Thesis Title	**Traffic Flow Management System based on Ad-hoc Wireless Sensor Networks**
Research Field	
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Abstract

This thesis is dedicated to the application of wireless ad-hoc sensor networks in the area of vehicular transportation.Wireless sensor networks offer a very attractive characteristics for traffic management on free-ways and at intersections in terms of cost, ease of deployment and maintenance, and enhanced measurement capabilities. In the first part of the thesis, a simple and economic wireless sensor network architecture composed of only a single sensor node per lane, is proposed as a replacement to induction loops to be used as intelligent transportation systems. The results of the SUMO and OMNeT++ simulators, show that the proposed work enhances the vehicular delay as compared with fixed-time signals, which produces significant change by a factor of almost 40%. In the second part, a wireless ad-hoc sensor network architecture extended from the previous work that does not depend on a centralized unit, is proposed by placing different sensors across main and minor streets. The effectiveness of this work is evaluated against the traditional fixed-time model. Simulation results show this architecture also achieves reduction in vehicular delay, with conditions, on the city been projected. Traffic signal failure is also taken into consideration, and a healing algorithm is proposed to remedy the fault. Finally, a Web-based monitoring interface is created in order to make vehicular surveillance clear, knowing where traffic load is located and to determine if whether to particularly trace a vehicular route or to choose another.

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