more demanding task since it requires extensive probabilistic studies that relate the controls and the random fluctuations of traffic flow.

This paper describes a new efficient microscopic traffic simulator that is an essential component part of a predictive decision support system for operational control of a city traffic that is being developed at The Nottingham Trent University. The simulator reconciles a particle-oriented model with the macroscopic character of measurement information provided by the installed telemetry system. On the microscopic level, the simulator evaluates for each vehicle the dynamically changing micro-environments which determine the feasibility of the intended movements of a given vehicle. At the same time, the turning movements at the road junctions are modelled macroscopically, through the probability density functions that can be related to the traffic flow measurements. The paper demonstrates how the combination of these two complementary features of the simulator affords accurate predictions of traffic flows through the adaptation of its parameters.

The results reported in the paper relate to the Leicester city road network and the collaboration of the Area Traffic Control section of the Leicestershite County Council in providing traffic flow data is gratefuly acknowledged.